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COLLECTIVE MONOGRAPH

RESILIENCE APPROACHES AND MECHANISMS FOR SUSTAINABLE PERSPECTIVES

Plovdiv, 2026

Academy of National and Information Security

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COLLECTIVE MONOGRAPH:
resilience approaches and mechanisms for sustainable perspectives

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COLLECTIVE MONOGRAPH: resilience approaches and mechanisms for sustainable perspectives

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COLLECTIVE MONOGRAPH: resilience approaches and mechanisms for sustainable perspectives

This monograph represents the result of a complex scientific approach, aimed at understanding and deepening the concept of resilience in the context of sustainable economic development. The work integrates contributions from various fields: economics, management, marketing, public policy and environmental sciences, reflecting the interdisciplinary nature of resilience.

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Preface

In recent decades, the global economy has been marked by profound transformations generated by globalization, digitalization, climate change and the intensification of economic interdependencies. These processes have amplified the level of uncertainty and highlighted the structural vulnerabilities of economies, especially emerging ones. In this context, the concept of economic resilience has acquired increased relevance, being perceived not only as a capacity to react to shocks, but as an essential attribute of sustainable development. The reorientation of economic paradigms from quantitative growth towards adaptability, stability and sustainability reflects the need for integrated approaches, capable of responding to the complexity of the contemporary environment.

The Republic of Moldova and Romania are part of this global dynamic, facing multiple structural, institutional and socio-economic challenges, such as macroeconomic volatility, dependence on external factors, labor migration and pressures on natural resources. At the same time, technological progress imposes high standards of competitiveness, sustainability and economic convergence, which requires the strengthening of resilience mechanisms at a systemic level. Thus, the analysis of economic resilience in the context of sustainable development becomes a necessary scientific approach for understanding the capacity of the national economy to cope with shocks and to capitalize on development opportunities.

This monograph, the result of studies carried out by an international and interdisciplinary team, aims to provide an interdisciplinary approach to resilience, analyzing the interdependencies between different components of the economic and social system. The paper starts from the premise that resilience cannot be analyzed in isolation, but must be integrated into a broader conceptual framework, which includes economic sustainability, social equity and environmental protection. In this sense, the research aims to highlight how resilience manifests itself and is consolidated at the level of the financial sector, the business environment, the labor market, regional competitiveness, marketing strategies, leadership and

natural capital.

From a methodological point of view, the paper combines theoretical analysis of the concepts of resilience and sustainable development with empirical approaches based on statistical data, case studies and analytical models. Economic and organizational performance assessment tools are used, as well as composite indices that allow the quantification of resilience at different levels. This mixed approach facilitates both the conceptual substantiation of the topic and the identification of relevant application directions for public policies and organizational strategies.

The structure of the paper reflects the multidimensional nature of resilience. The analysis begins with an assessment of the role of the financial sector in supporting economic stability and continues with an examination of the capacity of the business environment to adapt to systemic pressures. Subsequently, issues related to the integration of young people into the labor market and the competitiveness of enterprises are addressed, highlighting existing imbalances and opportunities. The strategic dimension is completed by analyzing sustainable marketing and the role of leadership in facilitating transitions to sustainable development models. Finally, the paper extends the perspective on resilience to natural capital, highlighting the role of soil in ensuring food security and ecological balance.

In the context of the accelerated economic, social and technological transformations that characterize the contemporary global economy, the concept of resilience has become a fundamental benchmark in the analysis of sustainable development. Modern economies are no longer evaluated exclusively in terms of growth performance, but rather by their capacity to cope with shocks, to adapt to structural changes and to evolve in a balanced and sustainable way.

Through this integrated approach, the monograph aims to contribute to the development of the theoretical and applied framework of economic resilience, offering a coherent perspective on the mechanisms through which economic systems can become more adaptive, more robust and more sustainable. The research results can constitute a useful support for the academic environment, for decision-makers and for practitioners interested in developing strategies aimed

at strengthening resilience and promoting sustainable development in economies with similar characteristics.

Chapter 1
The Resilience of the Financial Sector in Strengthening Economic Resilience: The Case of the Republic of Moldova

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This study is carried out within the Subprogram 030101 "Strengthening the resilience, competitiveness and sustainability of the economy of the Republic of Moldova in the context of the European Union accession process", institutional funding.

Abstract. *In the context of increasing global uncertainties, strengthening economic resilience is becoming a strategic priority for emerging economies, including the Republic of Moldova. This paper analyzes the impact of the quality of the financial sector on the economy's ability to withstand and adapt to external and internal shocks. Based on a theoretical and empirical approach, the interactions between financial stability, access to credit and insurance, the efficiency of financial intermediation and the level of capitalization of banking institutions are examined, in correlation with economic resilience indicators. The results obtained reveal that a well-regulated, stable and accessible financial sector contributes significantly to reducing economic vulnerabilities and*

accelerating post-crisis recovery. The purpose of the research is to analyze the evolution of the financial sector in the Republic of Moldova, with a focus on the banking and insurance sectors, over the last two and a half decades, in order to assess its degree of structural, institutional and operational resilience. This analysis aims to formulate strategic directions aimed at increasing the financial system's capacity to withstand future shocks and support sustainable economic development.
The paper was developed within the framework of Subprogram 030101 "Strengthening the resilience, competitiveness and sustainability of the economy of the Republic of Moldova in the context of the European Union accession process", institutional funding.
Keywords: *resilience indicators, banking sector, insurance sector, crises, sustainability, GDP.*

Introduction

Economic resilience is determined by a variety of factors, the effects of which have become increasingly evident in the context of major global events, such as the 2008 financial crisis, increased global economic uncertainty, climate change, the COVID-19 pandemic and the economic complications of the military conflict that broke out in 2022. These events have generated a heightened interest in the specialized literature for studying economic resilience, in close connection with the goals of sustainable development. According to existing research, the economic resilience of a state or a region is influenced by a set of essential factors, which deserve to be analyzed in an integrated and contextualized manner.

The concept of resilience is a dynamic and complex one, with multiple valences and extensive applicability in economics, ecology, sociology and other fields. It reflects both the solidity of the system in maintaining essential functions under crisis conditions, as well as the flexibility necessary to adapt structures and processes to changes. In the case of systems that present vulnerabilities and are exposed to risks, resilience becomes a measure of the ability to continue functioning and to transform constructively to cope with future[1]

[1] https://ier.gov.ro/wp-content/uploads/2022/03/SPOS-2021.-Studiul-2.-Rezilienta-strategica-a-Uniunii-Europene_final_site.pdf

uncertainties.

The specialized literature offers a variety of definitions and approaches regarding the concept of resilience, highlighting multiple dimensions, characteristics and defining principles. Essentially, resilience is perceived as the opposite of fragility and expresses the level of robustness that a system should achieve in the context of exposure to risks. Thus, in situations marked by instability or vulnerability, the development of resilience acquires strategic importance, being considered an essential condition for the survival and adaptation of the system.

The scientific concept of resilience, in its modern sense, was first introduced by C.S. Holling, a theoretical ecologist, who defined resilience as the capacity of a system to maintain its functioning despite external disturbances. According to him, "resilience determines the persistence of relationships in a system and represents a measure of the system's capacity to absorb changes in state variables, processes and parameters, while maintaining its basic structure and functions" [Holling, 1973].

A widely accepted definition of resilience is formulated by Andrew Mitchell in his work "Risk and Resilience: From Good Idea to Good Practice" (2013), published under the auspices of the Organization for Economic Co-operation and Development (OECD). According to this approach, resilience is defined as "the capacity of households, communities and states – the constituent levels of society – to absorb shocks, to recover from them and, at the same time, to adapt and positively transform structures and livelihoods in the face of long-term stress, change and uncertainty."

In this context, the notion of "shock" is understood as the concrete manifestation of a risk, that is, the moment when a potential threat materializes. Thus, if risk designates the probability of a negative event occurring and its consequences, the shock reflects the actual impact of this event on the system.

There is a complementary relationship between resilience and risk management, since resilience defines how to respond to risks, while risk management defines what actions to take. *Resilience is a continuous and iterative process, the purpose of which is to protect a*

given system and to enable it to address the changes that occur. To do this, resilience involves, firstly, combining the system's existing characteristics (existing programming) with various risk management approaches and, secondly, harnessing a set of resilience-building capabilities (adaptation, absorption, transformation). Therefore, resilience adds another stage in the decision-making process regarding how to address risk, which better takes into account the changes and uncertainty with which it manifests itself. Furthermore, resilience, in A. Mitchell's view, can modify or change the basic structure and functioning of a system. If risk management offers a range of options to deal with both rare events with major impact (such as disasters) and frequent ones with low impact, as well as existing vulnerabilities, resilience proposes a set of options aimed at managing the change and uncertainty generated by the long-term trends that determine these events and vulnerabilities[2].

Subsequently, the specialized literature has extended the applicability of the concept in multiple fields, from ecology and psychology, to social sciences, physics and economics, developing a variety of definitions and approaches. Thus, resilience can be classified according to the specificity of the field of application: ecological, economic, social, institutional, psychological or technological resilience. Each of these forms involves a distinct series of dimensions, features and principles that reflect the way in which systems respond to shocks or disturbances[3].

Philosophically, the concept of resilience involves ensuring the continuity and survival of a system, starting from the premise that it is not possible to completely prevent or mitigate all risks before they manifest themselves. As a methodological practice, resilience involves optimizing the use of limited resources in order to prepare the system to deal with a wide range of threats, accepting the fact that, regardless of the level of preparation, a disturbance will inevitably occur. In this context, the ability of the system to function as

[2] https://cssas.unap.ro/ro/pdf_studii/cresterea_rezilientei_marilor_sisteme_publice_ale_romaniei.pdf

[3] http://www.akademos.asm.md/files/88-92.pdf

efficiently as possible during the disturbance and to return quickly and coherently to a state of equilibrium afterwards becomes essential.

According to the proposed model, in the pre-disruption stage, the essential steps in resilience management include defining the system, assessing the degree of resilience and strengthening it, actions associated with three fundamental phases: preparation, prevention and protection.

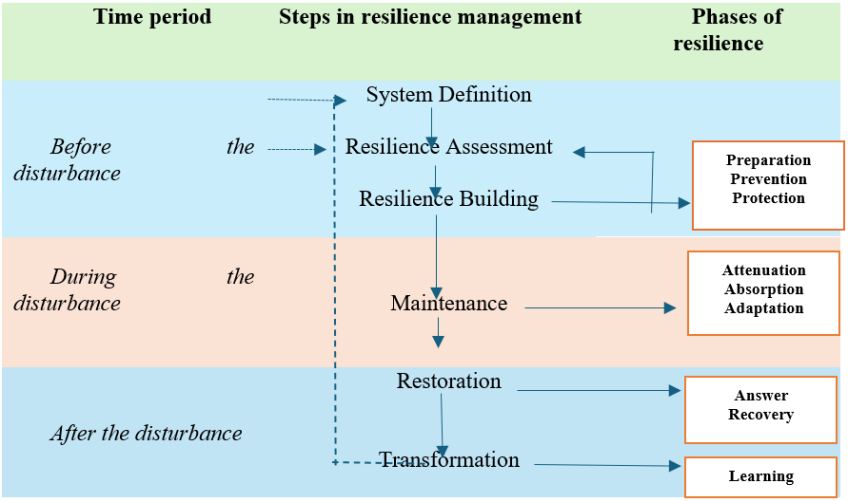

Figure 1.1. The role of resilience in systems

Source: https://cssas.unap.ro/ro/pdf_studii/cresterea_rezilientei_marilor_sisteme_publice_ale_romaniei.pdf p. 14

In the period immediately following the occurrence of the disturbance, resilience management focuses on maintaining the functionality of the system, through the mitigation, absorption and adaptation phases.

In the post-disruption stage, the process involves both restoring the system, through response and recovery measures, and transforming it, through a process of organizational and systemic learning.

In this context, the need for a feedback loop is outlined, which allows the integration of lessons learned and information obtained

following the crisis, by returning to the resilience assessment stage. This cyclical mechanism allows for the continuous improvement of the system's capacity to react and adapt to possible future shocks[4].

Following the above, we conceptualize that resilience plays an essential role in ensuring the functional continuity, adaptability and transformation capacity of a system in the face of external or internal disturbances. In a context in which uncertainties and systemic risks are increasingly frequent and complex, resilience becomes a fundamental feature of long-term sustainability. This does not only involve returning to the initial state after a shock, but also integrating lessons learned, adjusting vulnerable structures and optimizing resources to cope with future crises. Therefore, resilience is not a passive reaction, but an active strategy of governance and systemic design, which involves anticipatory preparation, adaptive response and sustainable transformation capacity.

Within the conceptual framework of resilience, three essential capacities can be identified that contribute to the functional and structural strengthening of systems in the face of shocks:

- Absorption capacity – reflects the ability of a system to prepare for, mitigate or prevent the negative impact of a disturbance, using predefined mechanisms and responses, while maintaining essential structures and functions during the crisis.
- Adaptation capacity – expresses the flexibility of the system to adjust its characteristics and behaviors to avoid functional deterioration, continuing to operate without significant changes to its structural identity.
- Transformation capacity – involves the deep restructuring of the system when it becomes unsustainable, generating a new system capable of operating efficiently in post-shock conditions, so that future shocks have minimal or no impact.

Resilience is maximum when these three capacities are activated simultaneously and coherently correlated in the crisis management

[4] https://cssas.unap.ro/ro/pdf_studii/cresterea_rezilientei_marilor_sisteme_publice_ale_romaniei.pdf

process.

In light of these elements, the resilience of a complex system can be defined, in an extended formulation, as: *the capacity of a system to reorganize itself following a major shock, through absorption, adaptation and learning, so as to maintain its essential functions and to transform itself innovatively to prevent future vulnerabilities*. This approach involves replacing the reactive and centralized (top-down) vision with a collaborative and proactive one, based on partnership between all components of the system, in an adaptive and participatory framework.

In light of the above, this study aims to deepen the concept of resilience with an economic focus through a systemic and functional approach, oriented towards identifying mechanisms through which economies can anticipate, absorb, respond and adapt effectively to external shocks and significant disruptions.

Economic resilience refers to an economy's capacity to recover from external shocks, such as financial crises or global disruptions. A resilient economy is characterized by its ability to adapt to evolving circumstances, sustain long-term growth, and minimize vulnerabilities (Martin et al., 2016)[5]. Key contributors to economic resilience include industry diversification, labor market flexibility, and strong support for small and medium-sized enterprises (Hussen Saad et al., 2021)[6].

Cities like Lisbon and Barcelona have effectively implemented recovery strategies by promoting entrepreneurship and innovation to broaden their economic foundations (Gómez-Baggethun & Barton, 2013)[7]. However, some scholars caution that market-driven approaches to resilience may neglect marginalized economic groups and place greater emphasis on recovery than on structural

[5] Martin, R., Sunley, P., Gardiner, B., & Tyler, P. (2016). *How Regions React to Recessions: Resilience and the Role of Economic Structure.* Regional Studies, 50(4), 561–585. https://doi.org/10.1080/00343404.2015.1136410

[6] Saad-Filho, A., Johnston, D., & Weeks, J. (2021). *Economic resilience in the time of COVID-19: The role of the state and public policy.* Development and Change, 52(5), 1101–1125. https://doi.org/10.1111/dech.12673

[7] Gómez-Baggethun, E., & Barton, D. N. (2013). *Classifying and valuing ecosystem services for urban planning*. Ecological Economics, 86, 235–245. https://doi.org/10.1016/j.ecolecon.2012.08.019

transformation, potentially reinforcing existing inequalities (Bristow & Healy, 2014)[8].

Nevertheless, the integration of these resilience dimensions remains largely a theoretical ideal rather than a systematically implemented practice within urban planning or governance (Meerow et al., 2016)[9]. This highlights a persistent gap between conceptual ambitions and real-world application. The literature emphasizes the need for comprehensive frameworks that can translate the multifaceted nature of resilience into practical tools tailored to specific urban and territorial contexts[10].

Economic resilience indicators serve as vital tools for assessing a region's or an economy's capacity to withstand and recover from shocks. However, understanding the key components that underpin economic resilience is essential for leveraging these indicators effectively. These components are multifaceted and interrelated, influencing how economies respond to both anticipated and unforeseen challenges.

To withstand and recover from shocks. However, understanding the key components that underpin economic resilience is essential for leveraging these indicators effectively. These components are multifaceted and interrelated, influencing how economies respond to both anticipated and unforeseen challenges.

In the specialized literature, numerous authors have approached the conceptualization of economic resilience, formulating definitions adapted to the economic and political context specific to each region. In turn, international institutions, in various studies, have given several definitions of economic resilience. The European Central Bank proposes the following definition: resilience is the capacity of the economy to minimize the reduction in GDP when a shock occurs.

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[8] Bristow, G., & Healy, A. (2014). Regional resilience: An agency perspective. Regional Studies, 48(5), 923–935. https://doi.org/10.1080/00343404.2013.854879

[9] Meerow, S., Newell, J. P., & Stults, M. (2016). Defining urban resilience: A review. Landscape and Urban Planning, 147, 38–49. https://doi.org/10.1016/j.landurbplan.2015.11.011

[10] https://csei.ase.md/journal/files/issue_111/9.EEJRS_issue1_2025-ANTONESCU.pdf

Table 1.1. Key Components of Economic Resilience

Economic Diversification	Reduces dependency on a narrow set of sectors or exports. Spreads risk across industries (e.g., agriculture, manufacturing, services). Encourages innovation and entrepreneurship.
Adaptive Capacity	Ability to respond to and absorb external shocks (e.g., financial crises, pandemics). Includes labor market flexibility, technological adaptability, and institutional readiness
Financial System Stability	Strong and well-regulated banking and financial institutions. Sound fiscal and monetary policies. Access to credit for businesses and households.
Recovery Speed (Bounce-Back Capacity)	The rate at which an economy returns to its pre-shock output levels. Influenced by policy interventions, infrastructure, and institutional efficiency.
Social Capital & Inclusion	Trust in institutions, networks of cooperation, community engagement. Reduces the negative impact of crises on vulnerable populations. Promotes cohesion and collective problem-solving.
Public Governance and Policy Framework	Transparent and responsive institutions. Clear contingency planning and risk management policies. Investment in disaster risk reduction and early warning systems.
Human Capital	A well-educated and healthy workforce. Capacity for upskilling and retraining in response to economic shifts.
Environmental Sustainability	Resilience to climate-related shocks (droughts, floods, etc.). Sustainable management of natural resources.
Innovation and Digital Transformation	Adoption of smart technologies, AI, and data-driven policymaking. Encourages new business models and resilient value chains.
External Relations and Connectivity	Participation in regional and global trade networks. Access to external financial and humanitarian support during crises.

Source: prepared by the author based on the material https://fastercapital.com/term/economic-resilience-indicators.html

The OECD considers that economic resilience is the ability of an economy to reduce its vulnerabilities, to withstand shocks and to recover quickly (OECD, 2015). Thus, Martin (2012) defines economic resilience as the ability of an economy to withstand and recover from an economic or other shock that affects the development trajectory, also involving the reconfiguration of the economic, social and institutional structure, in order to return to a sustainable development trajectory.

In turn, Briguglio et al. (2008) emphasize the role of public policies, defining resilience as the ability of an economy to withstand and recover from exogenous shocks, a capacity that is largely determined by the quality of government interventions and the institutional framework. On a complementary conceptual line, Di Caro (2017) defines economic resilience as the ability of a region or country to withstand a shock, to recover from unexpected events and to maintain a sustainable economic growth trend in the long term.

Therefore, the conceptual framework analyzed provides the necessary foundation for identifying the key elements of economic resilience, highlighting the essential components that contribute to the capacity of an economic system to cope with shocks, to adapt and to return to a sustainable development trajectory.

Thus, the economic system functions as a complex whole, influenced by a multitude of factors that constantly and deeply interact with each other. Within this system, interdependent relationships are emerging between the political decisions of governments, the behaviors of economic actors (individuals and firms) and market mechanisms, which makes economic dynamics difficult to predict and control in crisis conditions.

Given the above, we believe that an adequate definition of economic resilience could be formulated as follows: *economic resilience represents the ability of an economy to cope with a crisis by implementing measures that increase the capacity to withstand shocks, facilitate adaptation to new conditions, allow structural transformation and support the return to a sustainable economic growth trajectory.*

In the context of the onset of a major shock or a systemic crisis, it

becomes obvious that not all disruptions can be predicted or integrated into conventional analysis models. Therefore, in addition to approaches based on the capacity to adapt and recover of economic systems that is, on resilience, it is also essential to recognize the limits of knowledge and anticipation.

In this direction, Nassim Nicholas Taleb[11] introduces the concept of the "black swan" event, referring to those extremely rare, unpredictable and major-impact phenomena that radically change the dynamics of economic and social systems. These events escape traditional statistical predictions and, although they are often rationalized post-factum, they highlight the fragility of existing institutional structures and analytical paradigms. A relevant example is the September 11, 2001 attack, considered by Taleb a black swan: an event that completely escaped conventional predictions and caused profound changes at a global level.

Taleb also explains our tendency to underestimate the role of major uncertainty: we focus on what we already know, ignoring what we cannot anticipate. After the occurrence of a black swan, people tend to overestimate the probability of its recurrence, although reality demonstrates the opposite.

In addition, Flage and Aven[12] propose a useful conceptual classification for understanding modern risks, starting from the "known/unknown" taxonomy: emerging risks are "known unknowns" – risks about which there are indications, but not enough information for a complete assessment; on the other hand, black swan events are "unknown unknowns" – events that are completely unpredictable, but with significant disruptive potential.

This distinction emphasizes the importance of developing anticipation and response mechanisms that go beyond traditional

[11] Nassim Nicholas Taleb, The Black Swan: The Impact of the Highly Improbable, Random House, 2007. ISBN: 97814000063512.
https://archive.org/stream/10.1.1.695.4305/10.1.1.695.4305_djvu.txt

[12] Flage Roger, Terje Aven. Emerging risk – Conceptual definition and a relation to black swan type of events. Publicat în: Reliability Engineering & System Safety. Volume 144, December 2015, Pages 61-67.
Disponibil: https://www.sciencedirect.com/science/article/pii/S0951832015001982

approaches, focused exclusively on obvious and quantifiable risks. In this sense, economic resilience should not be understood only as a capacity to bounce back from known shocks, but also as a systemic ability to cope with deep uncertainty, integrating both emerging risks and the possibility of unexpected, extreme events. Such an approach offers a more realistic and robust perspective on managing complexity in modern economies.

Figure 1.1 illustrates a typical model of economic resilience, frequently encountered in the literature. This model is structured in four distinct stages, which reflect the evolution of an economy in relation to a major external shock. The first period precedes the shock and establishes the determining characteristics for the preparation of an economy. The second period is immediately after the occurrence of the external shock, when the economy absorbs it and tries to minimize the effects. The third period involves effectively combating the negative effects of the shock and starting the recovery process. The fourth period involves the final stage, of adaptation and exit/overcoming the crisis. However, in practice, the strict delimitation of these stages is often difficult, as economies can go through different phases simultaneously or overlapping. In addition, the uncertainty related to the intensity, duration and nature of an external shock, as well as the efficiency of the economic policy measures adopted in response, makes it impossible to accurately anticipate the post-crisis evolutionary trajectory[13].

A resilient economic sector is one that is capable of supporting the process of sustainable development, responding effectively to the needs of both the current and future generations. In this sense, analyzing the resilience of the banking sector becomes essential for identifying mechanisms through which a more robust and adaptable financial system can be built. The concept of resilience is essential for understanding the behavior of economies during and after economic crises, offering a new perspective on how they can absorb, adapt and transform shocks into opportunities for reform. In the absence of a

[13] Reziliență economică a statelor membre UE la marea criză economică din perioada 2008 – 2013, pag 7

sufficient degree of resilience, each cyclical recession risks becoming a deep crisis, with lasting effects on growth potential and macroeconomic balances.

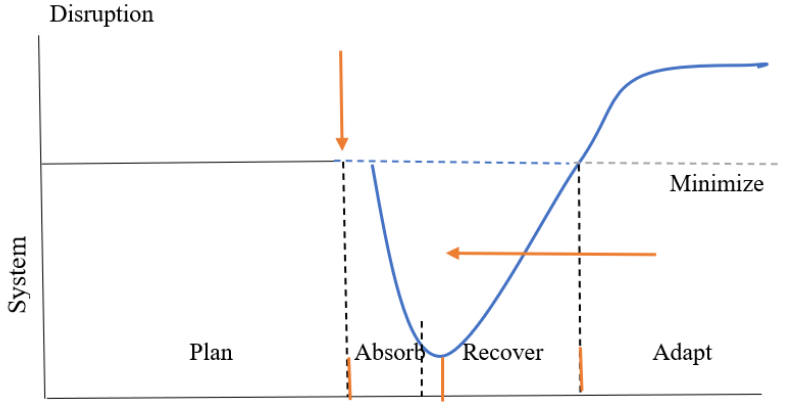

Figure 1.2. Stages of Economic Resilience
Source: National Academy of Sciences, SUA/OECD, 2019.

Moreover, low economic resilience is usually correlated with structural dysfunctions, such as: a low degree of competition, labor market rigidities, significant barriers to entry and exit of firms from the market, poor governance quality and the presence of corruption. All these factors diminish the shock absorption capacity and limit the structural adjustment processes necessary to resume a sustainable economic growth trajectory. Thus, resilience not only moderates the impact of business cycles, but also becomes a defining element in an economy's ability to transform periods of crisis into catalysts for progress.

The economic cycle, by its recurring nature, reflects the alternation between phases of expansion and contraction of economic activity, generating endogenous or exogenous shocks that can affect the economic stability of a state or a region. In this context, economic resilience represents the capacity of the economic system to cope with these fluctuations, to absorb the negative impact of the downward phases, to maintain the critical functions of the economy and to quickly return to a sustainable growth trajectory.

Table 1.2. Economic Cycles vs. Economic Resilience

Criterion	Economic Cycles	Economic Resilience
Definition	Recurrent fluctuations in economic activity (expansion, peak, contraction, recovery)	The capacity of an economy to withstand, adapt to, and transform after external shocks
Nature	A recurring and inevitable process in market economies	A functional and strategic feature of an economic system
Objective	Describes the natural dynamics of economic performance over time	Minimizes the adverse effects of crises and accelerates recovery
Phases	Expansion – Peak – Contraction – Recession – Recovery	Preparation – Absorption – Adaptation – Response – Recovery – Learning
Causes	Cyclical factors, external shocks, inadequate economic policies	Structural weaknesses, lack of preparedness, delayed or weak policy responses
Role of Public Policy	Policies may amplify or mitigate the intensity of cycles	Policies are crucial for building and strengthening resilience
Relationship to Crises	Crises are recurring phases within the economic cycle	Resilience is a management mechanism for navigating and learning from crises
Measurement	Through output indicators: GDP, unemployment, inflation	Through composite indicators: responsiveness, adaptability, governance, diversification
Outcome	Cyclical return to a new starting point	Sustainable recovery and systemic improvement after shocks

Source: prepared by the authors.

Thus, resilience does not eliminate economic cycles, but influences the duration, amplitude and impact of negative phases (recession, stagnation) on fundamental indicators such as GDP, employment or

financial stability.

The study of the concept of resilience can be substantiated by a dual, structuralist and systemic approach, as these two methodological perspectives are complementary and allow a coherent analysis of complex systems. The structuralist approach facilitates the investigation of the internal components of a system (such as banking institutions, regulations, financial instruments), while the systemic approach allows for the understanding of the overall functioning of the financial system in its interaction with the economic, political and social environment.

Therefore, the authors elucidate the resilience approach at the level of subsystems, i.e. the structural components of the financial sector, as well as at the level of the entire system, in order to assess the capacity to react, adapt and transform in the face of shocks or uncertainty.

Next, the authors propose to **analyze the main crises that have marked the evolution of the economy of the Republic of Moldova since 1991 and until now**, highlighting how they have influenced the resilience of economic sectors and the quality of the financial sector. *The study also aims to identify the essential lessons that can be learned from these episodes, in order to strengthen the capacity to react and adapt to the financial system.*

The analysis focuses both on the triggering factors of these shocks and on the mechanisms through which the national economy responded and adapted to the disruptions, providing an integrated perspective on its capacity for recovery and structural transformation.

The period 1991–2025 was marked, for the Republic of Moldova, by a succession of economic shocks and crises of both internal and external origins, which profoundly influenced the dynamics of economic development and the stability of the financial sector. The transition from a planned economy to a market economy, the regional financial crisis of 1998, the global recession of 2008–2009, the COVID-19 pandemic, the energy and inflationary crisis of 2022–2023, as well as recent geopolitical uncertainties constituted moments of inflection that tested the limits of the national economy's capacity to react and adapt.

In a context in which the manifestation of economic cycles and

exogenous shocks is inevitable, financial resilience capacity becomes a key element for ensuring macroeconomic stability and for reducing the costs associated with economic contraction phases. Financial resilience is not limited to the ability of credit institutions and financial markets to survive in times of crisis, but also involves adapting their structure, diversifying instruments and strengthening governance, so that the financial system supports economic recovery.

In the post-independence period, the Republic of Moldova has gone through multiple economic and financial crises, the first of which occurred immediately after the proclamation of independence in 1991, known as **the "crisis of post-Soviet transformation" (1990–1999).** This stage was marked by a complex process of transition from a centralized economy to a market economy, characterized by the absence of functional financial institutions, hyperinflation, the collapse of the national currency and frequent bank failures. These phenomena led to a deep economic contraction. The impact of the financial crisis in the Russian Federation, which occurred in 1998, had considerable negative effects on the Moldovan economy, causing a decrease in GDP by approximately 15%.

The high degree[14] of integration of the Republic of Moldova's economy within the economic complex of the former Soviet Union was determined, mainly, by the lack of its own energy resources, non-agricultural raw materials, advanced technologies and industrial equipment. The disintegration of the USSR led to the disintegration of existing economic networks, generating significant obstacles in the movement of goods, restrictions on the access of the newly independent states to the recently established markets, as well as a sudden and unprecedented increase in the prices of energy resources and imported raw materials. At the same time, these transformations were accompanied by the increase in the cost of transportation and the loss of traditional sales markets, which seriously affected the economic functioning of the Republic of Moldova in the first years of independence.

[14] https://rses.ince.md/server/api/core/bitstreams/f4300cac-eb86-4476-9b28-e6d45316773d/content

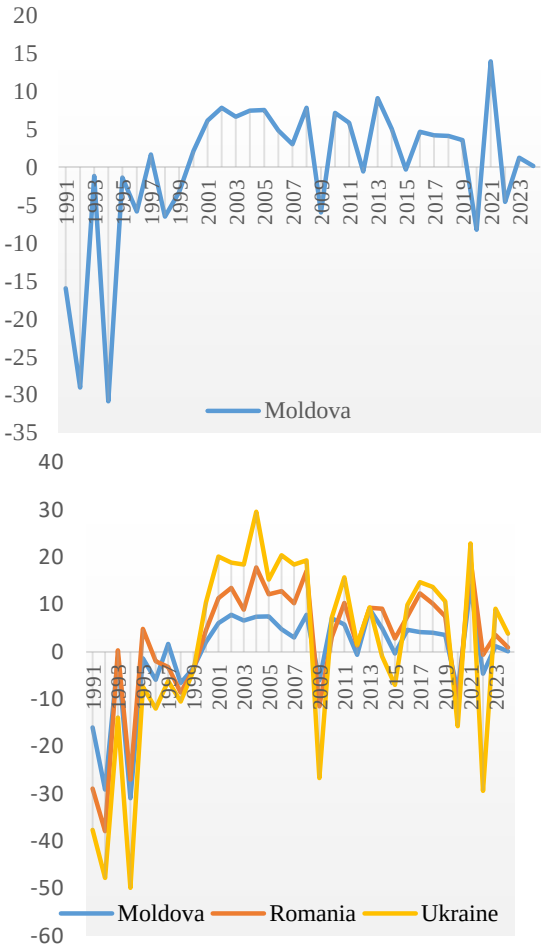

Figure 1.3. GDP Growth (Annual %)
Source: developed by the author based on World Bank datas

Table 1.3. The evolution of economic crises in the Republic of Moldova (1991–2025): lessons for strengthening financial resilience

Period	Type of Crisis	Main Causes	Impact on the Economy	Effects on the Financial Sector
1991–1994	*Post-Soviet Transition Crisis*	Dissolution of the USSR, collapse of traditional markets, hyperinflation, lack of market institutions	GDP decline of over 60%, runaway inflation, industrial collapse	Monetary instability, lack of regulatory framework, low public confidence in banks
1998–1999	*Regional Financial Crisis (Russia)*	Devaluation of the Russian ruble, collapse of exports to the CIS	GDP -6.5% (1998), sharp depreciation of the leu, rising unemployment	Liquidity problems in banks, increase in non-performing loans
2008–2009	*Global Financial and Economic Crisis*	Collapse of international financial markets, decline in remittances and exports	GDP -6% (2009), sharp drop in consumption and investments	Liquidity pressure, reduced lending, currency depreciation
2014–2015	*Domestic Banking Crisis*	Banking fraud ("the billion-dollar theft"), lack of control and prudential supervision	Public debt increased by ~15% of GDP, high inflation, depreciation of the leu	Loss of trust in banks, massive deposit withdrawals, emergency interventions by the National Bank
2020–2021	*COVID-19 Pandemic Crisis*	Health restrictions, trade blockages, decline in global demand	GDP -8.3% (2020), rising unemployment, reduced investments	Loan payment deferrals, increased default risk, accelerated digitalization of banking services

2022–2023	*Energy and Inflationary Crisis*	Surge in energy and gas prices, Russia–Ukraine conflict, disruptions in supply chains	Inflation >30%, major budget deficit, pressure on the balance of payments	Higher financing costs, increased credit risk, liquidity pressure
2024–2025	*Geopolitical Uncertainty and Macro Adjustments*	Ongoing regional conflict, volatility in energy and financial markets	Modest economic growth, declining investments, exchange rate volatility	Need to strengthen bank capitalization, adaptation to new regulatory requirements

Source: prepared by the authors.

In 1999, the effects of the economic crisis were accentuated by an acceleration of the inflationary process, with the average annual inflation increasing by 39.4% compared to the previous year. Food prices increased by 44%, non-food prices by 36%, and tariffs for services provided to the population increased by 56%. For some basic goods, such as cereals and buckwheat, prices doubled, registering increases ranging from 50% to 70%. At the same time, the costs of some essential public services increased exponentially: 2.6 times for gas distribution, 2.3 times for water supply, and electricity became more expensive by approximately 70%. The following year, 1999, the gross domestic product of the Republic of Moldova fell to about 33% of the level recorded in 1990, marking one of the most severe recessions in the country's contemporary history.

The global financial crisis[15] that began in the summer of 2007 is considered unprecedented, both in terms of its scale and the intensity of its impact on the world economy. Its causes are well documented in the literature, including excessive liquidity, massive savings accumulation, accelerated development and the globalization of

[15] Perciun R., et. 2015 Stabilitatea financiară a economiei în tranziției. ISBN 978-9975-3032-4-8. INCE 416.p

financial markets. The focus now needs to be on identifying the challenges and lessons learned from this crisis, especially for monetary authorities, which have often been criticized for contributing to the severity of the phenomenon.

The effects of the crisis on the Member States of the European Union have been uneven. In many cases, there were no fundamental domestic causes that fueled the manifestation of the crisis; however, the imbalances accumulated in the preceding period led to a significant decline in GDP in late 2008 and early 2009. A major factor in the economic contraction was the reduction in investment activity, especially in the productive sector.

Although the housing recession severely affected some countries, such as Spain and Ireland and other economies, including Germany, Austria and some eurozone countries, did not experience a significant boom in mortgage lending, even registering slight decreases in house prices before the crisis. However, across the European Union, companies reduced their investments in equipment and industrial infrastructure due to declining sales and a shortage of financial resources.

The negative impact on economic dynamics was particularly pronounced in countries with a positive trade balance, such as Germany, the Netherlands and Ireland, which recorded significant decreases in exports, amid the deterioration of the global economic context compared to the pre-crisis period.

In the real sector, the authorities of European countries applied both economic stimulus measures and direct legal regulation instruments. A relevant example is that of France, where a Strategic Investment Fund was established to purchase stakes in strategically important companies, with the aim of protecting them from takeovers by foreign investors, but also to redirect financial resources from the speculative sector to industry.

At a general level, specialized structures were created in the European Union to support companies, especially small and medium-sized enterprises, as well as to facilitate access to credit in the new conditions generated by the crisis. The measures included the elimination of some taxes or the compensation of local budget losses

from national funds and the realization of public investments in strategic sectors, such as research, education, environmental protection and advanced technologies.

Thus, three main directions of intervention can be distinguished:

- Ensuring companies' liquidity through tax incentives, tax holidays or credits, as well as by allocating additional funds for investments, coming from various incentive mechanisms.
- Financing investments in the public sector, including social and housing programs.
- Lending to large state-owned enterprises for the modernization and development of railway, energy and postal infrastructure.

These measures aimed to support sustainable economic growth, mitigate the negative effects of the financial crisis, stimulate aggregate demand and consumption, as well as reduce the tax burden on the business environment.

For the Republic of Moldova, measures aimed at supporting the real sector of the economy are of particular interest, in the context in which the actions taken by the authorities of European countries to maintain the stability of the financial and banking system were mainly relevant for the initial stage of the global financial crisis (2007–2009), with the aim of limiting its spread.

In the case of Moldova, the effects of the global financial crisis were manifested mainly through reduced exports, decreased remittances, reduced foreign direct investment and restricted lending. Thus, the negative impact on the real sector, especially in agriculture, industry and construction – was significant, amplifying the already existing structural vulnerabilities.

Although some acute problems in the financial sector were managed in the years immediately following the crisis, many dysfunctions persist today, such as: the relatively low level of financial intermediation, the low confidence of the population in banking institutions, excessive concentration of assets and dependence on external sources of financing. These deficiencies require approaches adapted to the specifics of the national economy.

In this regard, it is unlikely that the solutions implemented by the

monetary authorities of the European Union member states can be fully taken over in the Republic of Moldova, given the differences in economic structure, institutional capacity and level of development. Domestic policies need to be calibrated to directly support productive sectors, stimulate investment in infrastructure and innovation, and reduce dependence on external factors, thus strengthening long-term economic resilience.

The evolution of inflation in the first decade of the 21st century indicates a moderation in the pace of price growth, which is essential for strengthening economic resilience in the Republic of Moldova. In the period preceding the global financial crisis (2003–2008), average annual inflation was in the range of 10%–13%, reflecting a moderation process compared to previous years. This relative stabilization of the general price level contributed to creating a more predictable economic climate, favorable to medium-term investment and planning.

Subsequently, in 2010, price dynamics were characterized by an average annual growth rate of 7.4%, confirming the trend of reducing inflationary pressures. This development provided favorable premises for the consolidation of disinflationary trends and for the anticipation of increased stability in 2011.

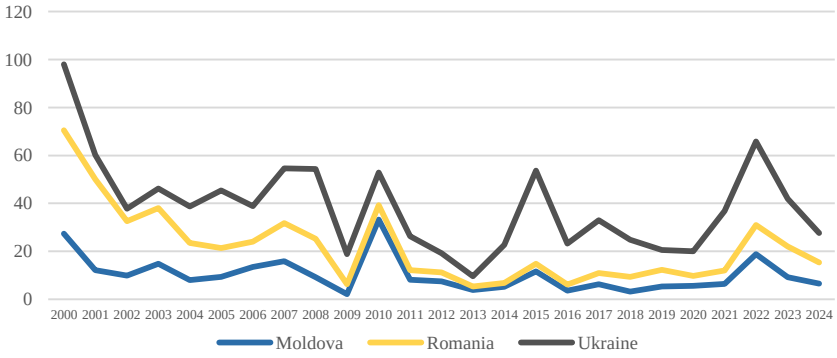

Figure 1.4. Inflation, GDP deflator: linked series (annual %) – Moldova

Source: developed by the author based on World Bank data.

From the perspective of economic resilience, maintaining inflation within moderate limits is a key factor for supporting aggregate demand, protecting purchasing power and preventing macroeconomic imbalances, thus ensuring a more robust framework for responding to possible external or domestic shocks.

The Republic of Moldova remains highly exposed to external and internal economic shocks, such as increases in energy prices or adverse weather conditions, which negatively affect the agricultural sector. At the same time, the persistence of structural imbalances means that inflation continues to be a major challenge for the national economy.

Table 1.4. Annual data on the evolution of the GDP deflator, GDP and the monetary aggregate M3

Year	GDP Deflator, %	GDP, MDL million	Average annual stock of M3, MDL million	GDP Deflator, MDL% (2000=100%)	GDP, MDL million (expressed in 2000 prices)	Average annual stock of M3, MDL million (expressed in 2000 prices)
2000	127,3	16052	2961	100	16052	2961
2001	112	19052	3998	112	17010	3570
2002	109,8	22556	5477	123	18342	4453
2003	114,8	27619	7483	141,2	19563	5300
2004	108	32032	9570	152,5	21008	6277
2005	109,3	37652	13597	166,7	22593	8159
2006	113,4	44754	17406	189	23682	9210
2007	115,9	53430	22731	219	24394	10378
2008	109,2	62922	30219	239,2	26307	12634
2009	102	60043	29495	244	24612	12090

Source: developed by the authors, using data taken from: http://www.statistica.md/category.php?l=ro&idc=191& and http://www.bnm.md/md/agregate_monetare

In the case of the Republic of Moldova, factors such as low labor productivity and structural weaknesses of the economy, including inefficient management of public enterprises and the lack of a genuine competitive environment, exert significant influences on price dynamics. However, multifactorial regressions performed on the basis of annual data fail to highlight solid correlations between inflation and structural variables. One of the reasons for this limitation is the lack of relevant indicators, such as unit labor costs, the calculation of which would allow a clearer understanding of the relationship between wage developments, labor productivity and inflation.

The quantitative analysis performed revealed the significant influence of the exchange rate and changes in the value of imported goods on inflation. The high openness of the national economy amplifies the impact of external factors, which makes them play a determining role in the formation and evolution of domestic prices.

According to the report on the global economic outlook published by the International Monetary Fund (IMF), the Republic of Moldova was the only country in 2010 for which no economic growth was forecast.

The global economic crisis was aggravated, in the case of Moldova, by internal political instability and significant deficiencies in governance, aspects reported by both local and international experts. Among the determining factors of the worsening economic situation are:

- Deterioration of the business environment, reflected by Moldova's ranking in 158th place out of 176 economies in terms of the "construction permit" indicator in the Doing Business ranking;
- Spread of corruption, with a considerable regression in the Transparency International ranking, where Moldova fell by 30 positions since 2006, reaching 109th place globally in 2009.

According to IMF assessments, after a period of relatively constant economic growth, with an average annual rate of 5.5% between 2000 and 2008, in 2009 the Moldovan economy contracted by approximately 9%, contradicting the optimistic estimates of the previous government, which had forecasted a growth of 3.5%.

This contraction was determined by cumulative external and internal factors, including:

- The reduction by over 20% in exports, in the context of the global recession;
- The decrease by over 30% in remittances from Moldovan workers abroad, an essential pillar of the national economy, given that these transfers represented approximately 40% of GDP, placing Moldova in second place in the world, after Tajikistan, in terms of dependence on remittances.

Overall, 2009 represented a critical point for the Moldovan economy, marking not only a severe economic setback, but also a crisis of institutional confidence, fueled by systemic corruption, poor governance, and an economic climate unfavorable to investment and structural reforms.

Table 1.5. Evolution of the share of transactions with the main trading partners in total foreign trade

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Ucraina	10,6%	11,2%	14,4%	15,8%	16,7%	18,2%	17,1%	17,2%	17%	15,1%	11,8%
România	11,7%	12,6%	9%	8,7%	8,6%	9,6%	10,9%	13,4%	13,1%	14,3%	12,1%
Federaţia Rusă	31,4%	26,4%	26,8%	23,3%	22,4%	20,5%	18,2%	16%	14,5%	15,1%	14,4%
Germania	9%	9,9%	8,5%	7,8%	8,7%	8%	7%	7,1%	8,1%	6,6%	7,2%
Italia	6,1%	6,8%	7,5%	8,6%	9,1%	9,7%	8,4%	8,4%	8,1%	7,3%	8%
China	0,1%	0,3%	0,6%	0,8%	1%	1,4%	2,2%	3,1%	4,1%	5%	5,4%
Turcia	1,4%	1,6%	1,5%	2,2%	2,5%	3%	3,5%	3,8%	4%	4,1%	4,5%
Belarus	4,2%	4,3%	4,7%	4,8%	4,2%	4,5%	4,6%	4%	4%	4,5%	4,8%
Polonia	1,3%	1,4%	1,3%	1,6%	2%	1,9%	2,7%	3%	2,7%	2,7%	2,7%
Franţa	1,8%	2,2%	2,3%	2,1%	2%	2,3%	2,4%	2,3%	2,4%	1,9%	1,8%
S.U.A.	3,5%	5,1%	3,6%	4,9%	3,1%	2,6%	2,3%	1,4%	1,2%	1,7%	1,3%
Ungaria	2,2%	1,4%	1,7%	1,5%	1,3%	1,4%	1,4%	1,3%	1%	1,4%	1,4%
Total	83,4%	83,4%	82,1%	82,2%	81,6%	83,0%	80,8%	81,0%	80,2%	79,7%	75,4%

Source: developed by the authors based on data taken from http://www.statistica.md/category.php?l=ro&idc=336&

In 2013, the Republic of Moldova's trade deficit amounted to 3,064.1 million USD, registering a marginal increase compared to the

level recorded in 2012. Although the dynamics of imports is a common phenomenon in many economies, the size of the Republic of Moldova's trade deficit remains significant in international comparison, standing at approximately -44% of the volume of foreign trade. This value reflects the vulnerability of the national economy structure and its high dependence on imports, with direct implications for macroeconomic stability and the sustainability of economic growth in the medium and long term.

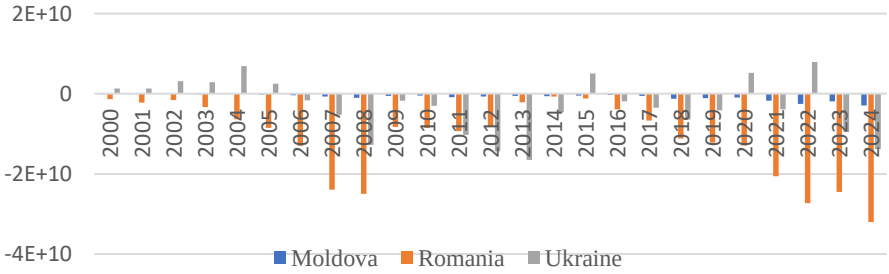

Figure 1.5. Current account balance (millions US$)
Source: developed by the author based on World Bank data

According to the National Bureau of Statistics, in 2013, enterprises and organizations in the Republic of Moldova, regardless of the form of ownership, used for the development of the national economy and the social sphere investments in tangible assets totaling 18,635.7 million lei (in current prices), coming from all sources of financing. Compared to 2012, the volume of investments registered an increase of 1.5% (in comparable prices). In relation to the population, investments amounted to an average of 5,236.9 lei per inhabitant, compared to 4,819.2 lei in the previous year.

The analysis of the technological structure of fixed capital investments for 2013 highlights the following trends:

- Investments in construction and assembly works totaled 9,467.8 million lei (50.8% of the total), registering a decrease of 0.5% compared to 2012.
- Investments in equipment, machinery and means of transport totaled 8,016.3 million lei (43.0% of the total), which

represents an increase of 2.4% compared to the previous year. Of this category, 95.4% were destined for import purchases, which underlines the dependence of the national economy on foreign technologies.

Overall, the structure of investments reflects a predominant orientation towards the construction sector, simultaneously with an intensification of the import of equipment and means of transport, an aspect that reveals both the modernization of economic processes and the vulnerability related to the dependence on foreign markets for technological capital.

The analysis of the dynamics of the external debt of the Republic of Moldova reveals a significant increase before the onset of the economic crisis in 1998–1999, reaching a maximum value of 133.8% of GDP in 2000. Subsequently, a new upward trend is observed during the crisis of 2009, as well as in 2012. Against the background of the slowdown in the pace of economic growth, in 2012 the external debt constituted 82.15% of GDP. The evolution of this indicator is explained, to a large extent, by the increase in the volume of loans contracted by the Government and the National Bank of Moldova from the IMF, intended to cover the public budget deficit and consolidate official foreign exchange reserves. In parallel, the debts of the private sector derive mainly from foreign trade relations, reflecting in particular the financial obligations related to the import of energy resources.

In comparative terms, the Republic of Moldova is among the states with the lowest levels of external debt. For example, Romania's external debt is estimated at around 98.4 billion euros, and Ukraine's at around 135.05 billion US dollars, while in the Republic of Moldova the level of external debt per capita is around 460 US dollars, compared to around 5,000 euros in Romania and 2,000 US dollars in Ukraine.

Collected by the state and Gross Domestic Product (GDP), expressed as a percentage. This is an important indicator reflecting how much citizens and businesses contribute to the public budget through taxes and levies. Fiscal pressure in Moldova has ranged between 28% and 34% of GDP in recent years. Compared to the

European average (which can exceed 40% in some countries), fiscal pressure in Moldova is moderate. The economy of the Republic of Moldova faces high informality, with many taxpayers failing to declare their actual income. The low efficiency of tax collection results in fiscal losses and tax evasion. Disproportionate tax burden – small and medium-sized enterprises (SMEs) may be more affected than large companies.

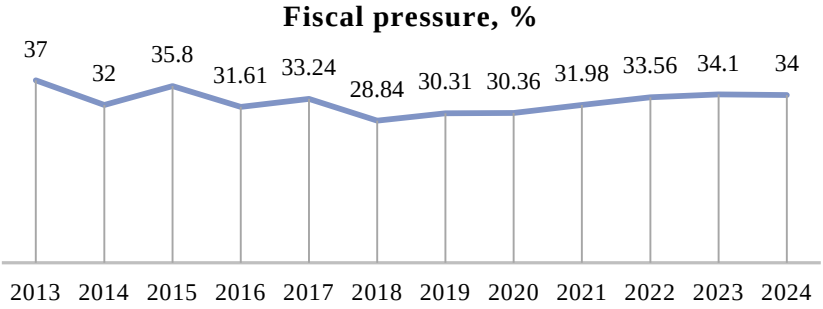

Figure 1.6. Dynamic fiscal pressures, %
Source: Prepared by the author based on data from the Ministry of Finance.

The analysis of the dynamics of fiscal pressure is essential to understand how a state finances its activities and to assess the impact on economic growth and citizens' well-being. A moderate and equitable level of fiscal pressure can contribute to sustainable development, while an excessively high level can have negative effects on the economy.

In many European Union (EU) countries, fiscal pressure tends to be higher compared to other regions, reflecting the robust public sector, social benefits, and extensive public services available to citizens.

Nordic countries (Sweden, Denmark, Finland, Norway): These countries exhibit some of the highest fiscal pressures in the world, often exceeding 40% of GDP. This high level is primarily due to comprehensive welfare systems, universal healthcare, and generous pension schemes. The Nordic model is characterized by high taxes in

exchange for extensive public goods and services.

Germany, France, and the Netherlands: These economies typically have fiscal pressures ranging from 40% to 45% of GDP. High fiscal pressure is linked to strong social security systems, subsidies, public health, and educational services. These countries also have relatively high tax rates for individuals and corporations.

The fiscal pressure in these countries - Southern Europe (Italy, Spain, Greece), tends to be lower compared to the Nordic region, but still significant. It generally ranges from 30% to 40%. Economic challenges, including high public debt and unemployment rates, have put pressure on tax systems to generate sufficient revenue while managing austerity measures.

The sustainability of public finances in the Republic of Moldova in recent years has been largely shaped by the economic resilience efforts amid both regional and global crises. Despite the rising public debt, the government has managed to implement measures that ensure fiscal stability and control over public expenditure, maintaining the balance between the growing debt and the economy's capacity to support it.

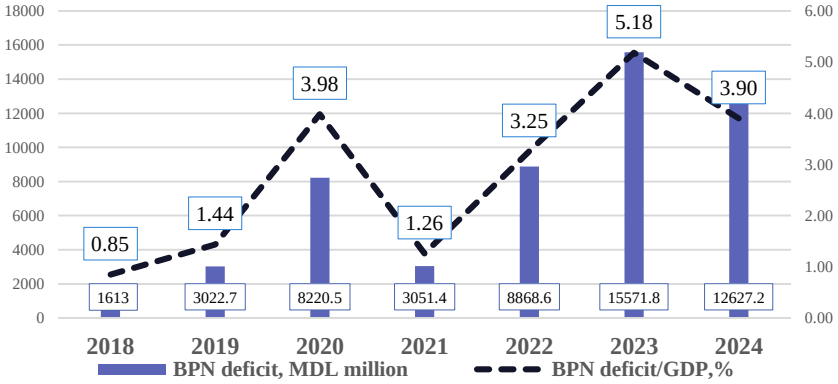

Figure 1.7. Public Finance Deficit, million MDL

Source: Prepared by the author based on data from the Ministry of Finance.

The increase in public sector debt in 2024, although significant, has

remained within economically sustainable limits. The government's ability to secure both internal and external financing for the budget deficit, along with the prudent management of public debt, has been crucial for maintaining macroeconomic stability. The government's focus on social spending, particularly in sectors such as social protection, education, and healthcare, has contributed to the economic and social resilience of the country.

Nevertheless, it is essential to closely monitor the dynamics of public debt, as continued growth in debt levels, especially if not accompanied by corresponding economic growth, may pose risks to fiscal sustainability in the long run. The government must continue to balance fiscal expansion with prudent debt management to avoid compromising future economic stability.

Ultimately, ensuring the sustainability of public finances is not only a matter of managing the budget deficit and debt levels but also of implementing sound governance principles that support long-term economic growth and stability. The challenges ahead will require a continued commitment to fiscal discipline, careful planning, and responsive policies to mitigate risks and promote sustainable economic development.

The effects of population aging are multiple and complex, exerting a significant influence on demographic processes, social development and the dynamics of economic growth. Among the major consequences, the increase in the demographic dependency ratio is noteworthy, through the increase in the number of dependents in relation to the active population, an aspect that generates increased concerns in the areas of social protection, insurance systems and social assistance. The phenomenon of demographic aging has a transversal impact on various socio-economic spheres, including the pace of economic growth, the level of investment and savings, consumption, taxation and intergenerational transfers. In social terms, it influences the health of the population, family structure, lifestyle and living conditions, often also determining the intensification of migration flows.

Demographic changes affect not only the prospects for economic growth, but also the sustainability of public finances. The reduction in

the number of employed people leads to a decrease in tax revenues, while the increase in the share of pensioners in relation to the active population amplifies the pressures on the state budget. In the Republic of Moldova, population aging, combined with other demographic changes, has generated significant pressures on social protection systems, determining the need to assess the impact of these processes on the financial sustainability of the state. Thus, demographic aging is closely interdependent with the financial sustainability of the social protection system, through the manifestation of phenomena such as the increase in the costs of medical and social services, the intensification of the risk of social exclusion and the difficulties in ensuring a decent standard of living for the elderly population.

These data reveal both the structural vulnerabilities of the Moldovan economy and the advantage of a relatively low external burden compared to other economies in the region, which can be a factor of resilience in times of macroeconomic instability.

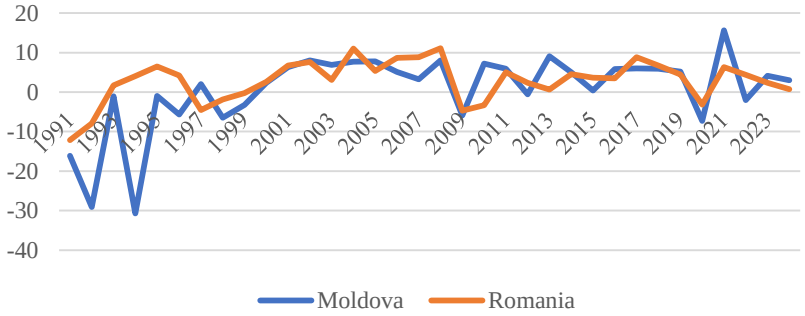

Figure 1.8. GDP per capita growth (annual %)
Source: developed by the author based on World Bank data

Recent developments in the macroeconomic indicators of the Republic of Moldova reflect a mixed situation: on the one hand, the positive dynamics of budget revenues and efforts to modernize the fiscal framework confirm a certain capacity for institutional adaptation and mobilization of domestic resources. The increase in tax and fee collections (+9.9% in January–October 2024) demonstrates the partial

effectiveness of the measures adopted, especially in terms of combating the informal economy and broadening the tax base.

On the other hand, the persistence of a significant external deficit, increasing dependence on external financing and the high level of external debt (over 57% of GDP in Q1 2025) indicate major structural vulnerabilities. These imbalances may affect medium-term stability in the absence of reforms that would increase export competitiveness, diversify the economic base and stimulate domestic productive investments.

Overall, the resilience of the Republic of Moldova is moderate, supported by progress in consolidating fiscal revenues and access to external financial resources, but is maintained by persistent current account imbalances and vulnerability to external shocks. Strengthening this resilience requires consistent structural policies, focused on increasing productivity, reducing import dependence and diversifying financing sources.

Challenges and prospects for resilience in the national banking system. Since 1991, the national banking system has undergone a continuous process of reform and modernization, recording notable progress on multiple dimensions. The current banking legal framework fully regulates the activity of commercial banks and the central bank, establishing accountability relationships between financial institutions and clients, as well as the mechanisms for organizing and monitoring the banking process. In addition, the internationalization of financial operations and the penetration of foreign capital into the domestic banking system contributed to the standardization of banking regulations in accordance with international requirements, through the implementation of financial market stabilization programs in collaboration with the IMF and through gradual alignment with the principles of the Basel Accord.

The capacity of the domestic banking system has experienced significant expansion, with the volume of active and passive operations constantly increasing. In parallel, the range of banking products and services has diversified, oriented both towards meeting the needs of an increasingly diverse clientele and towards increasing accessibility and efficiency in their provision. The structure of the

banking market has evolved, expanding the categories of eligible clients – from individuals with modest incomes or young entrepreneurs, to companies with growth potential – and diversifying, at the same time, the profile of the shareholders. The entry into the national market of international strategic investors, such as Groupe Société Générale, Gruppo Veneto Banca or Raiffeisen Group, brought not only capital contributions, but also the transfer of know-how, modern management strategies, pricing policies and technological innovations. All these processes contributed to the consolidation of a competitive and dynamic domestic banking system. However, its development also determined a diversification of banking risks, the management of which has become increasingly complex. The consequences of the manifestation of these risks are reflected in the reduction of banks' profitability and, in extreme cases, can generate major blockages in their activity.

One of the determining factors of the amplification of the global economic and financial crisis that started in 2007 was the extensive involvement of the banking sector in off-balance sheet activities and the excessive use of leverage. This behavior was accompanied by a gradual erosion of the level and quality of equity capital. At the same time, many banking institutions had insufficient liquidity reserves to cover their current obligations. As a result, the banking system proved incapable of absorbing losses generated by trading and lending activities, as well as exposures resulting from off-balance sheet re-intermediation, accumulated in the so-called "shadow banking system".

At the peak of the turmoil, market confidence in the solvency and liquidity of banks was severely affected. The vulnerabilities of the banking sector quickly spread to other segments of the financial system and to the real economy, generating a drastic contraction of liquidity and a significant decrease in the supply of credit. Ultimately, public authorities were forced to intervene through massive liquidity injections, recapitalizations and guarantee schemes, exposing taxpayers to considerable fiscal costs.

The immediate impact on banks and economies located at the epicenter of the crisis was profound, but its effects also extended to a

wider spectrum of countries. For countries outside the core of the crisis, the transmission channels were indirect, manifesting themselves in the tightening of global liquidity, the reduction of cross-border credit flows and the contraction of external demand for exports. Given the scale and speed with which financial shocks are transmitted worldwide, as well as the unpredictability of future crises, it becomes essential to strengthen the resilience of the banking sector, both in the face of domestic and external shocks.

In 2010, the increase in the minimum level of the capital adequacy ratio for banking institutions was announced, simultaneously with the launch of a new regulatory framework – Basel III. This is enshrined in two fundamental documents: the Global Regulatory Framework for More Resilient Banking Systems and Banks and the International Framework for Quantifying, Standardizing and Monitoring Liquidity Risk. Both reflect the reforms promoted by the Basel Committee, aimed at strengthening international capital and liquidity standards, as well as developing a more robust banking sector. The central objective of these reforms is to increase the capacity of banking institutions to absorb shocks from economic and financial turbulence, regardless of their origin, while reducing the risk of contagion from the financial sector to the real economy.

Over the past decade, the banking system of the Republic of Moldova has recorded a series of positive developments, reflected in the growth of the volume of assets, loans and deposits. An important aspect is the growth of new loans granted: in 2011, they increased by 26.4% compared to 2010. At the same time, the quality of the loan portfolio has improved, with the share of non-performing loans decreasing to 10.6% in 2011, 2.6 p.p. less than in 2010. These positive trends may contribute in the medium term to the decrease of interest rates, provided that inflation and the risks perceived by banks are reduced. Despite these advances, access to credit remains one of the main constraints for the business environment. According to the Global Competitiveness Report 2011–2012, this was the third most important problem for local entrepreneurs. The Republic of Moldova ranked 109th out of 142 countries in terms of ease of access to credit. The main reasons are:

- high interest rates, influenced by a high level of inflation;
- a significant risk premium included in the cost of commercial loans;
- a high banking margin, which in the first four months of 2012 stood at 7% for operations in national currency.

In addition, the share of the banking sector in GDP decreased in the post-crisis period: banking assets in relation to GDP decreased from 66.1% in 2009 to 57.5% in 2011, and deposits from 43.2% to 39.3%, while loans decreased from 37.1% to 35.9%.

The period preceding the crisis (2006–2008) was favorable for foreign investment. Among the most important acquisitions are the entry of Group Société Générale into Mobiasbanca and Gruppo Veneto Banca into Eximbank. However, the degree of foreign capital penetration remained modest: in 2010, foreign banks held 31.6% of the sector's assets, compared to an average of 88% in Central and Eastern Europe and 44.4% in the Eastern Partnership countries. The share of state capital was very low, representing only 2.5% of banking capital in 2011.

An important step in the modernization of the sector was the transition to International Financial Reporting Standards (IFRS) in 2012, which increased transparency and created the premises for the implementation of Basel II and Basel III principles.

The degree of financial intermediation of the Republic of Moldova, measured by basic financial depth indicators, recorded a significant evolution in the period 2006–2013. In 2012, the Republic of Moldova was at a level comparable to that of countries in the region at similar stages of development, surpassing even Romania in the indicators regarding the share of loans and deposits in GDP, but still remaining well below the European Union average.

The share of banking assets in GDP has increased steadily from 50.8% in 2006 to 76.3% in 2013, with the exception of 2009, when, amid the global economic and financial crisis, this indicator decreased by 7.3 p.p. Comparatively, the Republic of Moldova has surpassed states such as Armenia, Azerbaijan and Georgia, approaching the level recorded by Montenegro.

Also, the share of loans in GDP increased from 30.9% in 2006 to

42.2% in 2013. The growth rate was sharp until 2008 (20–30% annually), reaching the level of 39.4% of GDP, after which, under the impact of the financial crisis, the quality of bank portfolios deteriorated, causing a temporary decrease in the indicator for two consecutive years. Subsequently, the banking system resumed the expansion process: in 2012, the share of loans increased from 37.2% at the beginning of the year to 39.8% at the end of it, and in 2013 the gross loan portfolio increased by 20.6% (after an increase of 14.3% in 2012). These developments confirm the trend of consolidating the role of the banking system in financing the national economy and demonstrate the gradual increase of its influence on the development of the real sector. However, compared to European standards, the level of financial intermediation in the Republic of Moldova remains modest, which indicates significant potential for deepening financial integration and expanding lending to the economy.

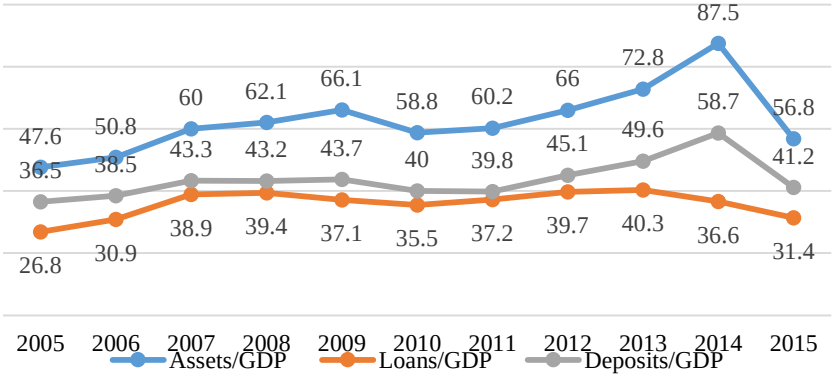

Figure 1.9. Degree of financial intermediation, %
Source: author's calculations according to data from the National Bank of Moldova

At the end of 2014, the banking sector of the Republic of Moldova was marked by an unprecedented systemic crisis, known as the devaluation of the three banks – Banca de Economii, Unibank and Banca Sociala. In an attempt to limit the consequences, the

Government secretly granted state-guaranteed emergency loans, which were later converted into public debt. The lack of institutional coordination, the shortcomings of banking supervision and the fragile political context facilitated the embezzlement of funds worth billions of lei, generating a long-term fiscal burden and seriously affecting confidence in the financial system and the political class. The size of the fraud was approximately 12% of the national GDP, generating not only significant direct losses for the banking sector, but also a major long-term fiscal burden for taxpayers, reflected in the transformation of state guarantees into public debt, estimated at around 13.6 billion MDL.

Despite the measures to liquidate the banks involved and the partial recoveries (approximately 1.2 billion MDL), the net impact on public finances remains overwhelming, especially through the additional costs generated by interest on the contracted debt (approximately 10 billion MDL). The decision not to direct the recovered amounts to reduce the debt to the NBM perpetuated the pressure on the public budget and implicitly on the population.

Kroll's investigations have demonstrated that the fraud was carried out through a complex, multi-stage mechanism, in which seemingly legal actions were orchestrated and combined to facilitate the systematic debasement of the three banking institutions – Banca de Economii, Unibank and Banca Socială. Thus, the "Theft of the Billion" is not only a manifestation of the vulnerabilities of the banking and regulatory system, but also an emblematic case of institutional capture, high-level corruption and structural fragility of the rule of law.

Therefore, this crisis has highlighted the urgent need for deep reforms in the banking sector, strengthening supervision and transparency mechanisms and creating an effective framework for preventing and sanctioning financial fraud, in order to restore the trust of citizens and investors and to avoid the repetition of such systemic slippages.

On December 21, 2017, the National Bank of Moldova published the summary of the second investigative report prepared by Kroll and Steptoe & Johnson. This document complements the conclusions of

the Kroll 1 report and examines the exposures of the three banks defrauded in the period 2012–2014, the role of the group led by Ilan Shor in the shareholding, the mechanisms used for money laundering and the destination of the stolen funds. However, the summary does not provide exhaustive details and does not reveal beneficiaries other than Shor, as sensitive information on the money trail and the complete list of individuals involved are to be included in the full Kroll 2 report, a document that will not be made public in order not to affect the criminal investigation.

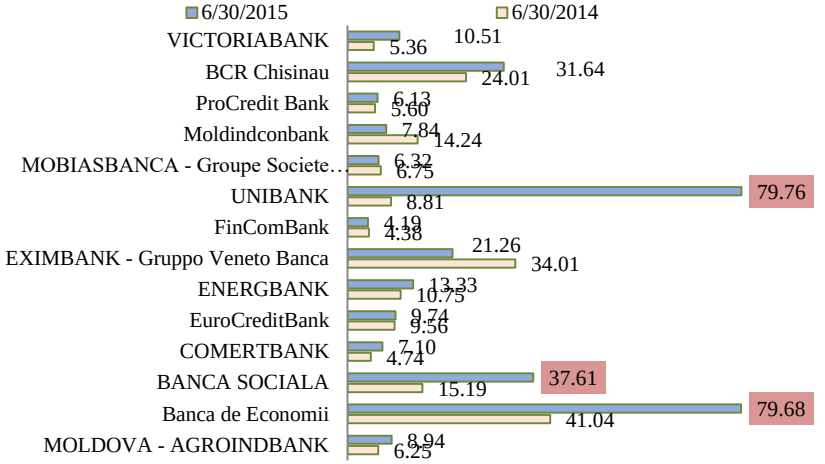

Figure 1.10. Share of non-performing loans in the banking sector as of 30.06.2014 and 30.06.2015, %

Source: Authors' calculations based on the data of the National Bank of Moldova.

Over the past two decades, the Republic of Moldova has faced profound transformations in terms of capital structure, regulatory framework, business practices and the general configuration of the economy. Restructuring them has been one of the essential tasks of the newly independent state, with major implications for economic stability and performance.

According to the National Bank of Moldova, the financial system is the essential circulatory mechanism of a functioning economy, integrating the set of rules, authorities, institutions and instruments that facilitate the flow of money in the economy. It operates through the active interaction of the state, enterprises, households and individuals. Whether we pay bills, receive transfers from abroad, exchange currencies, take out loans or make card payments, we inevitably participate in the functioning of this complex system.

In the Republic of Moldova, the regulatory and supervisory framework of the financial system is ensured by two independent authorities: the National Bank of Moldova (NBM) and the National Commission for the Financial Market (NCFM). The NBM has the role of developing and implementing regulations related to the banking sector, the foreign exchange market, non-bank lending, the insurance sector, the financial market infrastructure, as well as payment systems, arrangements and instruments. At the same time, it exercises supervisory and intervention functions to correct any malfunctions of the system.

The NCFM, in turn, is responsible for the regulation and supervision of the capital market and has as its main task the protection of the rights of consumers of financial services. In addition, the Service for the Prevention and Combating of Money Laundering (SPCSB) is the institution mandated to identify and mitigate the risks associated with money laundering and terrorist financing.

The fundamental objective of the National Bank of Moldova (NBM) is to ensure and maintain price stability in the economy. In fulfilling this mandate, without compromising its primary purpose, the NBM supports the functioning of a financial system based on market principles and contributes to the general economic policy of the state.

Price stability, reflected by maintaining inflation at a low and predictable level, is an essential condition for ensuring an economic environment conducive to sustainable growth and economic development. High inflation can erode public confidence in the national currency, as its loss of value leads to an increase in the tendency to quickly consume monetary resources, which fuels demand and, implicitly, an inflationary spiral. On the other hand, a deflationary

phenomenon – characterized by a continuous decrease in prices – can lead to the postponement of consumption, a reduction in aggregate demand, a decrease in production and investment, as well as a decrease in the income of the population.

In this context, the NBM has adopted an inflation targeting regime, establishing an "anchor" of 5% annually, with a tolerance of ±1.5 percentage points. This target aims to maintain inflation within an optimal range that favors macroeconomic balance.

To achieve the inflation objective, the National Bank uses a set of monetary policy instruments, the main of which is the open market operation, through which it influences liquidity and interest rates on the money market. In addition, auxiliary instruments are applied, such as:

- standing facilities (credit and deposit),
- the required reserve ratio applied to financial institutions,
- interventions on the foreign exchange market.

Monetary policy actions are directed by the Executive Committee of the NBM, which sets the base rate, the main orientation indicator for the short-term interbank money market. By adjusting this indicator, the NBM influences monetary and financial conditions in order to maintain inflation within the targeted range.

Financial stability refers to the ability of the financial system, which is composed of financial intermediaries, markets and infrastructures, to withstand major shocks and systemic imbalances, thus preventing the onset of crises with a widespread economic impact. This constitutes a fundamental premise for the efficient and sustainable functioning of the national economy.

The supervision of the financial system is based on a dual framework:

• the microprudential component, focused on monitoring and assessing risks at the level of individual entities (banks, non-bank credit organizations, etc.), and

• the macroprudential component, oriented towards identifying and managing systemic risks that may affect financial stability as a whole.

In accordance with art. 4 of Law no. 548/1995 on the National Bank of Moldova, the institution has as its fundamental objective the

maintenance of price stability, but, without compromising this goal, it also actively contributes to the consolidation of financial stability, while supporting the general economic policy of the state.

According to art. 5 of the same law, the National Bank is responsible for the development and implementation of macroprudential policy for the entities under its supervision. This responsibility aims to prevent the accumulation of systemic risks, mitigate their propagation and support a robust and resilient financial framework.

In 2024, the macroprudential indicators of the banking sector in the Republic of Moldova reflected a general trend of stability and consolidation. The system registered[16] several positive developments, including growth in total assets, strengthening of own funds, and an increase in the volume of bank deposits. Additionally, both the absolute value of non-performing loans and the volume of past-due loans declined. Consequently, portfolio quality indicators showed a marked improvement compared to the end of the previous year.

Despite these favorable trends, the banking sector's profitability[17] declined in 2024 compared to the same period of the previous year. This decrease was primarily attributed to a reduction in interest income, notably due to lower returns from investments in debt securities, such as government securities (VMS) and central bank notes (CBN), as well as from funds placed with the National Bank of Moldova (mandatory reserves). However, income derived from lending activities registered an increase, partially offsetting the overall decline.

Throughout the year, commercial banks[18] advanced their digital transformation efforts, focusing on the digitization of both internal processes and customer-facing services. These initiatives enhanced operational efficiency and contributed to expanding the customer

[16] National Bank of Moldova. (2024a). Raportul asupra stabilității financiare 2024. https://bnm.md/ro/content/rapoarte-de-stabilitate-financiara

[17] National Bank of Moldova. (2024b). Buletinul indicatorilor prudențiali și financiar-contabili ai băncilor comerciale. https://bnm.md/ro/content/statistici-sector-bancar

[18] World Bank. (2023). Digital Financial Services and Financial Inclusion in Moldova: Diagnostic and Policy Recommendations. https://www.worldbank.org

base, thereby supporting financial inclusion and service accessibility.

The concentration and liquidity levels in the banking sector remained high, sustained by the monetary policy framework implemented by the National Bank of Moldova. Concurrently, improvements were observed in key asset quality indicators, including a reduction in non-performing and overdue loans. As a result, the majority of banks reported a decrease in risk-weighted assets, reflecting more prudent credit risk assessments and better portfolio quality.

Notably, three banks emerged as sector leaders in terms of risk-weighted asset management and market activity: BC "MOLDOVA - AGROINDBANK" S.A., BC "Moldindconbank" S.A., and BC "Victoriabank" S.A. In terms of primary dealership and participation in the government securities market (VMS), the most active systemic banks during the reporting period included BC "Victoriabank" S.A., BC "MOLDOVA - AGROINDBANK" S.A., "FinComBank" S.A., and BC "Moldindconbank" S.A.

The degree of concentration of the domestic banking sector[19] remains at a high level in 2024. The asset market concentration index (AMIC) rose from 1918 points in 2022 to 2089.2 points at the end of 2024, a level from which the banking sector is considered to fall within the limits of a banking market with a high degree of concentration. And the value of loans (2289 points) compared to that of deposits (2169.7 points), indicates a higher concentration (excessively concentrated market) of the banking market of the Republic of Moldova. The ranking of the first four commercial banks, which hold 83.5% of total loans, increased by 3% in 2024, compared to 2022 (Table 1.6).

The banking sector presents a higher level of concentration, reflected by the market share by loans held by the top four banks in the system, as well as by the Herfindahl-Hirschman index (HHI) calculated by loans. The upward evolution of this indicator shows a

[19] INCE, (2024). Tendințe în Economia Moldovei. Publicației semestriale de analiză economică "Tendințe în Economia Moldovei" (Semestrul II, 2024, nr.52), https://ince.md/wp-content/uploads/2024/04/MET_50.pdf, 115 p.

continuous increase in the degree of concentration of the domestic banking sector and increased competition between banks.

Table 1.6. Banking sector concentration indicators, %

no.	Name of Banks	Market share by asset value (%)			Market share by loan value (%)			Market share by deposit value (%)		
		2022	*2023*	*2024*	*2022*	*2023*	*2024*	*2022*	*2023*	*2024*
1	BC "MOLDOVA - AGROINDBANK" S.A.	32,8	33,9	**34,9**	37,2	37,4	**37,9**	33	33,9	**35,7**
2	BC „Moldindconbank" S.A.	19,7	20,2	**21,2**	20,4	21,9	**23,7**	20,3	21,1	**22,2**
3	B.C. "VICTORIABANK" S.A.	14,0	14,1	**14,4**	9,3	10,3	**11,5**	14,4	13,9	**13,8**
4	OTP Bank S.A.	14,1	13,9	**12,6**	14,1	11,7	**10,4**	14,6	14,7	**13,1**
5	B.C. "ProCredit Bank" S.A.	4,7	4,2	**4,4**	5,8	5,3	**5,1**	3,5	3,3	**3,8**
6	B.C. "EXIMBANK" S.A.	3,6	3,3	**3,4**	3,5	3,4	**3,1**	3,5	3,2	**3,2**
7	"FinComBank" S.A.	3,8	3,8	**3,7**	3,3	3,5	**3,2**	3,8	3,8	**3,6**
8	BCR Chişinau S.A.	2,4	1,9	**1,2**	2,0	1,9	**0,5**	2,3	1,9	**1,0**
9	B.C. "ENERGBANK" S.A.	2,2	2,1	**1,9**	1,7	2,0	**2,3**	1,8	1,8	**1,7**
10	B.C. "COMERTBANK" S.A.	1,6	1,4	**1,3**	1,6	1,6	**1,3**	1,5	1,3	**1,2**
11	BC "EuroCreditBank" S.A.	1,2	1,1	**1,0**	1,0	1,1	**1,1**	1,2	1,0	**0,9**
Indicatorul HHI (puncte)		*1918*	*2006,2*	***2089,2***	*2153,8*	*2184,6*	***2289,0***	*1974,7*	*2051*	***2169,7***
Indicatorul CR-4 (%)		80,5	82,2	**83,2**	81	81,3	**83,5**	82,3	83,6	**84,8**

Source: Authors' calculations according to data from the National Bank of Moldova.

In recent years, the dominant position of the banking sector within the financial system of the Republic of Moldova has shown a moderate upward trend. The ratio of banking sector assets to GDP increased from 44% in 2019 to 52.6% in 2024, indicating a growing role of banks in the national economy. A similar trend was observed in the

ratio of bank loans to GDP, which rose from 19.6% in 2019 to 25% in 2024, despite a temporary decline to 21.7% in 2023. Likewise, the ratio of deposits to GDP increased from 33.1% in 2019 to 39.9% in 2024, although this indicator began to decline starting in 2022.

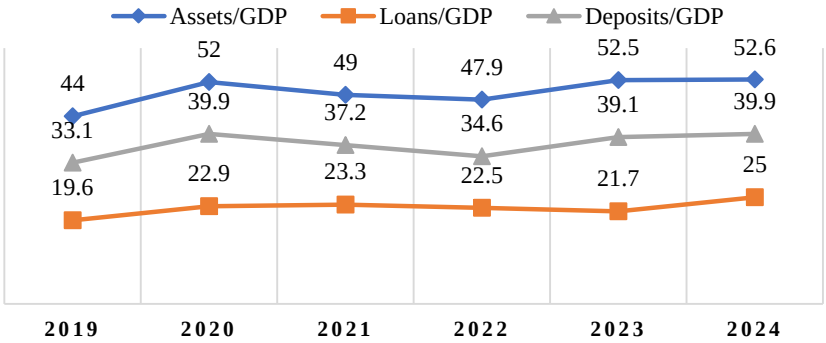

Figure 1.11. Degree of financial intermediation of the banking ector, %

Source: Authors' calculations based on data from the National Bank of Moldova and the National Bureau of Statistics.

The Moldovan banking market is characterized by a balanced development across all three major components: assets, loans, and deposits. The structure of the market reflects a tendency of both corporate clients and individuals to gravitate toward larger credit institutions, which benefit from enhanced visibility and perceived stability. The degree of concentration in the banking sector remains moderately high compared to regional peers and the average level observed in EU countries.

As of December 31, 2024, the total assets of the banking sector amounted to MDL 170,316.6 million, representing a year-on-year increase of 10.6%. In the same period, total risk-weighted exposure reached MDL 85,298.9 million, marking a 22% increase compared to the previous year. The share of risk-weighted assets in total assets increased by 4.6 percentage points, reaching 50.1%, which suggests a higher engagement in credit and investment activities.

The banking sector remains dominated by three key institutions in terms of asset volume:

BC "MOLDOVA - AGROINDBANK" S.A., with MDL 59,488.8 million; BC "Moldindconbank" S.A., with MDL 36,175.0 million; BC "Victoriabank" S.A., with MDL 24,608.3 million.

In 2024, total banking sector liabilities amounted to MDL 142,475 million, up 12% compared to the previous year. The top three banks in terms of liabilities were: BC "MOLDOVA - AGROINDBANK" S.A., with MDL 51,534.4 million; BC "Moldindconbank" S.A., with MDL 30,191.5 million; BC "Victoriabank" S.A., with MDL 19,664.6 million.

These figures highlight the continued consolidation of systemic banks and the important role they play in ensuring financial intermediation and economic resilience within the national economy.

According to data on the economic and financial performance of commercial banks, the total equity of the banking sector in the Republic of Moldova increased by 7.2% in 2024, reaching MDL 22,453.1 million compared to 2023. Tier 1 capital (core capital) also registered a 4.7% year-on-year increase, totaling MDL 21,346.2 million. Tier 2 capital experienced a significant rise, doubling from MDL 557.38 million at the end of 2023 to MDL 1,106.86 million in 2024.

Despite the increase in total capital, the overall equity-to-assets ratio of the banking sector declined by 3.6 percentage points, reaching 26.32%. Nevertheless, all 11 commercial banks in the system reported capital adequacy ratios above the prudential minimum requirement, with values ranging from 20.6% to 110.5%, indicating robust capitalization across the sector.

A noteworthy development was the significant increase in the equity ratio of BCR Chișinău S.A., in the context of its merger process with Victoriabank. The total equity-to-assets ratio for BCR Chișinău rose to 110.47%, marking an increase of 63.81 percentage points compared to 2023. This reflects the strategic impact of structural consolidation within the banking system and its potential to enhance financial strength and competitiveness.

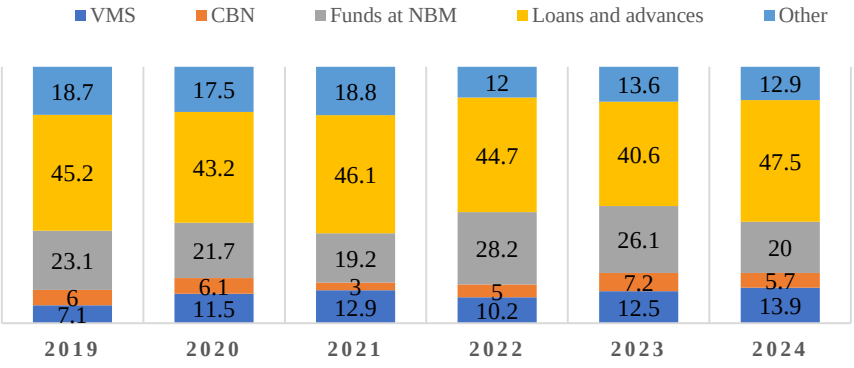

Figure 1.12. Structure of banking assets

Source: Authors' calculations based on data from the National Bank of Moldova

Kroll's investigations have demonstrated that the fraud was carried out through a complex, multi-stage mechanism, in which seemingly legal actions were orchestrated and combined to facilitate the systematic debasement of the three banking institutions – Banca de Economii, Unibank and Banca Socială. Thus, the "Theft of the Billion" is not only a manifestation of the vulnerabilities of the banking and regulatory system, but also an emblematic case of institutional capture, high-level corruption and structural fragility of the rule of law.

Therefore, this crisis has highlighted the urgent need for deep reforms in the banking sector, strengthening supervision and transparency mechanisms and creating an effective framework for preventing and sanctioning financial fraud, in order to restore the trust of citizens and investors and to avoid the repetition of such systemic slippages.

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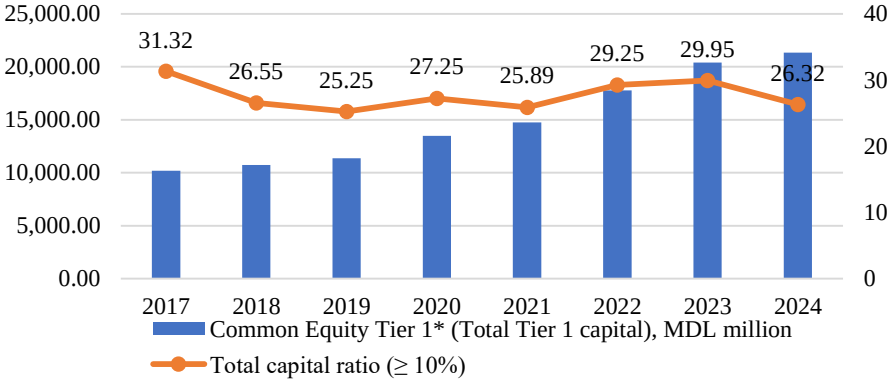

Figure 1.13. Evolution of bank capital quality

Source: Authors' calculations based on data from the National Bank of Moldova.

Therefore, this crisis has highlighted the urgent need for deep reforms in the banking sector, strengthening supervision and transparency mechanisms and creating an effective framework for preventing and sanctioning financial fraud, in order to restore the trust of citizens and investors and to avoid the repetition of such systemic slippages.

The Liquidity Coverage Ratio (LCR) for the sector as a whole was 274.2% (regulatory minimum ≥ 100%), with individual bank values ranging from 157.5% to as high as 1,671.4%. This marked a decrease of 7.9 percentage points compared to the end of 2023, yet continued to reflect a strong aggregate liquidity buffer. As of December 31, 2024, all banks remained compliant with prudential requirements on large exposures and exposures to affiliated persons, with one exception. A single bank exceeded the 30% regulatory limit for the sum of credit exposures to the ten largest clients or groups of related clients, registering a concentration ratio of 51.3%. However, in line with Chapter IV, point

26 of Regulation No. 109 on Large Exposures (adopted April 5, 2019), this situation does not constitute a regulatory breach, provided that the bank maintains additional own funds to cover the surplus exposure and remains in compliance with the respective capital requirement.

Banking sector profitability declined moderately in 2024. As of December 2024, the net profit of the sector amounted to MDL 3,974.5 million, reflecting a 3% decrease compared to the same period of 2023. As of June 30, 2024, the return on assets (ROA) and return on equity (ROE) stood at 2.39% and 14.79%, respectively, representing a decrease of 1.41 percentage points and 0.39 percentage points compared to the previous year.

The primary factor contributing to the decline in profitability was a reduction in interest income, which decreased by MDL 2,551.4 million. This decline was partially offset by increased revenue from foreign exchange operations (up MDL 342.1 million) and from fees and commissions (up MDL 316 million), indicating a degree of income diversification within the sector.

In 2024, the share of non-performing loans (NPLs) in total loans in the Republic of Moldova's banking sector decreased by 1.4 percentage points compared to December 2023, reaching 4.15%. The ratio of non-performing loans to total equity also declined, standing at 14.94%, a reduction of 2 percentage points over the same period. This downward trend was reflected across the majority of banks in the sector and is partly attributed to the cleanup of balance sheets following changes in majority shareholders, which facilitated a more rigorous review and restructuring of impaired assets.

In absolute terms, the volume of non-performing loans decreased by 5.5%, amounting to MDL 3,353.84 million. At the same time, the volume of expired loans increased by 24% during the year; however, their share in total loans decreased by 1.3 percentage points, reaching 1.9%. Across the banking system, the share of expired loans varied significantly, ranging from 0.0% to 5.2%, depending on the institution.

The quality of loan portfolios remained a critical factor in evaluating the sustainability and resilience of the banking sector. The observed reduction in non-performing loans in 2024 signifies improvements in credit risk management practices. Concurrently, financial institutions

continued to implement targeted strategies aimed at risk diversification and enhancing the assessment of borrower solvency, which contributed to improved asset quality across the sector.

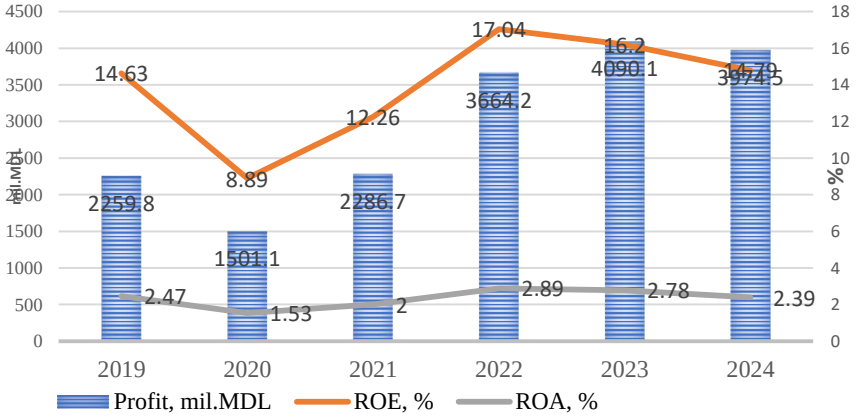

Figure 1.14. Evolution of banking profitability and profitability
Source: Authors' calculations according to data from the National Bank of Moldova.

As of the end of December 2024, the volume of new loans granted by the banking sector in the Republic of Moldova reached MDL 68,987.1 million, representing an increase of 34% compared to December 2023 (MDL 51,471.44 million). Of the total loans issued, MDL 51,867.5 million were denominated in national currency, while MDL 16,533.1 million were granted in foreign currency. Additionally, MDL 586.47 million were issued as loans indexed to exchange rate fluctuations. This significant growth in lending activity reflects both increased credit demand and the banking sector's improved capacity for financial intermediation, contributing to the overall expansion of domestic credit and potentially supporting investment and consumption dynamics.

In 2024, the total loan balance in the banking sector of the Republic of Moldova reached MDL 80,824.6 million, representing an annual increase of 26.5% compared to 2023. Loans accounted for 47.5% of

total banking sector assets, underscoring their central role in financial intermediation. Of the total loan portfolio, 21.7% was denominated in foreign currency, a decrease from 25.8% in the corresponding period of 2023, reflecting a shift toward national currency lending.

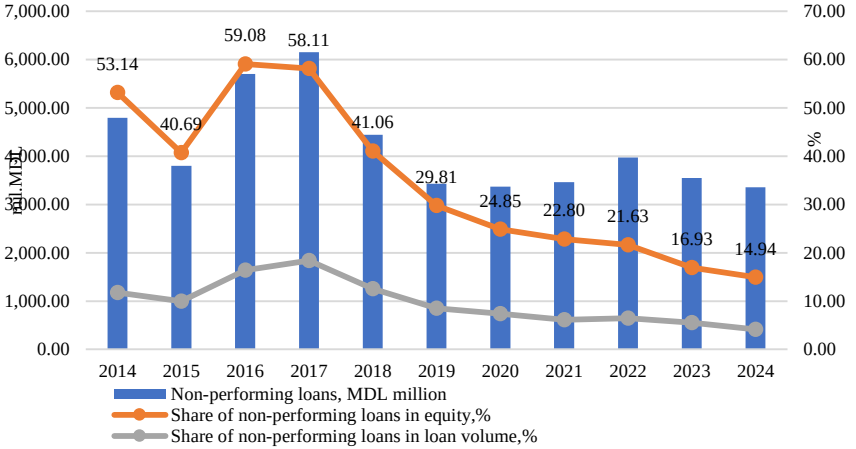

Figure 1.15. Evolution of non-performing loans and volume of loans granted

Source: According to data from the National Bank of Moldova.

By borrower category, loans to households amounted to MDL 34.1 billion, marking a robust increase of 35% year-on-year. Corporate lending also experienced significant growth, with the balance reaching MDL 46.6 billion, an increase of 21% over the same period. These dynamics indicate expanding credit demand across both segments, supported by favorable lending conditions and improved borrower confidence.

The annual growth rate of loans denominated in national currency increased slightly over the last two quarters of 2023, while the share of foreign currency loans continued to decline. This trend may reflect enhanced monetary policy credibility, reduced currency risk appetite, and a gradual shift toward domestic-currency-based financial products.

In 2024, the most significant increases in lending were observed across several key sectors of the Moldovan economy. Loans granted for the purchase or construction of real estate registered the highest growth, increasing by MDL 5,324.8 million (40.1%) to a total of MDL 18,607.0 million. Consumer loans rose by MDL 3,561.0 million (31.8%) to MDL 14,760.9 million, while loans extended to the trade sector increased by MDL 2,595.6 million (18.2%) to MDL 16,834.3 million.

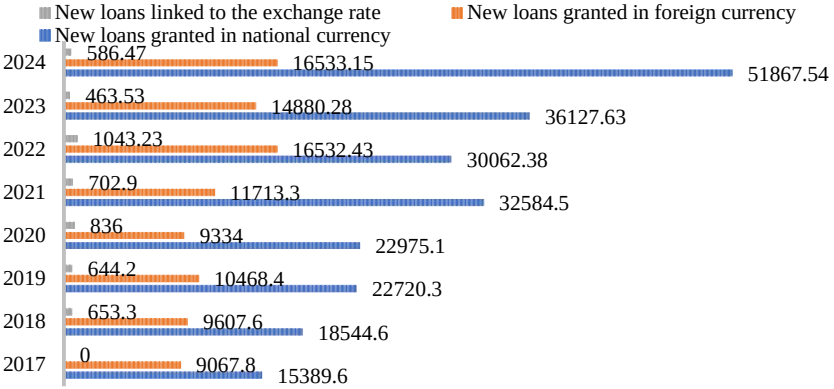

Figure 1.16. Volume of new loans granted by currency, million MDL

Source: According to data from the National Bank of Moldova.

Substantial growth was also recorded in:

- ✓ Energy sector lending, which rose by MDL 936.3 million (125.0%) to MDL 1,685.4 million;
- ✓ Construction sector loans, which grew by MDL 867.6 million (73.1%) to MDL 2,054.1 million;
- ✓ Loans to non-bank financial institutions, which increased by MDL 729.6 million (26.5%) to MDL 3,487.2 million;
- ✓ Loans for service provision, which grew by MDL 688.5 million (31.8%) to MDL 2,856.8 million;
- ✓ Agricultural sector loans, which rose by MDL 557.5 million (12.3%) to MDL 5,079.3 million.

The only segment that recorded a decline in 2024 was the category of 'other loans,' which decreased by MDL 45.2 million (2.0%) to MDL 2,245.0 million. As of December 31, 2024, the share of non-performing loans (classified as substandard, doubtful, and compromised) in total loans decreased by 1.4 percentage points, reaching 4.1%. This indicator varied between 2.6% and 10.8% across individual banks, reflecting differing levels of credit risk exposure and portfolio management efficiency.

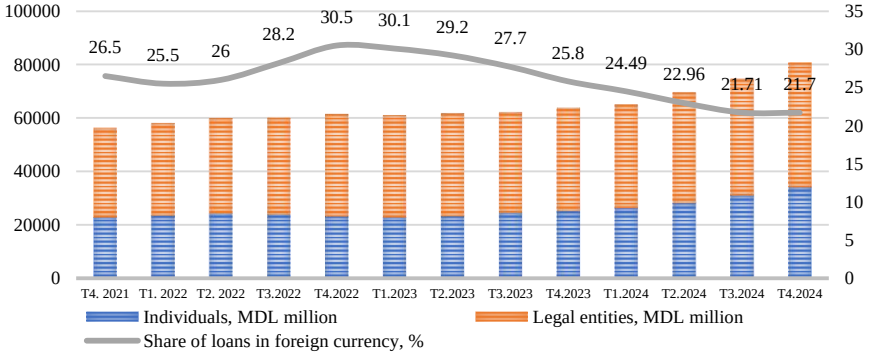

Figure 1.17. Evolution of loans in the currency in which they are granted and the category of borrowers

Source: According to data from the National Bank of Moldova.

In terms of deposit activity, the balance of deposits – both in national and foreign currency – reached MDL 131.5 billion as of December 31, 2024, representing an increase of 13.4% compared to the end of 2023. Of this total, 64.12% (MDL 82.77 billion) were deposits denominated in the national currency, while 35.8% (MDL 46.32 billion) were foreign currency deposits.

This increase was driven by a 13.5% rise in corporate deposits and a 13.2% rise in household deposits as of December 2024, compared to the previous year. The volume of newly attracted deposits amounted to MDL 6,046.3 million, reflecting a modest 2% increase year-on-year. Of this, MDL 3,867.72 million were denominated in national currency, and MDL 2,178.58 million in foreign currency.

To operationalize the proposed conceptual framework of banking sector resilience, a preliminary descriptive analysis was conducted using selected indicators representative of the five core dimensions: financial, operational, governance and regulation, external, and social/reputational resilience. The statistical foundation draws upon aggregated sectoral data available for the year 2024, offering a snapshot of the structural condition of the banking system in the Republic of Moldova.

The financial resilience dimension is captured through key performance indicators such as Return on Assets (ROA), Return on Equity (ROE), the Non-Performing Loans (NPL) ratio, and the Liquidity Coverage Ratio (LCR). In 2024, the ROA was reported at 2.3%, and the ROE at 14.8%, reflecting adequate profitability and capital efficiency within the system. The NPL ratio decreased to 4.1%, indicating an improvement in credit portfolio quality, while the LCR reached 274.2%, substantially surpassing the prudential benchmark of 100%.

In the operational dimension, the ongoing digital transformation of the banking sector is evidenced by an estimated 85% share of transactions executed electronically, supported by IT investments totaling approximately MDL 200 million. These developments highlight growing technological resilience and efficiency in service delivery.

Governance and regulatory resilience is illustrated by the 12 compliance audits carried out by the National Bank of Moldova (NBM) in 2024, underscoring a proactive supervisory approach consistent with international prudential standards.

In the context of external resilience, the sector's foreign exchange (FX) exposure was reported at 21.7%, indicating a moderate level of vulnerability to currency risk and external financial shocks. This underlines the need for continuous strengthening of risk management systems and macroprudential buffers.

The social and reputational resilience of the sector was evaluated through a trust index of 7.2 (on a scale from 1 to 10) and a low complaints rate of 0.5%, suggesting relatively high levels of consumer confidence and institutional credibility.

Together, these descriptive statistics provide not only a baseline for understanding the structural dynamics of the Moldovan banking sector, but also a foundation for the application of the resilience model in comparative, cross-sectional, and time-series analyses. Although limitations exist regarding the availability of uniform data across all institutions, the proposed framework demonstrates strong potential for integration into macroprudential supervisory strategies.

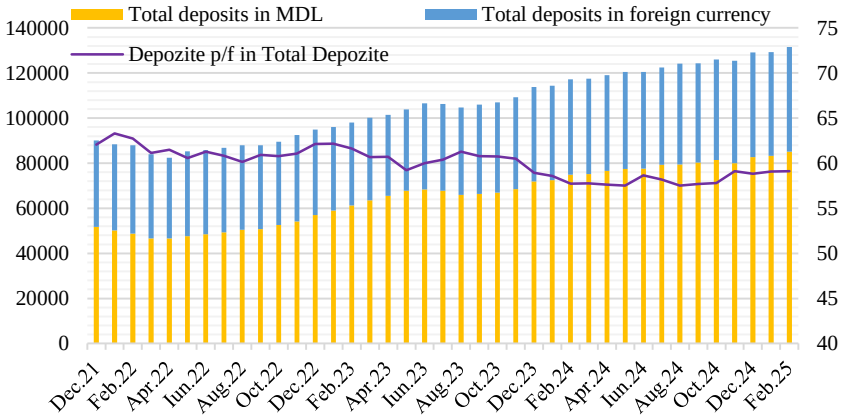

Figure 1.18. Evolution of the structure of deposits attracted by banks

Source: Authors' calculations according to data from the National Bank of Moldova.

The Table 1.7 above presents an applied example of the Composite Banking Resilience Index (CBRI) for three systemic banks in the Republic of Moldova – MAIB, Moldindconbank, and Victoriabank – based on a set of fictitious normalized data. Results and Interpretation:

1. MAIB has the highest resilience score (CBRI = 0.810), being classified as "High Resilience."
2. Moldindconbank records a solid score (CBRI = 0.748), also classified as "High Resilience."

3. Victoriabank is at the lower threshold of the upper category (CBRI = 0.692), being classified as "Moderate Resilience."

To support a quantitative and integrative evaluation of sectoral resilience, this study introduces a Composite Banking Resilience Index (CBRI). The CBRI is structured around the five dimensions of resilience and follows established guidelines for composite index construction provided by the Organisation for Economic Co-operation and Development[20] and the European Commission's Joint Research Centre[21]. These methodological foundations ensure transparency in indicator selection, normalization, aggregation, and interpretation, facilitating the model's scalability and replicability for policy application.

Table 1.7. Composite Banking Resilience Index (CBRI)

Bank	Financial	Operational	Governance &Regulation	External	Social& Reputational	CBRI
MAIB	**0.82**	**0.85**	**0.9**	**0.7**	**0.78**	**0.8099**
Moldindconbank	**0.76**	**0.79**	**0.8**	**0.65**	**0.74**	**0.748**
Victoriabank	**0.68**	**0.72**	**0.75**	**0.6**	**0.71**	**0.692**

Source: elaborated by authors

According to the Quarterly Financial Stability Assessment Report, Q4 2024[22], an adequate level of resilience to systemic risks is highlighted. The financial stress index recorded a value of 0.44, below the alert threshold of 0.58, which reflects stable operating conditions within the financial system. At the same time, the vulnerability level of the banking sector was placed at -0.60, below the signal threshold

[20] OECD. (2008). Handbook on Constructing Composite Indicators: Methodology and User Guide. Paris: Organisation for Economic Co-operation and Development. https://doi.org/10.1787/9789264043466-en

[21] Saisana, M., Saltelli, A., & Tarantola, S. (2005). Uncertainty and Sensitivity Analysis Techniques as Tools for the Quality Assessment of Composite Indicators. Journal of the Royal Statistical Society: Series A (Statistics in Society), 168(2), 307–323. https://doi.org/10.1111/j.1467-985X.2005.00350.x

[22] https://bnm.md/ro/content/raportul-trimestrial-de-evaluare-stabilitatii-financiare-trimestrul-iv-2024

of 0, indicating the absence of significant accumulation of systemic risks.

The risk of direct contagion remains low, an aspect explainable by the structure of the exposure portfolio, dominated by relationships with credit institutions abroad. Although the interbank network is relatively concentrated, it does not present signals of systemic stress, and the degree of interconnection does not generate major risks in the current context. Also, no signs of excessive sectoral concentration of lending were identified.

A notable aspect is the continued upward trend in banks' exposures to non-banking financial institutions (NBFIs), which in the fourth quarter recorded an increase of 10.5% compared to the previous quarter, reaching MDL 3,407.7 million, which represents 4.2% of the total loan portfolio. It is important to note that all these loans were classified in performing categories, which suggests a prudent management of the credit risk associated with this segment.

According to the systemic risk survey conducted among banking institutions, cyber risk has intensified its position, occupying fourth place in the risk perception ranking, after geopolitical, macroeconomic and sovereign risks, which are still considered the most significant by banks.

On the lending dimension, the quarterly lending activity survey reveals a slight relaxation of lending standards for both the corporate and the household segments, in parallel with a modest increase in loan demand in both segments.

Lending activity registered an accelerated dynamics in the fourth quarter of 2024. The volume of new real estate loans increased by 2.5 times compared to the same period of the previous year, and by 52.4% compared to the previous quarter, totaling 3,155.2 million MDL. Also, new consumer loans increased by 41.7% in annual terms, although they registered a quarterly decrease of 8.4%, totaling 3,624.7 million MDL.

From the perspective of the quality of the loan portfolio, a marginal improvement is noted. For legal entities, the balance of expired loans increased by 0.4%, but their share in total loans granted decreased to 2.2%. In the case of individuals, a significant reduction of 13.9% in

expired loans was recorded, with a share of 1.5% in the total portfolio related to this segment.

The risk profile of individual borrowers remains cautious. Thus, 70.1% of new loans granted recorded a debt service to income ratio (DSI) below 40%, and 91.5% were below the 55% limit. In addition, 94.4% of these loans were secured by a loan-to-collateral ratio (LCR) below 80%, indicating a solid collateral structure for the loans granted.

The residential real estate market was significantly influenced by the expansion of lending. The Chisinau Housing Price Index (RPPI) reached 178.8%, marking a quarterly increase of 12.2% and an annual increase of 36.4% – the second fastest expansion of this indicator since 2019.

Regarding credit risk, it continues to represent the main vulnerability of the banking sector, especially in light of the intensification of lending to the population. However, the results of stress tests reveal that banking institutions have adequate levels of own funds, being able to absorb potential deteriorations in asset quality without affecting the overall stability of the financial system.

In terms of liquidity risk, banks maintain a robust position, benefiting from substantial reserves of liquid assets. Simulations carried out for various crisis scenarios indicate the emergence of possible liquidity deficits only in the most severe hypotheses, which are considered unlikely under current conditions.

The role of the insurance sector in strengthening climate and economic resilience. The intensification of systemic risks in recent years – such as climate change, cyberattacks and technological disruptions – gives the insurance sector an increasingly important role in supporting the adaptation and recovery capacity of companies and communities. The accelerated pace of change generates significant pressures on business performance, and the degree of organizational resilience is becoming a determining factor of long-term competitiveness. Recent studies show that resilient companies perform better during crises and strengthen their position even in

adverse times[23].

Although many business leaders recognize the need to prepare for future disruptions, a significant percentage of them do not feel fully prepared. In this context, the insurance industry provides not only financial instruments for transferring risk, but also essential expertise in the field of risk assessment and management. By providing analytics, scenario models and tailored advice, insurers help anticipate threats and formulate robust business continuity plans[24].

One of the central dimensions is *climate risk management*. According to the Global Risk Report 2024[25], risks associated with extreme weather events, ecosystem degradation and biodiversity loss are at the top of the list of concerns for economic leaders. According to estimates by the Potsdam Institute for Climate Impact Research, global economic losses caused by climate change could reach USD 38 trillion by 2050[26].

In addition to the risk transfer component, insurers also offer risk engineering solutions, integrated assessments of physical and transition risks, and support in the design of adaptation strategies at the urban and regional level. For example, Zurich Insurance is working with the local authorities in Madrid to map the city's exposure to climate risks in the short and long term, thus supporting the development of sustainable urban resilience policies[27].

Cyber risks are also gaining a growing share in the modern threat portfolio. According to the *Global Risk Report*, cyber attacks are considered a major concern by respondents from both the public and

[23] https://www.mckinsey.com/industries/industrials-and-electronics/our-insights/resilience-during-uncertainty-what-industrial-leaders-must-know
[24] Zurich Insurance Group. (2024). How insurers can support resilience and recovery. Retrieved from https://www.zurich.com/knowledge/topics/global-risks/how-insurers-can-support-resilience-recovery
[25] World Economic Forum. (2024). Global Risks Report 2024. Geneva: WEF https://www.weforum.org/publications/global-risks-report-2024/
[26] Potsdam Institute for Climate Impact Research. (2023). Climate impacts and economic losses. Retrieved from https://www.pik-potsdam.de
[27] Zurich Insurance Group. (2024). How insurers can support resilience and recovery. Retrieved from https://www.zurich.com/knowledge/topics/global-risks/how-insurers-can-support-resilience-recovery

private sectors. Technological advances in artificial intelligence can amplify these vulnerabilities, and estimates indicate a 25% probability that Fortune 1000 companies will be affected by security breaches. Insurers offer *cyber resilience* solutions, including audits, training and specific coverage for incidents, adapted to the size and profile of each organization[28].

Thus, the insurance sector is evolving beyond the traditional function of loss compensation, becoming a *strategic actor in supporting the resilient transformation* of modern economies. Through a holistic approach to risks, based on cross-sector collaboration, education and advanced use of data, the insurance industry actively contributes to creating a more robust society and better prepared for future challenges.

Insurance in the transition to sustainability. In recent decades, climate change has become a major source of socio-economic instability at a global level, generating unprecedented economic losses and accentuating the systemic vulnerabilities of modern societies. The intensification of extreme weather events – such as floods, heat waves, droughts or violent storms – has led to annual economic losses estimated at over USD 200 billion, according to recent reports[29]. In this context, the role of the insurance sector is becoming increasingly relevant not only for mitigating direct financial risks, but also as a key actor in the transition to a resilient and sustainable economy.

One of the main challenges identified is the *existence of a global protection* gap, estimated at around USD 139 billion annually. This gap reflects the low degree of insurance coverage among the population and businesses exposed to climate risks, especially in low- and middle-income regions. Although increasing insurance coverage could significantly reduce the economic impact of disasters, many individuals and businesses either do not have access to adequate insurance products or are unaware of the importance of proactive

[28] https://www.howdengroup.com/

[29] Insurance Europe. (2024). Insurance matters: Climate change & sustainability. https://www.insuranceeurope.eu/mediaitem/176e97a6-f3dc-41e3-b2fe-affa2e7de04e/Insurance+Matters+-+Climate+change+%26+sustainability.pdf?inline=1

financial protection[30].

Faced with these challenges, the European – and global – insurance sector is redefining its mission, assuming a broader role in supporting climate risk adaptation and mitigation efforts. Key areas of action include:

• *Developing insurance products adapted to emerging risks*, including parametric policies for agriculture, critical infrastructure or housing in high-risk areas;

• *Encouraging preventive behaviour* by offering premium discounts for investments in resilience (thermal insulation, protective barriers, early warning systems, etc.);

• **Creating public-private partnerships** aimed at covering "catastrophic" risks through mutual funds, state reinsurance schemes or emergency funds for reconstruction;

• **Integrating ESG criteria into investment decisions**, with insurers being among the largest institutional investors that can redirect capital towards green projects, renewable energy and sustainable infrastructure;

• **Digitalizing claims assessment processes** and using emerging technologies (e.g. satellites, AI, IoT) for real-time risk monitoring and optimizing response.

At the same time, financial education and awareness of climate risks are essential for expanding insurance penetration, especially among vulnerable populations. Lack of product understanding, distrust in the financial system or difficulty in accessing digital services can perpetuate financial exclusion and exacerbate future losses.

Insurance innovation as a strategic tool for managing climate risks. Climate risk has become a central factor in corporate strategies, not just a marginal concern. Extreme events generated by climate change (severe weather events, fires, sea level rise) cause significant financial losses, and their impact is growing rapidly. Thus, we can see

[30] Insurance Europe. (2024). Insurance matters: Climate change & sustainability. https://www.insuranceeurope.eu/mediaitem/176e97a6-f3dc-41e3-b2fe-affa2e7de04e/Insurance+Matters+-+Climate+change+%26+sustainability.pdf?inline=1

that climate risk represents one of the most complex and urgent global challenges for business and society as a whole. To minimize these risks, early adaptation is necessary through strategic partnerships with the insurance sector, which will allow companies to protect assets, investments and communities.

In the insurance sector, new methods of risk assessment and management are emerging – for example, *parametric insurance* that offers rapid compensation (within 48 hours) based on quantifiable events, such as rainfall levels or storm intensity[31]. These instruments trigger rapid compensation, without damage assessment, and are ideal for rare but high-impact climate risks, reducing administrative costs and facilitating recovery. They were designed to provide immediate financing adapted to the affected environment, becoming an integral part of strategic financial resilience plans.

By applying innovative risk management instruments in insurance, climate risk is transformed into a competitive advantage. This facilitates financial stability, increased stakeholder confidence and access to sustainable capital.

From the above, we can deduce some key points of the importance of insurance sector innovation as a strategic tool for managing climate risks:

• Climate represents a real business risk, but it can also be an opportunity for innovation. Businesses that understand and proactively manage these risks can gain a strategic advantage

• Solutions based on climate risk modeling (e.g. Resilience Laboratory – a digital platform developed by Howden with Microsoft support) allow the assessment of the financial impact of climate scenarios and the substantiation of investment and insurance decisions.

• Parametric insurance and risk transfer instruments become imperative for financial resilience, especially in the face of the increase in the frequency and intensity of extreme climate events.

Therefore, the insurance industry is not only an instrument for compensating losses, but is becoming a strategic vector of

[31] https://www.howdengroup.com/au-en/climate-risk-business-risk

sustainability, with an impact on urban planning, agriculture, investment and social protection policies. The active involvement of this sector in the development of climate policies and in the financing of the ecological transition is essential for reducing protection gaps and creating a resilient and equitable framework for future generations.

Resilience of the insurance sector in the Republic of Moldova. In the architecture of national economic resilience, the insurance sector has a strategic role. Through its functions of risk transfer and dispersion, it significantly contributes to financial stability and the protection of economic agents and the population from events with negative impact.

In the Republic of Moldova, the influence of the insurance sector on the post-crisis economic recovery capacity remains, however, insufficiently analyzed. Given the considerable impact that this sector has on the economic systems of other countries, it is necessary to initiate a research approach that reflects the particularities and performances of the domestic sector.

Assessing the degree of resilience of the insurance system in the Republic of Moldova allows for a deeper understanding of the existing vulnerabilities and opportunities for structural reform with the aim of strengthening the capacity to react to external shocks and to support sustainable economic development.

The research problem from which the study started was to determine how the crises of the last decade have influenced the insurance market in the Republic of Moldova and what lessons we can learn from it. One of the most significant crises to which we refer is the COVID-19 pandemic, followed by the geopolitical conflict and the energy crisis of 2022. The purpose of the research was to analyze the evolution of the insurance market in our country over the last 10 years in order to determine how resilient this sector of the economy is.

When assessing the degree of resilience of the insurance sector in the Republic of Moldova in the context of recent exogenous shocks, especially the COVID-19 pandemic, it is appropriate to apply a dynamic analysis on the relevant aggregate data for the period 2014–2024. This approach allows the identification of fluctuations recorded

in the different stages of the resilience cycle – absorption, adaptation and recovery – and highlights the capacity of the insurance system to support post-crisis economic stability.

Among the key indicators analyzed are: the density and degree of insurance penetration, the number of professional players in the market, the volume of gross premiums written, the volume of claims paid and the net profit of insurance companies. The evolution of these indicators provides a relevant picture of the shock absorption capacity and the relaunch of activity in the sector.

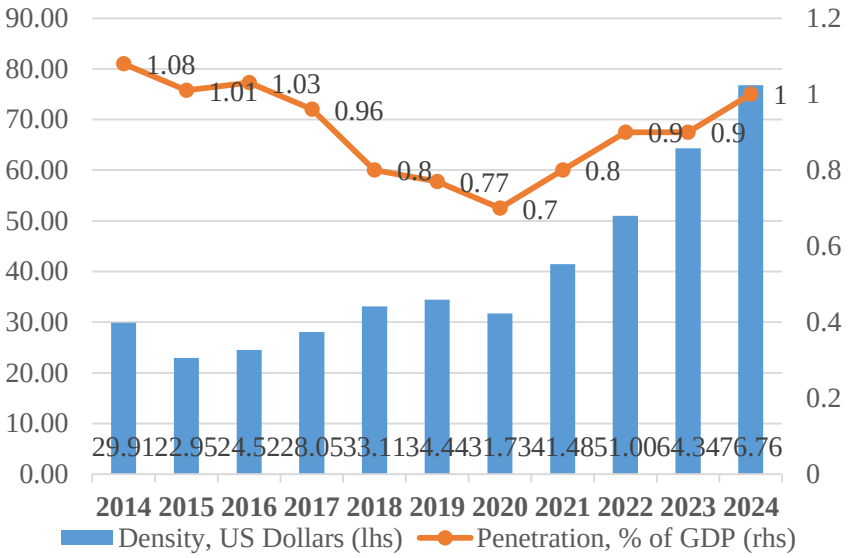

Figure 1.19. Evolution of insurance market development indicators in the Republic of Moldova (2014-2024)

Source: developed by the author based on NBM and NBS data.

Internationally recognized diagnostic indicators for assessing the performance of insurance markets are density and penetration. The insurance penetration rate is widely used to assess the relative importance of the insurance sector within a country's economy. It reflects how well the insurance sector is integrated into the economy

and, indirectly, the level of development and awareness of the population regarding insurance protection. In the Republic of Moldova, the insurance penetration rate stood at only 1.0% in 2024, a value significantly below the average of countries with developed economies. We can mention here that the average penetration rate of the insurance market in the European Union is around 8%. However, an upward trend is observed in the post-pandemic years, with the indicator increasing compared to the values recorded in 2020 and 2021 (0.7% and 0.8%, respectively). This evolution suggests that the sector has demonstrated the capacity to absorb the pandemic shock and has entered a moderate recovery trend.

A similar behavior is observed in the case of insurance density, which reached 76 USD per capita in 2024, indicating an openness of the population towards insurance services. Compared to 2020, an increase of approximately 45 p.p. is observed, which reinforces the hypothesis of the revival of the sector and the increase in the degree of consumer confidence.

During the analyzed period, the insurance sector underwent a major systemic reform. Starting with July 1, 2023, the supervisory authority of the non-banking financial market in the Republic of Moldova, of which the insurance sector is also part, became the National Bank of Moldova (NBM), thus replacing the National Commission for the Financial Market (NCFM). This transfer of responsibilities involved the NBM taking over the licensing, regulation and supervision of the activities of insurers, reinsurers, intermediaries, as well as the National Bureau of Motor Insurers (BNAA). The goal pursued by the state authorities through this change was to create a more integrated and resilient structure within the financial system of the Republic of Moldova.

Along with the transfer of insurance supervision responsibilities to the National Bank of Moldova, a set of legislative amendments was implemented in the insurance industry of the Republic of Moldova. Thus, the legislative basis in this sector was revised:

• Law No. 92 of 07.04.2022 on insurance or reinsurance activity (Parliament of the Republic of Moldova, 2022a);

• Law No. 106 of 21.04.2022 on compulsory motor third party

liability insurance for damage caused by motor vehicles (Parliament of the Republic of Moldova, 2022b).

• NBM Decision No. 328 of 19.12.2024 for the approval of the Regulation on own funds, valuation of assets and liabilities, assets admitted to cover technical reserves and the minimum capital requirement, solvency and liquidity of the insurance or reinsurance company and amendment of some normative acts (prudential/financial stability indicators in the insurance field)

• Regulation on the governance system of insurance or reinsurance companies no. 241 of 26.09.2024

• and other legislative and normative acts regulating the insurance activity in the country[32].

These legislative measures aim, mainly, to consolidate the insurance market in the country by protecting the rights and interests of beneficiaries of financial services and ensuring the stability of the insurance system.

In order to objectively reflect the current situation of the insurance sector in the Republic of Moldova, the main financial indicators were dynamically analyzed, such as liquidity, solvency, the volume of gross written premiums and premiums ceded to reinsurance, along with net profit in aggregate values (Table 1.8).

From the data presented in Table 1.8, it can be seen that 9 insurance companies operate on the insurance market in the Republic of Moldova, of which only one, Grawe Carat Asigurări, provides life insurance services. The share of life insurance on the market is 3.3% in 2024, constantly decreasing during the last 5 years. Of the total gross premiums subscribed for general insurance[33], the classes the largest shares were held by Mandatory Motor Third-Party Liability Insurance (53%) and Comprehensive Motor Vehicle Insurance (CASCO), other than railway, with a share of 20%. Thus, car insurance in the Republic of Moldova has a share of 73 percent of the market.

[32] https://bnm.md/ro/content/lista-regulamentelor#art7

[33] Banca Națională a Moldovei. Date statistice generale privind sectorul asigurări, asigurările RCA și Carte Verde. Disponibil la: https://bnm.md/ro/content/date-statistice-generale-privind-sectorul-asigurari-asigurarile-rca-si-carte-verde-0

During 2023, insurance companies subscribed gross premiums worth 168,73 million US dollars, 18.8% more than the gross premiums subscribed in the previous year, which indicates a significant growth trend in this sector.

According to the normative requirements[34], the solvency rate of the insurer (reinsurer) must be equal to at least 100%. The statistical data presented by the NBM for the year 2023 (Table 1.8) show that all insurance companies operating on the financial market in the Republic of Moldova have a level that exceeds the established norms, which reflects a high solvency of the insurers.

Table 1.8. Indicators of the insurance companies in the Republic of Moldova (situation on 01.01.2024)[35]

	Name of the insurance company	Solvency ratio, %	Liquidity coefficient	Gross premiums, US Dollars	Claims paid, US Dollars	Premiums ceded to reinsurance, US Dollars	Net profit, US Dollars
1	ACORD GRUP SA	173,9	4,3	13,69	2,64	2,71	2,26
2	ASTERRA GRUP SA	126,8	3,7	29,08	9,87	3,84	3,80
3	DONARIS VIENNA INSURANCE GROUP SA	140,2	2,3	20,75	8,07	4,59	1,94
4	GENERAL ASIGURARI SA	133,3	4,9	24,04	8,45	3,87	2,18
5	GRAWE CARAT ASIGURARI SA	140,3	4,9	24,73	11,92	1,68	2,98
6	INTACT ASIGURARI GENERALE SA	155,5	6,5	17,45	4,81	9,47	3,88
7	MOLDASIG SA	183,6	3,1	25,64	6,67	4,80	1,53
8	MOLDCARGO SA	130,5	2,7	5,54	2,36	2,58	-1,14
9	TRANSELIT SA	137,0	4,2	7,82	3,06	5,42	0,60
TOTAL		**X**	**X**	168,73	57,85	38,97	18,04

Source: developed by the author based on NBM data

[34] Hotărârea BNM nr. 328 din 19.12.2024 pentru aprobarea Regulamentului privind fondurile proprii, evaluarea activelor și pasivelor, activele admise pentru acoperirea rezervelor tehnice și cerinței de capital minim, solvabilitatea și lichiditatea societății de asigurare sau de reasigurare și modificarea unor acte normative (indicatorii prudențiali/de stabilitate financiară în domeniul asigurărilor). https://bnm.md/ro/content/hotararea-bnm-nr-328-din-19122024-pentru-aprobarea-regulamentului-privind-fondurile-proprii

[35] The exchange rate according to NBM data on 31.12.2023 was 1 Moldovan leu = 17.4 US Dollars

The average solvency ratio for non-life insurance activity in the last year (2024) increased by 27.5 percentage points compared to the end of the previous year and amounted to 175.4 percent, with insurance companies reporting solvency ratios ranging between 139.0 percent and 234.0 percent. For life insurance activity, a solvency ratio of 655.4 percent was recorded, a significant increase of 30.3 percentage points compared to the situation on 31.12.2023.[36]

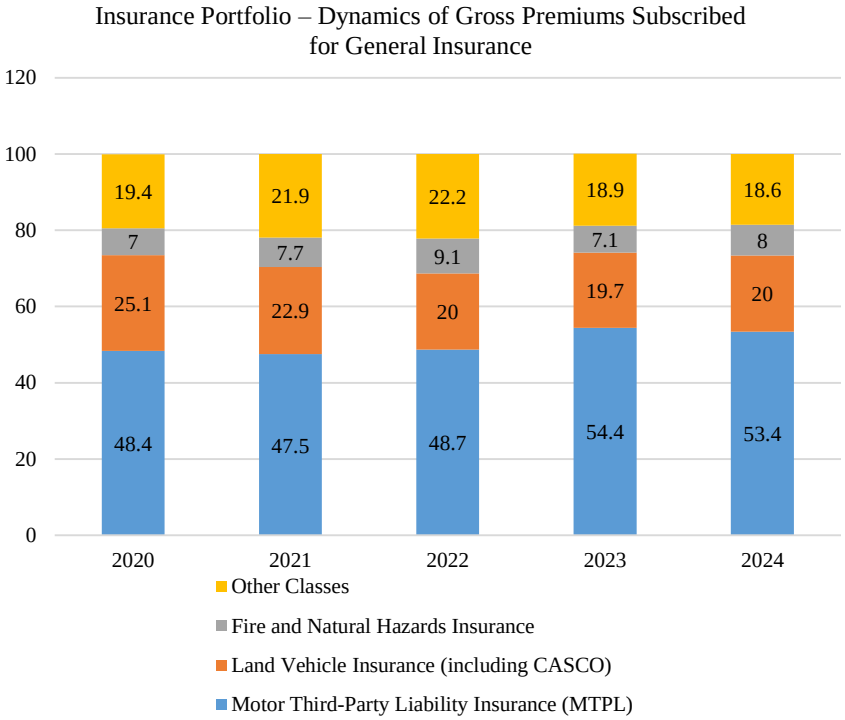

Figure 1.20. Insurance Portfolio – Dynamics of gross Premiums Subscribed for General Insurance

Source: developed by the author based on data from the National Bank of Moldova and the National Bank of Moldova.

[36] https://bnm.md/ro/content/situatia-financiara-sectorului-asigurari-pentru-anul-2024

Regarding the liquidity of insurance companies, the NCFM Regulation provides that the insurer is obliged to guarantee liquidity by permanently maintaining unencumbered and liquid assets and to permanently maintain a liquidity ratio of at least 1,0. Thus, we find that all analyzed insurance companies exceed at least twice the established limit, which indicates that the insurers will be able to pay their debts from the liquid assets held.

One of the particularities of the Moldovan insurance sector is the low level of reinsurance premium transmission. Only 23% of the insurance premiums are passed on to reinsurance, which is much less than in other countries. The basic indicator of the insurance business remains the net profit, which is 18,04 million US Dollars at the aggregate level of the market. Most insurance companies recorded net profits for 2023 from 0,6 million US Dollars at Transelit SA to 3,88 million US Dollars at Intact Asigurări Generale SA. Only the Moldcargo SA insurance company recorded losses of 1,14 million US Dollars in 2023.

Over the past 10 years, the number of market participants has undergone changes, largely due to legislative changes regarding capital requirements, solvency and insurance reserves. The main trends regarding the professional market participants are oriented towards the significant increase in the number of insurance and bancassurance agencies and the decrease in the number of insurance companies. From 16 companies active on the market in 2016, today we have reached 9 companies. The same downward trend is followed in the ranks of insurance brokers. However, we believe that the measures to change the legislative and normative requirements have nevertheless contributed to a filtering of professional participants in the insurance market, leaving only those who can ensure the provision of quality services that comply with market and consumer requirements.

The aggregated financial indicators accumulated from the statistics

of the National Commission for Insurance[37] and the National Bank of Moldova indicate a shock suffered by insurers on the financial market of the Republic of Moldova towards the end of 2019. The sudden decrease in companies' profits was caused by the COVID-19 pandemic, and the return in 2020 to the indicators prior to the shock demonstrates that the insurance market is resilient and has sufficient capacity to recover. It is worth noting that starting with 2019, there has been a constant decrease in the number of insurance companies, reaching from 17 in 2018 to 9 in 2023. The reduction in the number of market participants is due to the tightening of the sector's supervisory rules, but also to the inability of some companies to absorb the shock caused by the pandemic.

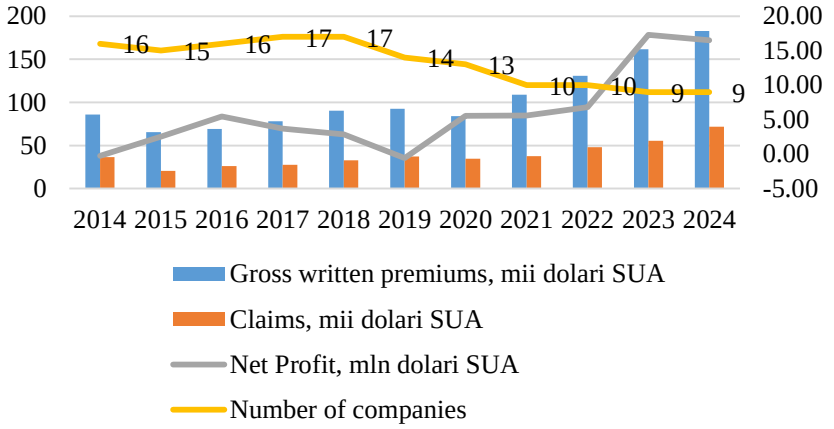

Figure 1.21. Dynamics of aggregate financial indicators of the insurance market in the Republic of Moldova

Source: developed by the author based on data from the National Monetary Fund, the National Bank of Moldova and the National Bank of Moldova.

Regarding the market recovery stage after the financial turmoil of

[37] Comisia Națională a Pieței Financiare. Indicatorii de bază ai companiilor de asigurare din Republica Moldova. https://www.cnpf.md/ro/indicatori-si-raportari-specializate-6437.html

2019, we note that only 10 insurance companies managed to obtain a profit 2.74 thousand US dollars higher in 2021 than 17 companies obtained in 2018. The indicator with the most spectacular dynamics is the volume of gross written premiums, which doubled in the last year compared to the pandemic year 2020. Overall, the aggregate indicators of the insurance market in the Republic of Moldova demonstrate that this sector is resilient and has sufficient financial potential to withstand various economic shocks. However, this is also due to the prudential norms that insurance companies are required to comply with. The solvency margin, the liquidity ratio and the cap on risky investment activity contributed to the rapid recovery of the financial position. Another reason for the stability of the sector is related to the insurance portfolio, which is 50% covered by mandatory motor third party liability insurance. Thus, even if the pandemic reduced gross premiums on other types of insurance, which are voluntary in nature, the companies' revenues continued to remain stable due to the mandatory nature of RCA policies. This phenomenon was also supported by the relatively constant level of compensation paid by insurers during the pandemic years. The natural increase in the volume of payments made in favor of insured persons under contracts took place in 2021, along with the increase in the volume of premiums written.

The challenges of the COVID-19 pandemic were mitigated by insurance companies in the Republic of Moldova, including by introducing innovative technologies into the sector. Many insurers have implemented or expanded online services to allow customers to purchase and manage policies without having to physically move. Some companies have also paid increased attention to communicating with customers to provide them with support and relevant information during the pandemic. Thus, despite the challenges, the insurance sector in the Republic of Moldova has demonstrated its resilience by quickly adapting to the new conditions and continuing to provide essential protection services for customers.

Therefore, the dynamic analysis of the insurance market indicators in the Republic of Moldova highlights a sharp decline determined by the impact of the COVID-19 pandemic. During 2019-2020, the market

recorded significant disruptions in terms of the number of insurance companies, the level of profitability and the volume of written premiums. However, the shock absorption process and recovery manifested themselves in the post-pandemic years. Currently, a consolidation and development of the positions of insurers is observed, confirming the resilience and sustainability of the insurance sector in the Republic of Moldova.

Although the insurance market presents characteristics of resilience, certain challenges remain. These include frequent changes in the legislative and regulatory framework of insurance, reduced demand for insurance services, but also digitalization trends. Under these conditions, close collaboration between authorities and insurance companies is essential to implement policies and mechanisms to support the insurance market in the Republic of Moldova that will increase its capacity to face challenges.

Implementing digital technologies for a sustainable insurance market/Digital innovation in insurance: adapting the Moldovan market to EU standards. Digital transformation has become a strategic imperative for all sectors of the modern economy, including the insurance market. In a context marked by the rapid advance of information technologies, changing consumer behavior and regulatory pressures at the European level, the digitalization of the insurance industry is no longer just an option, but a necessity.

The Republic of Moldova, in the process of convergence towards European Union standards, is faced with the need to accelerate digital reforms in the financial sector, including insurance. This transition is supported both by European initiatives on digital rights and principles, and by the growing demands of consumers for fast, transparent and personalized services.

This section explores the opportunities and challenges of digitalizing the insurance market in the Republic of Moldova, starting from the research question: *how can digital technologies be effectively implemented to modernize the interaction between insurers and consumers?* In this sense, national policies, institutional efforts, as well as technological solutions with potential impact on operational efficiency and customer experience are analyzed.

The proposed approach targets both the consumer perspective – by simplifying digital interaction and increasing trust in online services – and the institutional dimension, by identifying emerging technologies that can support rapid and proactive decisions in terms of risk prevention and adaptation to change. Thus, digitalization is not treated only as a technological reform, but as a genuine strategy for sustainable development and strengthening economic resilience.

The topicality of this research problem is supported by the clear trend of accelerating digital innovations in the financial sector at the European Union level, a trend explicitly underlined by the signing of *the European Declaration on Digital Rights and Principles for the Digital Decade (2023/C 23/01*[38]*)*. This Declaration, adopted in January 2023 as a joint commitment document between the European Commission, the European Parliament and the Council of the EU, sets out a reference framework for a safe, *inclusive and sustainable digital transformation*, with a focus on respecting citizens' fundamental rights in the digital age. Key principles promoted include universal access to high-speed internet, digital education, privacy protection, cybersecurity and access to high-quality digital public services.

This Declaration is part of a series of previous strategic initiatives aimed at guiding Member States in the process of responsible digitalisation. Thus, *the Tallinn Declaration on eGovernment (2017)*[39] reaffirmed the importance of a citizen-centred digital public sector, promoting the interoperability of public IT systems and cross-border data exchange, in particular in the areas of government and financial services.

Later, in 2020, *the Berlin Declaration on the Digital Society and Values-Based Digital Governance reinforced the commitment to*

[38] European Union (2023) European Declaration on Digital Rights and Principles for the Digital Decade 2023/C 23/01 Available at: EUR-Lex - 32023C0123(01) - EN - EUR-Lex (europa.eu)

[39] European Commission (2017). Ministerial Declaration on eGovernment - the Tallinn Declaration | Shaping Europe's digital future, 2017. Available: Ministerial Declaration on eGovernment - the Tallinn Declaration | Shaping Europe's digital future (europa.eu)

ethical and fair digitalisation[40], focusing on transparency, accountability, non-discrimination and democratic participation in the digital environment. This declaration advocated for citizens' trust in digital technologies and highlighted the need to strengthen the security of essential digital infrastructures, including those in the financial and insurance sectors.

Another important act is *the Lisbon Declaration – Digital Democracy with Purpose (2021)*[41] which highlighted the need for digital technologies to support democratic objectives, sustainability and social cohesion, encouraging the development of digital ecosystems that reflect European values and rights. This declaration played an important role in shaping a long-term vision for the digital transformation, in a way that fosters innovation and economic competitiveness, without compromising data protection and equal access.

Therefore, research dedicated to the digitalization of the insurance market in the Republic of Moldova is part of a broader European framework, in which digital technologies are recognized as pillars of sustainable development, modernization of public administration and strengthening of economic and institutional resilience. This alignment with European strategic directions is particularly relevant in the context of the Republic of Moldova's aspirations to join the EU, which implies an acceleration of digital reforms in all sectors, including the financial and insurance fields.

Over 80% of insurers believe that the future on the insurance market belongs to those organizations that will make significant investments in the area of innovation and digitization.[42]

Based on the analysis of the insurance market in the Republic of

[40] European Commission (2020). Berlin Declaration on Digital Society and Value-based Digital Government | Shaping Europe's digital future, 2020 Available at: Berlin Declaration on Digital Society and Value-based Digital Government | Shaping Europe's digital future (europa.eu)

[41] European Union (2021). Lisbon Declaration – Digital Democracy with a Purpose, 2021. Available at: lisbondeclaration.eu

[42]Pauch, D., and Bera, A. (2022). Digitization in the insurance sector – challenges in the face of the Covid-19 pandemic. Procedia Computer Science, 207, pp. 1677-1684. https://doi.org/10.1016/j.procs.2022.09.225

Moldova and the investigation of existing digital technologies, we have identified a series of digital solutions that can be implemented in the insurance sector. (Figure 1.22).

Digitalization efforts in the insurance sector in the Republic of Moldova. Digitalization is an essential component of the modernization of the national economy and alignment with European standards. These efforts focus on both improving the technological infrastructure and increasing the level of digital and financial education of the population.

In recent times, the greatest efforts have been made to implement online sales systems. Insurers in the Republic of Moldova have begun to develop online platforms that allow customers to compare insurance offers, purchase policies directly from company websites, manage policies and make payments online.

At the same time, insurance companies have implemented the use of chatbots and virtual assistants, which has contributed to improving the user experience. These technologies provide instant support to customers, answering frequently asked questions and assisting them in the policy purchase process.

Significant efforts are being made in the field of digital and financial education of the population by initiating information campaigns and education programs that include: workshops and training seminars, online educational materials, such as: video tutorials, guides and informative articles available on the websites of insurance companies and on social media platforms.

It is also important to mention the efforts of the Government of the Republic of Moldova, which, in collaboration with international development partners, significantly contributes to supporting the digitalization process. Thus, regulations have been made and favorable policies have been implemented that encourage innovation and the adoption of digital technologies in the insurance sector. For example, amendments were voted to the Law on Compulsory Civil Liability Insurance for Damage Caused by Motor Vehicles, the Contravention Code and the Law on Preventing and Combating Money Laundering and Financing of Terrorism. This allowed the Compulsory Motor Liability Insurance Policy (RCA) to be completed

online in the Republic of Moldova. The amendments aimed to digitalize the process of issuing MTPL policies. Thus, the electronic conclusion of MTPL contracts and online payment of the related insurance premium contributed to facilitating the process of purchasing MTPL policies by drivers, reducing the duration of contracting the given service, as well as the development of online channels for distributing insurance services. Thanks to these legislative amendments, the obligation to issue documents (motor vehicle liability insurance policy, contract) on paper was eliminated.

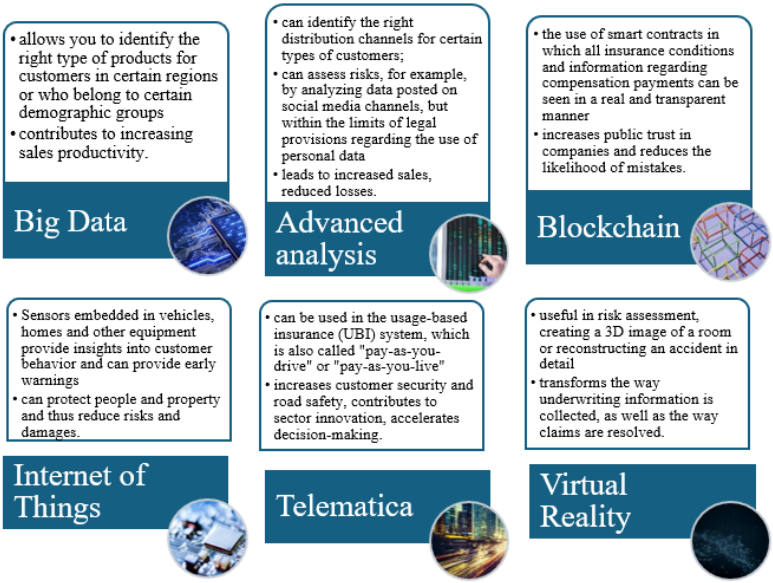

Figure 1.22. Technologies with potential for implementation in insurance

Source: prepared by the author

As the Republic of Moldova fulfills its aspirations to join the European Union, alignment with European standards in the field of digitalization becomes a priority. This involves adopting the best practices and technologies used in the EU Member States, as well as participating in European financial innovation initiatives. In this

regard, we note that the European Union wants to prepare its businesses and citizens for a sustainable and more prosperous digital future, centered on the human factor. To achieve this goal, the Digital Decade Policy Program was created, with concrete targets and objectives for 2030. Among the central objectives are the digitization of all government and private enterprises, as well as the development of digital skills for at least 80% of the population by 2030[43].

In support of the idea of digitization promoted by the EU, the initiative of the Republic of Moldova to develop the Digital Transformation Strategy for 2023-2030 also comes.

The analyses carried out within the research indicate a high potential for the implementation of innovative technologies on the insurance market in the Republic of Moldova due to the increased level of internet connection, but also the increased penetration of electronic connection devices. Approximately six out of ten households (57.3%) in the Republic of Moldova have a computer at home[44]. This indicator has been decreasing in recent years, reaching a maximum of 71% in 2016.

The decrease is explained by the fact that consumers are changing their preferences by choosing other, more accessible and convenient devices to browse the internet. The overall internet connection rate in the Republic of Moldova in 2023 was 88.1% (Figure 1.23).

In addition to being equipped with electronic devices and access to the Internet, the population of the Republic of Moldova has a level of 59.5% financial literacy, which is almost equal to the average level for OECD[45] countries. Financial education is the element without which the population would not access insurance services through any of the

[43] European Commission (2024). Europe's Digital Decade: digital targets for 2030. Available: Deceniul digital al Europei: obiectivele pentru 2030 | Comisia Europeană (europa.eu)

[44] Electronic Government Agency of the Republic of Moldova (EGARM) 2023. The population's perception, assimilation and support of e-Government and Modernization of government services. 2023 Annual National Survey. Available: https://egov.md/sites/default/files/document/attachments/raport_sondaj_anual_2023_rom_final.pdf

[45] Ciumara, T. (2022) Financial Education and Digitalization. The Case of Romania. Financial Stdies 4/2022, pp. 65-76.

distribution channels. Taking into account that both the technical equipment and the level of training in the financial field are sufficient, we can conclude that the digitalization of insurance services has high development potential in the Republic of Moldova.

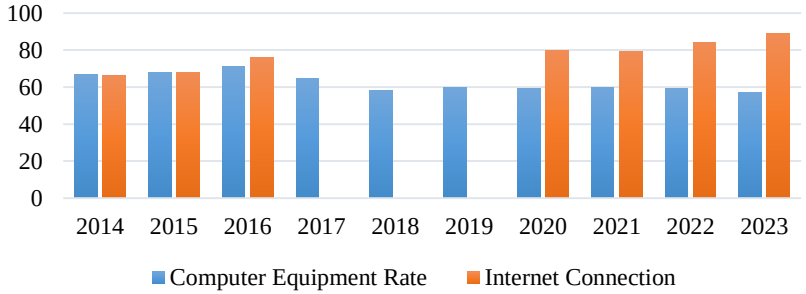

Figure 1.23. Access to the Internet by the population of the Republic of Moldova

Source: developed by the author based on data from the Electronic Governance Agency of the Republic of Moldova

Therefore, we can conclude that the efforts to digitize the insurance sector in the Republic of Moldova have the potential to modernize and streamline this sector. By adopting modern technologies, promoting online sales, using chatbots, digital and financial education, government support and aligning with European standards, the insurance sector can become more accessible, transparent and efficient. These measures will contribute to strengthening the insurance market and providing high-quality services to consumers, thus supporting the sustainable development of the national economy.

Arguments regarding the need to implement digital technologies in the insurance sector of the Republic of Moldova. The adoption of digital technologies in the insurance sector represents an essential strategic direction for the modernization, expansion and consolidation of the insurance market of the Republic of Moldova. This transformation is justified by the need to increase the accessibility of insurance products, improve transparency and increase the degree

of financial protection of the population.

For insurance companies, the priority is to develop and provide products and services adapted to the varied needs of customers, with a competitive price and in an easy-to-understand and use format. Diversifying the portfolio, from life and health insurance to property, property and civil liability insurance, is becoming crucial in an increasingly dynamic economic and social environment. Product personalization, through the use of digital data and advanced algorithms, allows the adaptation of offers to the individual characteristics of customers, thus increasing their attractiveness and usefulness.

In parallel, collaboration between public authorities and companies in the field is indispensable for strengthening consumer trust and increasing awareness of the benefits of insurance. Regulatory authorities have a key role in supervising and guaranteeing the quality and transparency of processes, through rules that facilitate digital innovation without compromising consumer protection. On the other hand, insurance companies must assume their responsibility to inform the public through well-structured and accessible educational campaigns.

A key tool in this process is financial education, which must be expanded at national level and aimed at explaining the fundamental concepts of insurance, the criteria for selecting the right products and the mechanisms of market operation. Financial education programs can include interactive seminars, online resources, media campaigns and partnerships with educational institutions, contributing to the development of a solid financial culture among the population.

The implementation of digital technologies brings tangible benefits in terms of accessibility, efficiency and customer satisfaction. Dedicated digital platforms, mobile applications and automated policy and claims management systems enable fast and efficient interaction between the insured and the insurer. Thus, services become more transparent, easier to use and faster, contributing to increasing insurance penetration and the sustainable development of the entire sector. In conclusion, digitalization is not just a technological option, but a systemic necessity to strengthen the resilience of the insurance

sector, to adapt it to the demands of the modern consumer and to integrate the Republic of Moldova into a sustainable and competitive European financial ecosystem.

Conclusions

The financial sector represents one of the cornerstones of the architecture of economic resilience, holding a strategic role in strengthening macroeconomic stability and stimulating sustainable development processes. In the case of the Republic of Moldova, a country characterized by the small size of its market, a high degree of economic openness, and vulnerability to external shocks, the capacity of the financial sector to support adaptability and rapid recovery is crucial. The banking system, dominant within financial intermediation, has undergone over the past decade a complex process of reforms aimed at strengthening corporate governance, transparency, and public trust, while the non-banking sector has expanded, diversifying financing options for households and enterprises.

The aim of the research is to highlight the strategic role of the financial sector in strengthening the economic resilience of the Republic of Moldova, by analyzing its capacity to ensure macroeconomic stability, to support adaptation to external shocks, and to contribute to the structural transformations required for sustainable development.

The research provides a comprehensive analysis of the role of the financial sector in consolidating the economic resilience of the Republic of Moldova, bringing theoretical, methodological, and practical contributions. From a theoretical perspective, the study deepens the concept of economic resilience by integrating the financial dimension into the overall architecture of economic stability and adaptability. From a methodological perspective, the research proposes the use of relevant indicators (financial stability, intermediation, inclusion, quality of regulation) to evaluate the resilience of the financial sector in a context marked by crises and structural transformations.

On an applied level, the study offers a diagnosis of the

vulnerabilities and strengths of the financial sector of the Republic of Moldova, analyzing both the dynamics of the banking and non-banking sectors, as well as the process of European integration. The results obtained can guide public authorities in designing regulatory and supervisory policies, orient financial institutions in developing innovative and sustainable products, and support businesses and investors in adapting to a volatile economic environment.

Strengthening the resilience of the financial sector is therefore a cornerstone for enhancing the overall economic resilience of the country. A robust and well-capitalized banking system, capable of absorbing shocks and supporting sustainable credit flows, is essential for macroeconomic stability, investor confidence, and long-term growth. The Moldovan case demonstrates that resilience is not a static achievement, but a continuous process of adaptation, reform, and alignment with international best practices.

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Chapter 2
Business Environment Resilience in the Context of Systemic Economic Pressures

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This study is carried out within the Subprogram 030101 "Strengthening the resilience, competitiveness and sustainability of the economy of the Republic of Moldova in the context of the European Union accession process", institutional funding.

Abstract: *Contemporary business environments present unprecedented challenges characterized by extreme unpredictability, making entrepreneurial ventures increasingly risky and complex to manage. Global economic volatility, supply chain disruptions, technological transformations, and geopolitical instabilities create conditions where traditional business strategies prove inadequate for ensuring organizational survival and growth.*

This study investigates business resilience mechanisms within Moldova's challenging economic environment, examining how enterprises develop adaptive capabilities in response to systemic pressures. The research explores whether adverse conditions can stimulate the development of superior organizational adaptive capacities, transforming apparent limitations into competitive advantages. The investigation aims to understand how structural vulnerabilities influence enterprise adaptation processes and identify pathways for strengthening organizational resilience.

The theoretical framework traces resilience conceptualization evolution from reactive crisis management to proactive transformation paradigms. The study applies McKinsey's 7S organizational effectiveness model, examining interconnected dimensions of shared values, strategy, structure, systems, skills, staff, and leadership style within the Moldovan context.

The analysis reveals a complex economic landscape marked by macroeconomic volatility, demographic pressures, and entrepreneurial ecosystem challenges. Despite these difficulties, the research identifies organizational adaptation patterns suggesting potential competitive advantages emerging from adversity. The study examines how resource constraints drive innovation in operational systems, workforce development, and strategic flexibility.

Five fundamental resilience dimensions emerge: transformational leadership, adaptive organizational culture, innovation mechanisms, strategic partnerships, and financial resilience strategies. These dimensions interact synergistically, creating amplified effects on organizational performance.

The investigation uncovers evidence of necessity-driven organizational excellence, where systematic pressures catalyze superior adaptive capability development. The research suggests that challenging environments may function as natural laboratories for developing exceptional organizational resilience, contributing to understanding how structural limitations transform into sources of competitive differentiation.

Keywords: *business resilience, systemic pressures, economic volatility, McKinsey 7S model, Moldova economy, transformation strategy*

Introduction

The contemporary business environment faces a fundamental challenge: developing the capacity to thrive in conditions of extreme uncertainty. This need transcends economic sectors and geographies, becoming a global strategic priority.

Current systemic economic pressures are of an unprecedented multidimensional nature. Volatility in financial markets, disruptions in supply chains and disruptive technological transformations create an unpredictable economic environment. Climate change amplifies

these effects. Geopolitical instability and trade conflicts complete the picture of a global economy in permanent transition.

Traditional risk management strategies no longer provide adequate solutions. Reactive approaches, focused on post-crisis recovery, are giving way to proactive paradigms that integrate anticipation and organizational transformation.

Republic of Moldova presents a particularly relevant case study in this context. The Moldovan economy operates at the intersection of internal structural vulnerabilities and global systemic pressures, creating a business environment characterized by multiple and interconnected challenges.

The structural vulnerabilities of the Moldovan economy are manifested in multiple dimensions. Excessive dependence on the agricultural sector, vulnerable to climatic factors and market fluctuations, limits the capacity to absorb external shocks. The lack of industrial diversification accentuates this structural fragility. Chronic trade deficit of 5.6 billion USD in 2024 (NBM, 2024)[46] reflects the deep imbalance of the national economy.

Regional geopolitical dynamics amplify these internal vulnerabilities. The ongoing conflict in Ukraine disrupts traditional trade routes and affects energy security. The European integration process, while offering strategic opportunities, imposes compliance requirements that require significant investments in technological and organizational modernization. These challenges overlap with existing limitations: reduced access to financing, poor infrastructure and a shortage of specialized skills.

Contemporary literature in organizational resilience offers fresh perspectives for Moldova's business environment. Academic discourse increasingly highlights transitions from reactive approaches toward transformative paradigms integrating superior adaptive capabilities. Central to this research lies a central objective, which concerns examining whether the apparent structural limitations can

[46] National Bank of Moldova. (2024). *Evolution of Moldova's international accounts in Q4 2024 and 2024 (preliminary data) - press release*. Retrieved from https://www.bnm.md/ro/content/evolutia-conturilor-internationale-ale-republicii-moldova-trimestrul-iv-2024-si-anul-2024

transform into competitive advantage sources through adaptive organizational capability development. Investigation focuses on mechanisms whereby extreme systemic pressures catalyze superior organizational resilience development.

The original contribution of the study lies in demonstrating how the Moldovan context, characterized by extreme economic volatility and limited resources, can function as a natural laboratory for the development of adaptive organizational excellence. The research proposes a conceptual framework that allows enterprises to transform systemic constraints into sources of competitive differentiation in international markets.

Evolution of business environment resilience

The resilience of the business environment in response to systemic economic pressures has transformed significantly: from traditional reactive practices, organizations have migrated to approaches based on strategic innovation. This evolution constitutes a continuously developing field of research, which requires rigorous analysis of the determinants, underlying mechanisms, and effects on organizational performance. (Herbane, 2010; Liu et al., 2024)[47,48]. This evolution reflects a transformation in the understanding of how organizations respond to systemic disruptions, moving from a defensive perspective to a proactive and transformative one.

Current studies, although increasingly numerous, still offer a fragmented perspective on this complex phenomenon, most focusing on specific aspects of business resilience without a holistic view of systemic interconnections. (Purwanti & Hapsari, 2022; Aldianto et al.,

[47] Herbane, B. (2010). The evolution of business continuity management: a historical review of practices and drivers. Business History, 52(6), 978-1002. https://doi.org/10.1080/00076791.2010.511185

[48] Liu, W., Hu, Y., & Huang, Q. (2024). Research on critical factors influencing organizational resilience of major transportation infrastructure projects: a hybrid fuzzy dematel-ism-micmac approach. Buildings, 14(6), 1598. https://doi.org/10.3390/buildings14061598

2021)[49,50]. This fragmentation necessitates a critical synthesis that identifies existing theoretical convergences, conceptual gaps, and future research directions in developing adaptive capacities of the business environment.

The critical synthesis of contributions in the field has allowed highlighting a conceptual evolution marked by three distinct phases in understanding business resilience. The first phase, dominated by reactive approaches (1990-2005), focused on the capacity to recover from disruptive events. Herbane (2010)[51] defines this period through the lens of business continuity management, characterized by discrete event planning and standardized response procedures. The major limitation of this approach is that it treats crises as isolated events, ignoring the systemic nature of contemporary disruptions.

The **transition to the adaptive phase** (2005-2015) marked paradigm shift with the introduction of the concept of dynamic capabilities. This perspective, developed by Sinha & Ola (2021)[52] și Robertson et al. (2022)[53], recognizes that resilience requires continuous adaptation to environmental changes, not just recovery from disruptive events. The emergence of quantitative analyses and longitudinal studies during this period allowed for multidimensional measurement of the phenomenon, overcoming the methodological

[49] Purwanti, L. and Hapsari, R. (2022). Analyzing the role of business resilience as sme's core competence to improve business performance on pandemic crisis: a study on indonesian' smes.. https://doi.org/10.2991/aebmr.k.220128.036

[50] Aldianto, L., Anggadwita, G., Permatasari, A., Mirzanti, I., & Williamson, I. (2021). Toward a business resilience framework for startups. Sustainability, 13(6), 3132. https://doi.org/10.3390/su13063132

[51] Herbane, B. (2010). The evolution of business continuity management: a historical review of practices and drivers. Business History, 52(6), 978-1002. https://doi.org/10.1080/00076791.2010.511185

[52] Sinha, R. and Ola, A. (2021). Enhancing business community disaster resilience. a structured literature review of the role of dynamic capabilities. Continuity & Resilience Review, 3(2), 132-148. https://doi.org/10.1108/crr-03-2021-0009

[53] Robertson, J., Botha, E., Walker, B., Wordsworth, R., & Balzarova, M. (2022). Fortune favours the digitally mature: the impact of digital maturity on the organisational resilience of sme retailers during covid-19. International Journal of Retail & Distribution Management, 50(8/9), 1182-1204. https://doi.org/10.1108/ijrdm-10-2021-0514

limitations of the previous phase.

Table 2.1. Evolution of theoretical approaches in studying business resilience

Period	Dominant paradigm	Main ideas	Methodolog. features	Regional/specific context
1990-2005 Reactive phase	Continuity management and post-crisis recovery	Preparing for discreet events Standardized answer procedures Loss minimization	Descriptive case studies Normative approaches Focus on compliance	Focus on developed economies Ignoring structural vulnerabilities in emerging economies
2005-2015 Adaptive phase	Dynamic capabilities and organizational learning	Continuous adaptation to change Developing adaptive skills Strategic flexibility	Quantitative analyses Emerging longitudinal studies Multidimensional measurements	Recognizing the specificity of SMEs First approaches for economies in transition
2015-2025 Transformative phase	Strategic innovation and reinvention	Proactive transformation Business model innovation Creating opportunities from crises	Mixed methodologies Ecosystem approaches Predictive analytics	Integrating regional geopolitical pressures Considering European regulations (CSRD, EU taxonomy) Adapting to the specifics of economies

Source: Prepared by the author based on the cited bibliographic sources

The current transformative phase (2015-present) represents the culmination of conceptual evolution, adopting a proactive perspective that encompasses strategic transformation and disruptive innovation.

Contributions by Radić et al. (2022)[54] and Khatib et al. (2024)[55] emphasize organizations' ability to transform systemic pressures into opportunities for growth and competitive differentiation. *This approach becomes especially critical for emerging economies, where such structural challenges are manifested through multiple vulnerabilities.*

The evolutionary approach highlights a clear progression from traditional reactive ones, which treated business resilience as a function of preparation and response to discrete events, towards contemporary transformative perspectives that conceptualize resilience as a dynamic capacity for strategic reinvention and continuous innovation.

In this way, progress acquires particular relevance in the context of emerging and transition economies, such as the Moldovan one, where systemic pressures manifest themselves through multiple structural vulnerabilities. Excessive dependence on the agricultural sector, persistent trade deficit and regional geopolitical context create a business environment in which traditional reactive approaches become insufficient to manage the complexity of contemporary pressures.

The evolution towards the transformative phase intersects with European normative dynamics, through the progressive introduction of sustainability regulations that redefine the operational parameters for enterprises with aspirations of integration into European value chains. For the Moldovan business environment, the convergence between local challenges and European requirements creates the need to develop a hybrid approach that takes into account both structural limitations and the modernization opportunities offered by the

[54] Radić, M., Herrmann, P., Haberland, P., & Riese, C. (2022). Development of a business model resilience framework for managers and strategic decision-makers. Schmalenbach Journal of Business Research, 74(4), 575-601. https://doi.org/10.1007/s41471-022-00135-x

[55] Khatib, I., Ndiaye, M., & Acquaye, A. (2024). Enhancing resilience in logistics-based business models amid disruptions. International Journal of Service Science Management Engineering and Technology, 15(1), 1-23. https://doi.org/10.4018/ijssmet.361596

European integration process. This evolutionary trajectory finds empirical validation across diverse crisis contexts. Sargu et al. (2023)[56] demonstrate that during the COVID-19 pandemic, even vulnerable populations developed strategic adaptive mechanisms when confronted with systematic pressures. This micro-level evidence of necessity-driven adaptation provides compelling support for the hypothesis that business organizations - with their superior resources and structural flexibility - can similarly transform systematic constraints into sources of competitive advantage.

The synthesis of theoretical contributions allows us to highlight ***five fundamental interconnected dimensions that define business resilience in the context of systemic economic pressures (Figure 2.1)***. These dimensions do not operate in isolation, but form a complex architecture of mutually reinforcing factors.

The transformational leadership dimension emerges as the main catalyst for organizational resilience. Peng and Terry (2023)[57] demonstrated that transformational leadership strengthens resilience by developing adaptive culture and facilitating organizational learning, allowing for rapid resource mobilization in times of crisis. Furthermore, Yang et al. (2023)[58] in their study concluded that diversity in executive teams improves the ability to anticipate and respond to systemic disruptions, *complementing the transformational approach through enhanced decision-making perspectives.*

[56] Sargu, Lilia, Felicia Andrioni, Lavinia Popp, Adrian Netedu, Maria Cristina Bularca, Adrian Otovescu, Gabriela Motoi, Ion Negrilă, Cosmin Goian, Claudiu Coman, and et al. 2023. "The Role of Mass Media in Influencing the Lifestyle of the Elderly during the COVID-19 Pandemic" *Healthcare* 11, no. 13: 1816. https://doi.org/10.3390/healthcare11131816

[57] Peng, J. (2023). Tourism organizational resilience to the covid-19 crisis: evidence from sichuan province, china. E3s Web of Conferences, 409, 06004. https://doi.org/10.1051/e3sconf/202340906004

[58] Yang, H., Tang, M., & Huang, J. (2023). Can female executives enhance organizational resilience? evidence from china during the covid-19 pandemic. Sustainability, 15(18), 13532. https://doi.org/10.3390/su151813532

Figure 2.1. Integrated model of business resilience in the context of systemic pressures
Source: developed by the author

Organizational culture – the second fundamental dimension, functions as an amplifier of collective adaptive capacity. Suryaningtyas et al. (2019) [59] demonstrate that strong organizational culture significantly influences organizational performance and contributes to the development of resilience necessary to cope with disruptive technology. Integrating organizational culture with resilience strategies is important for maintaining performance under systemic pressure, with culture having a mediating role in the

[59] Suryaningtyas, D., Sudiro, A., Troena, E., & Irawanto, D. (2019). Organizational resilience: as mediating effect of organizational culture and organizational performance.. https://doi.org/10.4108/eai.6-12-2018.2286329

relationship between resilience and organizational performance.

Innovation and adaptation represent the third fundamental pillar of business resilience. Murtianingsih et al. (2023[60]) demonstrate that innovation has a significant effect on business resilience and mediates the relationship between managerial skills and the ability to survive in crisis conditions. In the pandemic context, the study highlights the importance of process innovation, especially in distribution and the adoption of digital technologies. In addition, Nugroho and Lutfiyah (2024)[61] confirm that organizational innovation positively influences both resilience and organizational performance, with resilience acting as a mediator in this relationship.

Collaboration and strategic partnerships represent the fourth dimension of business resilience. Li et al. (2021)[62] demonstrate that in the context of major crises, cooperation with multiple stakeholders becomes the fundamental factor for developing resilience capacity. The study identifies cooperation as the most vital activity in crisis management practices, manifesting itself through partnerships with communities, e-commerce platforms, suppliers and other external parties. For the business environment, developing strategic collaboration networks can facilitate access to complementary resources and specialized expertise, reducing vulnerabilities.

And finally, **financial resilience**, which is manifested by the ability of organizations to maintain operational stability in contexts of

[60] Murtianingsih, M., Salim, U., Djazuli, A., & Sudjatno, S. (2023). Building business resilience of small and medium enterprises through managerial skills and innovation on second wave of covid-19 pandemic (study to batik smes in east java indonesia)., 52-66. https://doi.org/10.2991/978-94-6463-178-4_7

[61] Nugroho, A. and Lutfiyah, K. (2024). The effect of financial culture, risk management, organizational innovation on organizational performance in private higher education: organizational resilience as mediating variable. Jurnal Manajemen Strategi Dan Aplikasi Bisnis, 7(1), 91-110. https://doi.org/10.36407/jmsab.v7i1.1236

[62] Li, B., Zhong, Y., Zhang, T., & Hua, N. (2021). Transcending the covid-19 crisis: business resilience and innovation of the restaurant industry in china. Journal of Hospitality and Tourism Management, 49, 44-53. https://doi.org/10.1016/j.jhtm.2021.08.024

economic volatility. Qaisar et al. (2025) [63] demonstrate that financial resilience is built through three interconnected strategies: liquidity management (the strongest predictor of revenue stability), cost management, and risk planning. In addition, Rahmi et al. (2023) [64] demonstrate that working capital management positively affects both profitability and firm value, highlighting the importance of efficient management of current assets and liabilities for organizational performance. Li et al. (2021) [65] confirm that financial resources are necessary to mobilize other resources during crises. These studies converge in emphasizing that resilient organizations develop strict liquidity protocols, optimize the cash conversion cycle, and use advanced digital tools for real-time financial monitoring.

Interacting, these identified dimensions can create complex synergistic effects and amplify the individual impact of each factor on the overall resilience of the business environment. Transformational leadership acts as a catalyst for all other dimensions, influencing the development of organizational culture, stimulating innovation and adaptation, facilitating the formation of strategic partnerships and improving financial resilience.

Organizational culture functions as a mediator between the vision of leaders and the concrete behaviors of employees, translating strategic orientations into specific organizational practices. This mediating function explains the variability of results in organizations with apparently similar leadership - success depends not only on the quality of leaders, but also on the ability of the organizational culture to absorb and implement the proposed changes.

Innovation and adaptation moderate the relationship between

[63] Qaisar, M. (2025). Financial resilience strategies: liquidity, cost management, and risk planning in economic downturns. AJEAF, 3(2), 88-100. https://doi.org/10.63075/5q7t8n93

[64] Rahmi, F., Arfan, M., & Saputra, M. (2023). Assessing determinant of firm value: Indonesia conventional bank analysis. Jurnal Akuntansi dan Auditing Indonesia, 27(1), 67-78. https://doi.org/10.20885/jaai.vol27.iss1.art6

[65] Li, B., Zhong, Y., Zhang, T., & Hua, N. (2021). Transcending the covid-19 crisis: business resilience and innovation of the restaurant industry in china. Journal of Hospitality and Tourism Management, 49, 44-53. https://doi.org/10.1016/j.jhtm.2021.08.024

external pressures and organizational responses, organizations with developed innovative capabilities being able to transform threats into growth opportunities. Collaboration and strategic partnerships amplify the effects of all other dimensions by facilitating access to external resources, complementary skills and collective learning opportunities. And finally, financial resilience provides the material foundation for all other dimensions, maintaining the resources necessary for continued investment in developing organizational capabilities.Astfel, reziliența mediului de afaceri în contextul presiunilor economice sistemice se conturează ca un mecanism de adaptare multidimensional dinamic, în care succesul organizațional depinde nu de excelența într-o singură dimensiune, ci de capacitatea de a integra armonios toate cele cinci componente într-un sistem coerent și adaptabil la provocările în continuă schimbare ale mediului economic contemporan.

Analysis of systemic pressures

The economy of the Republic of Moldova faces a complex of systemic pressures that generate a business environment characterized by chronic instability and structural vulnerability. This instability is deeply influenced by the volatile political and economic context, which directly affects the capacity of the private sector to develop. In particular, the democratic fragility of the republic, marked by political instability, has had a negative impact on the overall economic development of the country. Pavliuc and Buga suggest that democracy in Moldova is not so much the result of strong support from citizens, but rather a consequence of social inertia, which leads to a perpetuation of instability (Pavliuc & Buga, 2022) [66].

Research suggests that Moldova's economic challenges are not just cyclical, but reflect fundamental structural imbalances. Moldova's association with the European Union in 2014 facilitated better access for Moldovan producers to European markets, and this agreement has created significant economic opportunities, even though domestic

[66] Pavliuc, C. and Buga, A. (2022). Democracy and economic growth: the case of Moldova. Journal of Social Sciences, 5(3), 71-87. https://doi.org/10.52326/jss.utm.2022.5(3).06

conditions, such as political instability and a fragile financial sector, continue to limit the positive effects of these initiatives (Secrieru et al., 2021[67]). Similarly, the Moldovan business environment is deeply influenced by a volatile macroeconomic context, making operating conditions highly sensitive to external changes and regional crises (Crudu, 2019)[68]. From a private sector development perspective, it is essential to understand how economic and political instability lead to a less favorable business environment. For example, in conditions of institutional uncertainty, companies become reluctant to invest or innovate, which restricts the potential for business growth and contributes to broader economic stagnation (Dunyo & Odei, 2023)[69]. Also, forced labor migration, caused by poor economic conditions, has further reduced the potential for developing the human capital needed in strategic sectors of the economy (Bogdan, 2025)[70].

In addition, research indicates that in the Republic of Moldova, affected by fiscal and political instability, there are difficulties in implementing support policies for SMEs, and this directly affects their capacity for innovation and competitiveness (Cîrlan, 2021)[71]. Thus, even when policies aimed at stimulating the business environment are implemented, their impact is often limited by an undermined economic and trust climate. The insufficient performance of the business environment is exacerbated by an excessive emphasis on quantitative indicators and a neglect of the quality of regulations

[67] Secrieru, V., Terskaya, G., & Solovykh, N. (2021). Moldovan- eu economic cooperation: the role and potential of agricultural sector. Journal of World Economy Transformations & Transitions. https://doi.org/10.52459/jowett1241021

[68] Crudu, R. (2019). Business environment for development of enterprises in the republic of moldova., 68-92. https://doi.org/10.4018/978-1-5225-5784-5.ch004

[69] Dunyo, S. and Odei, S. (2023). Firm-level innovations in an emerging economy: do perceived policy instability and legal institutional conditions matter? Sustainability, 15(2), 1570. https://doi.org/10.3390/su15021570

[70] Bogdan, L. (2025). Transnational mobility in moldova: exploring socio-economic triggers for migration aspirations. International Migration, 63(1). https://doi.org/10.1111/imig.13358

[71] Cîrlan, A. (2021). Entrepreneurial ecosystem in the republic of moldova: the role of government policy. Economy and Sociology, (2021.1), 63-74. https://doi.org/10.36004/nier.es.2021.1-06

(Cîrlan, 2021).

The complexity of the problems facing the Moldovan economy is the result of a set of interdependent factors, including political instability, external economic pressures, forced migration and ineffective regulation. All of these aspects contribute to a business environment characterized by structural vulnerability and chronic instability, making it difficult to achieve sustainable private sector development.

The analysis of the dynamics of the entrepreneurial ecosystem in the Republic of Moldova highlights one of the most serious systemic challenges facing the business environment: the structural fragility of the capacity to support active enterprises. Statistical data for the period 2011-2024 reveal a progressive deterioration of the net balance of enterprises, with distinct manifestations in three evolutionary stages (Figure 2.2).

The period 2011-2016 was characterized by a relatively stable equilibrium, with the positive net balance fluctuating between +3055 enterprises (2012) and +1618 enterprises (2016), indicating a moderate capacity to support entrepreneurial growth. The decline became evident starting in 2017, when the first significant deficit of -2134 enterprises was recorded, followed by an accelerated deterioration until 2020, culminating in the record deficit of -6016 enterprises in the context of the COVID-19 pandemic.

The period 2021-2022 marked a temporary recovery, with positive values of +231 enterprises (2021) and +1504 enterprises (2022), suggesting a return of confidence in the business environment. This improvement proved fragile, however, with 2023 and 2024 marking a return to deficit, with -935 and -2474 enterprises respectively, the latter year representing the most serious imbalance after the pandemic crisis.

This significant imbalance between the capacity to initiate new businesses (8778 registrations in 2024) and their survival rate (11252 deregistrations in 2024) reflects the systemic economic pressures facing the Moldovan business environment.

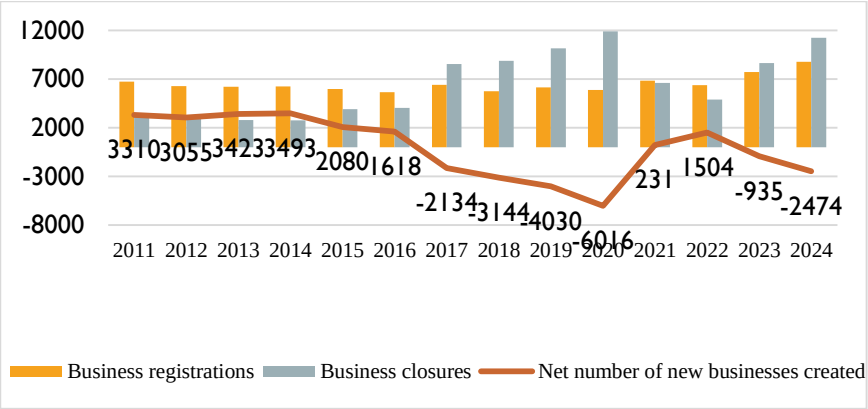

Figure 2.2. Net business formation trends (unites)
Source: NIER, Moldovan Economic Trends, 2014-2025[72]

The regional context of Moldovan economic performance

The extent of the structural vulnerabilities of the Moldovan economy becomes evident through the comparative analysis of regional performances in 2024 (Figure 2.3). While the Moldovan economy recorded a symbolic growth of 0.1% (NBS, 2025) [73], Romania achieved an expansion of 0.8%, the European Union average stood at 1.1%, and the Eurozone grew by 0.9% (Eurostat, 2025) [74].

Even more significant is the fact that the countries directly affected by the conflict managed to record superior performances: Ukraine grew by 2.9%, and Russia by 4.3% (World Bank, 2025)[75].

[72] NIER. *Moldovan Economic Trends*. Chișinău: National Institute for Economic Research, 2014-2025. ISSN 1857-3126. Available at: https://www.ince.md/buletinul-semestrial-de-analiza-economica-tendinte-in-economia-moldovei/
[73] BNS. (2025). Produsul Intern Brut în trimestrul IV și anul 2024. Biroul Național de Statistică al Republicii Moldova. https://statistica.gov.md/ro/produsul-intern-brut-in-trimestrul-iv-si-anul-2024-9497_61702.html
[74] Eurostat. (2025). Real GDP growth rate - volume. European Commission. https://ec.europa.eu
[75] World Bank (2025) 'GDP growth (annual %) - Russian Federation, Ukraine', World Bank Open Data. Available at: https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=RU-UA

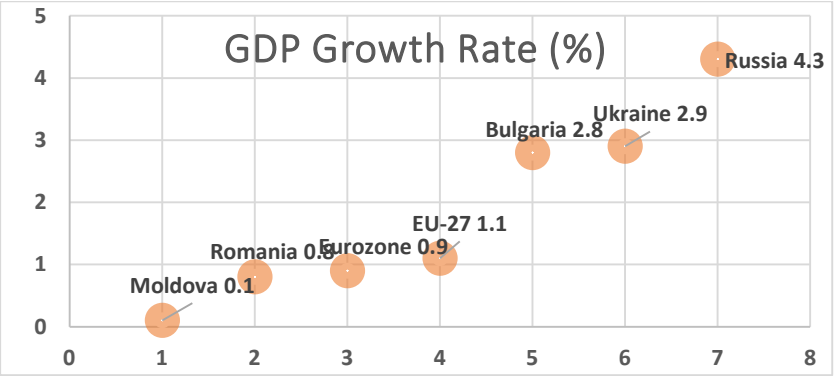

Figure 2.3. Economic performance divergence, Moldova vs. Regional Economies (2024)

Source: NIER (2025)[76], Eurostat (2025), World Bank (2025)

The divergence of Moldovan economic performance from regional economies cannot be explained solely by the geographical proximity of the conflict in Ukraine. Comparison with the superior performances of Ukraine (2.9%) and Russia (4.3%) in 2024 demonstrates that the structural problems of the Moldovan economy are independent of regional geopolitical factors.

Moldova's economic performance (0.1%) is dramatically below the optimal economic growth thresholds established in the specialized literature, which recommends minimum rates of 3% for sustainable post-crisis recovery, 5% for the transition to expansion and 7% for rapid structural transformation (Luong et al., 2024[77]; Govori &

[76] NIER. *Moldovan Economic Trends*. Chișinău: National Institute for Economic Research, 2025, no. 52 (Semester II, 2024). ISSN 1857-3126. DOI: https://doi.org/10.36004/nier.met.2024.52.

[77] Luong, T., Birur, D. K., & Lal, P. (2024). The global economic recovery from covid-19 vaccinations. Journal of Applied Business and Economics, 26(3). https://doi.org/10.33423/jabe.v26i3.7140

Fejzullahu, 2020[78]; Feng et al., 2023) [79]. This situation further highlights the Moldovan performance deficit in the regional context and international standards of economic development.

Macroeconomic volatility and the impact on the business environment

Weak economic performance has significant implications for Moldova's entrepreneurial ecosystem. Moldova's GDP data from 2008-2024 reveals persistent volatility that undermines business environment predictability. Such chronic instability creates substantial barriers to entrepreneurial development and investment planning (see Figure 2.4).

Empirical evidence from Moldova strongly supports the inverse relationship between macroeconomic instability and entrepreneurial activity. GDP volatility creates "a climate of uncertainty in which entrepreneurs feel less confident in launching businesses" (Bisio & Ventura, 2013[80]; Mohey-ud-din & Siddiqui, 2022[81]), thus explaining the degradation of the net balance of enterprises and confirming the hypothesis that the fragility of the Moldovan entrepreneurial ecosystem is primarily a consequence of systemic macroeconomic instability. This vulnerability translates directly into the inability of the business environment to plan and invest in the long term. When the economy oscillates between +13.9% and -5.4% in two consecutive years, the predictability necessary for investment decisions disappears, transforming development strategies into survival tactics.

[78] Govori, F. and Fejzullahu, A. (2020). External financial flows and gdp growth in kosovo. Journal of Developing Societies, 36(1), 56-76. https://doi.org/10.1177/0169796x19898964

[79] Feng, X., Wu, J., & Yu, H. (2023). An inquiry into the influencing factors of gdp growth in our country since the reform and opening up—an empirical study based on ols model. Academic Journal of Business &Amp; Management, 5(11). https://doi.org/10.25236/ajbm.2023.051120

[80] Bisio, L. and Ventura, L. (2013). Growth and volatility reconsidered: reconciling opposite views. ISRN Economics, 2013, 1-17. https://doi.org/10.1155/2013/381368

[81] Mohey-ud-din, G. and Siddiqui, M. W. (2022). Determinants of gdp fluctuations in selected south asian countries: a macro-panel study. The Pakistan Development Review, 483-497. https://doi.org/10.30541/v55i4i-iipp.483-497

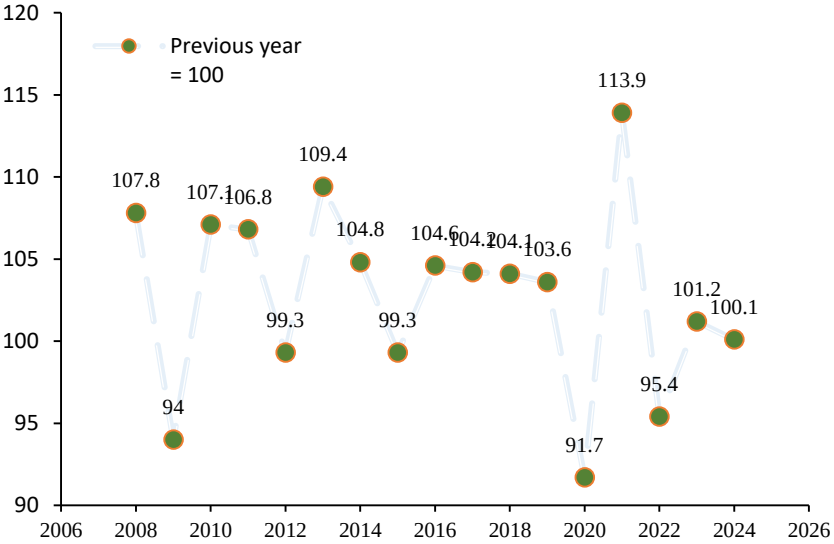

Figure 2.4. GDP growth volatility in the Republic of Moldova (2008-2024)

Source: NIER (2025)[82]

Structural weaknesses across economic sectors

Economic volatility manifestations can be analyzed through the structural lens of Moldova's economy during 2020-2024, with 2024 offering current insights into persistent sectoral challenges. The evolution of macroeconomic indicators highlights a trajectory characterized by selective stabilization: inflation, which peaked at over 28% in 2022, decreased to 4.7% in 2024, while the trade balance deficit progressively deepened, reaching 5,510.1 million USD (Figure 2.5)[83].

This divergent performance across indicators signals an economy

[82] NIER. *Moldovan Economic Trends*. Chișinău: National Institute for Economic Research, 2025, no. 52 (Semester II, 2024). ISSN 1857-3126. DOI: https://doi.org/10.36004/nier.met.2024.52.

[83] National Institut of Economic Research. (2025). Tendințe în economia Moldovei (Nr. 52/2025). ASEM. https://doi.org/10.36004/nier.met.2024.52

experiencing unbalanced adjustment dynamics. While monetary authorities have successfully restored price stability, the widening external imbalance reveals persistent competitiveness deficits that monetary policy alone cannot address. The sustained trade deficit, occurring alongside disinflation, suggests supply-side constraints and structural rigidities that limit the economy's capacity to respond to relative price adjustments. These patterns indicate that Moldova's economic challenges extend beyond cyclical monetary phenomena to encompass fundamental productivity gaps and insufficient industrial diversification.

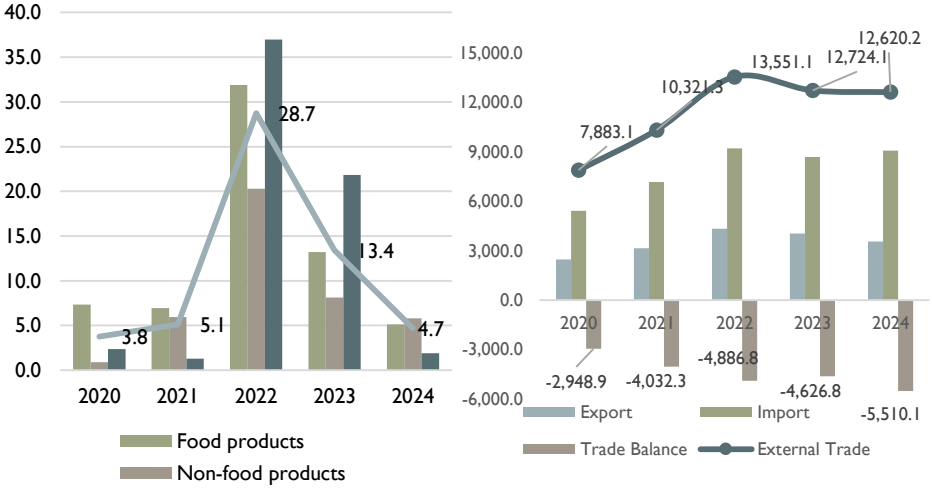

Figure 2.5. Inflation and Trade Balance dynamics 2020-2024
Source: NIER (2025).[84]

The sectoral decomposition of GDP formation and growth dynamics in 2024 corroborates this structural fragmentation hypothesis, highlighting an economy characterized by service sector dominance but limited sustainable growth-generating capacity (Figure

[84] National Institut of Economic Research (2025). *Tendințe în economia Moldovei* (Nr. 52/2025). ASEM. https://doi.org/10.36004/nier.met.2024.52

2.6). Miscellaneous services constitute the largest economic component, accounting for 33.8% of GDP and contributing 0.6 percentage points to growth, while trade represents 15.1% and manufacturing only 7.7% of total output. This sectoral composition reflects a tertiarization pattern typical of post-transition economies, yet with an underdeveloped productive base that constrains long-term growth potential.

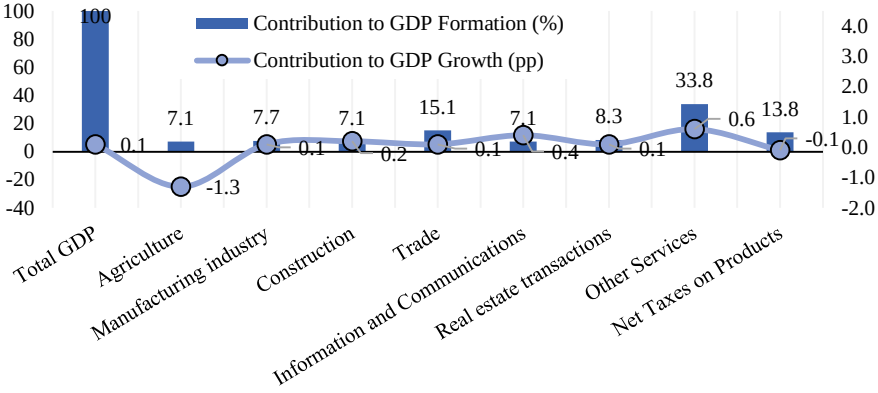

Figure 2.6. Sectoral contributions to GDP formation and growth (2024)

Source: NIER (2025).[85]

The sectoral analysis reveals a concerning structural imbalance that characterizes Moldova's economic development pattern. We see that while high value-added sectors, such as IT and telecommunications, record significant positive contributions (+0.4 percentage points) with a modest share of only 7.1% of GDP, traditional sectors show contrasting performances. Agriculture, with a share of 7.1% of GDP, contributed negatively with -1.3 percentage points to economic growth, being the main factor that dragged the economy down in 2024. This poor performance of agriculture, in the context of an economy

[85] National Institut of Economic Research (2025). *Tendințe în economia Moldovei* (Nr. 52/2025). ASEM. https://doi.org/10.36004/nier.met.2024.52

that grew by only 0.1%, highlights the structural vulnerability of a sector that, although it has significantly reduced its share in GDP compared to historical levels, remains capable of decisively affecting overall macroeconomic performance.

Manufacturing presents an equally concerning picture of stagnation and missed opportunities. The sector contributes merely +0.1 percentage points to growth despite representing 7.7% of GDP. This near-zero contribution signals deeper structural problems that extend beyond cyclical factors and reflecting the stagnation of a sector that should be the engine of economic transformation and productivity growth. Labour productivity in the industrial sector remains substantially below EU levels, standing at around EUR 2,300 per person/year compared to EUR 60,000 in Germany (Figure 2.7). The productivity gap reflects not only technological differences but also shortcomings in process management, workforce skills and integration into global value chains, limiting the industry's ability to contribute significantly to economic growth.

Figure 2.7. Labor Productivity (EUR per person/year)
Source: Rija, I. (2024)[86]

[86] Rija, I. (2024). Expert: Sectorul agricol din R. Moldova este dominant dar vulnerabil. *AgroExpert*. Preluat de la https://agroexpert.md/rom/novosti/expert-sectorul-agricol-din-r-moldova-este-dominant-dar-vulnerabil

Emerging sectors demonstrate the potential for transformation of the Moldovan economy, with IT and telecommunications contributing +0.4 percentage points to growth, construction +0.2 percentage points, highlighting the capacity of these areas to generate added value in the overall context of stagnation. However, the relatively limited size of these sectors – the combined contribution being insufficient to compensate for the negative impact of agriculture – highlights the fundamental challenge of the Moldovan economy: diversification towards high-productivity activities remains in its infancy, and sectors with potential have not yet reached the critical mass necessary to support robust and sustainable economic growth. The analysis of systemic pressures confirms that the Moldovan economy faces a complex of interconnected structural vulnerabilities that generate a business environment characterized by chronic instability and reduced predictability. The fragility of the entrepreneurial ecosystem, reflected in the negative net balance of enterprises, combined with extreme macroeconomic volatility and sectoral polarization, creates a context in which traditional business development strategies become insufficient. The dependence on vulnerable sectors, combined with the still limited size of resilient sectors, demonstrates that systemic pressures go beyond business cycles and reflect fundamental imbalances that require complex adaptive approaches from the business environment.

In the context of these identified systemic vulnerabilities, the analysis of factors that facilitate the adaptation and survival of enterprises highlights the existence of support mechanisms that allow certain companies to overcome the structural limitations of the Moldovan economy. The 2024 data reveal a paradoxical dynamic: despite the general economic stagnation, certain segments of the business environment demonstrate remarkable capacities for resource mobilization and strategic adaptation, confirming that organizational resilience can be developed even in adverse macroeconomic contexts.

Investment performance in 2024 confirms the existence of a strategic adaptation capacity among Moldovan enterprises, despite the fragile macroeconomic context. Investments in fixed assets increased by 7.9%, reaching 35,150.8 million MDL, with a significant

component of 60.8% coming from enterprises' own resources (Table 2.2).

Table 2.2. Investment in Fixed Assets - Structure and Financing Sources (2024)

Investment Category	Realizations (mil. MDL)	% vs. 2023	% of Total	Financing Sources	Amount (mil. MDL)	% of Total
Total Fixed Assets Investment	35,150.8	107.9	100.0	Total Investment	35,150.8	100.0
Non-corporate mobilizations	1,098.1	98.9	3.1	Own resources	21,378.2	60.8
Corporate mobilizations	34,052.7	108.2	96.9	State budget	2,587.9	7.4
Residential buildings	4,449.1	120.4	12.7	Local administrative budgets	2,371.7	6.7
Non-residential buildings	5,504.1	103.6	15.7	Domestic loans & credits	4,016.1	11.4
Engineering constructions	6,126.3	84.9	17.4	External loans & credits	1,318.1	3.7
Machinery & equipment	10,986.5	114.7	31.3	Foreign sources	1,608.0	4.6
Transport vehicles	4,321.8	121.4	12.3	Road fund	1,359.8	3.9
Other corporate assets	2,664.8	126.8	7.5	Ecological fund	54.6	0.1
				Other sources	456.4	1.3

Source: NIER (2025) [87]

This financing structure indicates an internal capacity to generate resources and a strategic orientation towards self-financing development, reducing dependence on external factors and

[87] National Institut of Economic Research (2025). *Tendințe în economia Moldovei* (Nr. 52/2025). ASEM. https://doi.org/10.36004/nier.met.2024.52

demonstrating the financial maturity of the resilient segment of the Moldovan economy. Investments in machinery and equipment recorded an increase of 14.7%, highlighting the prioritization of technological modernization in response to competitiveness and productivity pressures – an essential strategy for compensating for the structural disadvantages of the national economy.

In addition to the mobilization of own resources, developments in the banking sector provided enterprises with improved access to financing in 2024, albeit in the context of an overall stagnant economy. The volume of loans granted to legal entities increased by 21%, reaching approximately MDL 81 billion, while average interest rates decreased to 8.25% (Figure 2.8).

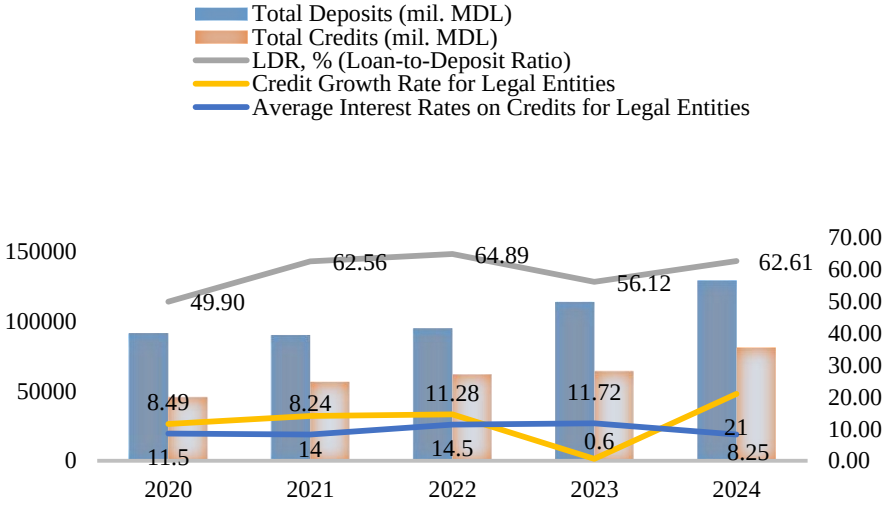

Figure 2.8. Evolution of banking sector key indicators in Moldova (2020-2024)

Source: NIER (2025) [88]

[88] National Institut of Economic Research (2025). *Tendințe în economia Moldovei* (Nr. 52/2025). ASEM. https://doi.org/10.36004/nier.met.2024.52

This expansion of lending reflects a gradual normalization after the contraction period of previous years, rather than a robust growth dynamic. The evolution of the loan/deposit ratio, which increased by 6.4 percentage points from 56.12% in 2023 to 62.61% in 2024, confirms the increased mobilization of banking resources, but this trend must be analyzed in the context of an economy that grew by only 0.1% and a business environment characterized by a negative net balance of enterprises. Thus, although credit facilities have improved, the capacity of enterprises to transform these resources into productive investments remains limited by the fundamental structural constraints of the Moldovan economy.

The challenges in the labor market have additionally tested the adaptive capacity of resilient enterprises, generating pressures on operational costs that have required innovative optimization strategies. The employed workforce decreased from 886.9 thousand people in 2023 to 853.9 thousand people in 2024, while the average wage increased by 14.1% nominally (9% real), creating a double pressure on enterprises: reducing labor availability and increasing personnel costs (Figure 2.9). Truly resilient enterprises responded to this challenge with strategies complementary to financial and investment ones: they increased productivity by automating repetitive processes, focused on higher-margin products, and strategically invested in developing employee skills as an essential element of their ability to adapt to systemic pressures. This integrated approach demonstrates that resilience in the Moldovan business environment is not limited to the management of financial resources, but requires a holistic vision on the optimization of all production factors in the context of the structural constraints of the national economy.

Beyond economic volatility, Moldova is facing what can be called a "devastating demographic syndrome" – an existential crisis that amplifies all other economic vulnerabilities. This demographic hemorrhage is not just an abstract statistic, but a force that fundamentally erodes the economy's capacity to generate sustainable growth.

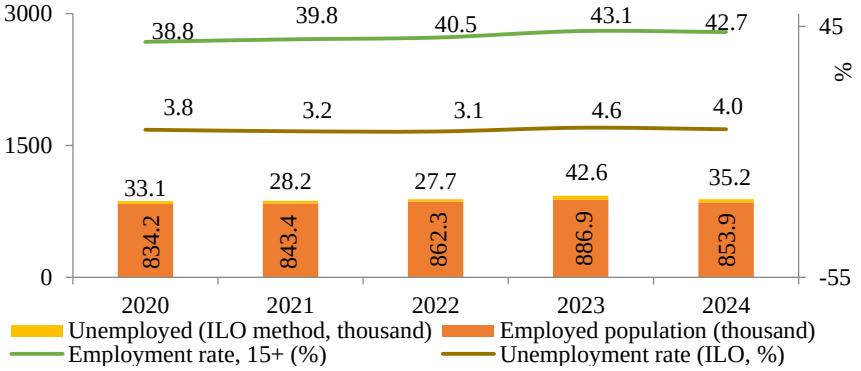

Figure 2.9. Labor Market Dynamics in Moldova (2019-2024)

Source: NIER (2025) [89]

The devastating demographic syndrome in the Republic of Moldova is a complex problem, characterized by a series of negative effects on the economy and social cohesion. Phenomena such as massive migration, population aging and declining birth rates contribute to a significant decrease in the available labor force and exacerbate conditions of economic and social vulnerability (Gagauz, 2024[90]; Coban, 2024[91]). Recent analyses indicate that these demographic changes endanger the country's economic security and create a growing burden on the social welfare system (Coban, 2024)[92].

In recent years, the Republic of Moldova has experienced a sharp decline in population, and projections for 2040 suggest that the situation will continue to deteriorate without drastic and well-thought-

[89] National Institut of Economic Research (2025). *Tendințe în economia Moldovei* (Nr. 52/2025). ASEM. https://doi.org/10.36004/nier.met.2024.52

[90] Gagauz, O., "The population of Moldova in 2040: economic and social implications of depopulation and demographic ageing" (2024) doi:/10.36004/nier.cdr.18.2024.01

[91] Coban M., "The impact of demographic changes on the economic security of the Republic of Moldova" (2024) https://doi.org/10.36004/nier.cdr.18.2024.01

[92] Coban M., "The impact of demographic changes on the economic security of the Republic of Moldova" (2024) https://doi.org/10.36004/nier.cdr.18.2024.01

out interventions in public policies. Projects that are oriented towards supporting families, improving access to health services, and economic development are essential to counteract the impact of these negative demographic trends (Gagauz, 2024; Fala, 2023[93]). The challenges generated by the aging population directly contribute to a growing economic burden on the active population (Fala, 2023).

What is particularly worrying is that this devastating demographic syndrome affects not only the economy, but also social stability. This situation leads to increased dependence on social assistance, which puts additional pressure on state resources and the national economy (Coban, 2024) [94].

In addition, regions such as Transnistria, which are facing a similar demographic crisis, have witnessed a sharp decline in population, exacerbated by mass migration. Thus, it is essential that the Moldovan authorities adopt proactive measures that respond not only to immediate social support needs, but also to those related to stimulating the birth rate and integrating young people into the workforce (Gagauz, 2024[95]; Fala, 2023).

This demographic crisis creates a vicious circle: massive emigration reduces the tax base, limiting the resources available for public investment in infrastructure and services, which in turn stimulates new waves of emigration. For the business environment, the impact is twofold: on the one hand, the domestic consumer market is reduced, on the other hand, the shortage of qualified labor is intensified, forcing wage costs to increase in an already non-resilient economy. This demographic reality transforms short-term economic challenges into long-term structural constraints, requiring a fundamental reconsideration of development strategies at both the national and organizational levels. Moreover, the persistent population

[93] Fala V., "The first and second demographic dividends in Moldova" Economy and sociology (2023) https://doi.org/10.36004/nier.es.2022.2-02

[94] Coban M., "The impact of demographic changes on the economic security of the Republic of Moldova" (2024) https://doi.org/10.36004/nier.cdr.18.2024.01

[95] Gagauz, O., "The population of Moldova in 2040: economic and social implications of depopulation and demographic ageing" (2024) doi:/10.36004/nier.cdr.18.2024.01

decline undermines social cohesion and institutional capacity, creating a self-reinforcing cycle where weakened state institutions become increasingly unable to address the root causes that initially triggered the demographic exodus.

The analysis of systemic pressures confirms that Moldova's economic vulnerabilities go beyond business cycles and reflect fundamental imbalances that reinforce each other. The fragility of the entrepreneurial ecosystem, chronic macroeconomic volatility, sectoral polarization, and devastating demographic syndrome create a context in which the Moldovan business environment operates in a permanent regime of adaptation to constraints, rather than proactive strategic development. This systemic reality requires complex adaptive approaches that go beyond traditional risk management strategies and integrate organizational transformation and reinvention capabilities as fundamental elements of long-term survival.

Strategies to strengthen business resilience

Developing effective organizational resilience strategies has become a critical priority for businesses operating in volatile and unpredictable economic environments. Contemporary research identifies three fundamental pillars of business resilience (Russo et al., 2023[96]; Bachtiar & Ramli, 2023[97]):

- implementing robust business continuity plans
- cultivating an adaptable organizational culture
- developing strategic collaboration networks with external partners.

For the Moldovan business environment, which is faced with complex structural vulnerabilities and major macroeconomic volatility, these general principles require specific adaptation to local realities. The analysis of systemic pressures in the previous chapter

[96] Russo, N., Mamede, H. S., Reis, L., Martins, J., & Branco, F. (2023). Exploring a multidisciplinary assessment of organisational maturity in business continuity: a perspective and future research outlook. Applied Sciences, 13(21), 11846. https://doi.org/10.3390/app132111846

[97] Bachtiar, N. K., Setiawan, A., Prastyan, G. A., & Kijkasiwat, P. (2023). Business resilience and growth strategy transformation post crisis. Journal of Innovation and Entrepreneurship, 12(1). https://doi.org/10.1186/s13731-023-00345-5

highlighted that Moldovan enterprises operate in a context characterized by a negative net balance of enterprises, pronounced sectoral dependencies and limited financial resources. This reality requires the development of resilience strategies that maximize the impact with moderate resources and take advantage of the opportunities offered by the European integration process.

The specialized literature offers multiple approaches to developing organizational resilience, from theoretical academic models to practical tools developed by international consultants. For the Moldovan context, it is essential to select those conceptual frameworks that have been empirically validated in economies with similar characteristics and that provide concrete implementation tools.

Among the available alternatives, the McKinsey conceptual framework for analyzing organizational effectiveness stands out for its relevance to the Moldovan context. The 7S model examines seven interconnected elements: strategy, structure, systems, shared values, competencies, people, and management style. The model emphasizes the holistic nature of organizational transformation and performance (Bakir et al., 2024; Anam & Churiyah, 2023) [98,99]

The 7S model offers a holistic perspective on cultural and operational integration, being particularly beneficial for organizations undergoing significant change (Parmer et al., 2023; Winahyu & Marlena, 2021) [100,101]. For the Moldovan business environment, this systemic approach allows the transformation of structural

[98] Bakir, B., Hamdi, E., Indradewa, R., & Abadi, F. (2024). Human capital plan analysis in improving competitiveness and productivity at franchiseglobal.com. Jurnal Indonesia Sosial Teknologi, 5(10), 4616-4630. https://doi.org/10.59141/jist.v5i10.5316

[99] Anam, C. and Churiyah, M. (2023). 7s-mckinsey based organizational performance model on msmes. JMK (Jurnal Manajemen Dan Kewirausahaan), 8(2), 112. https://doi.org/10.32503/jmk.v8i2.3458

[100] Winahyu, Y. T. and Marlena, N. (2021). Mapping an internal-eksternal matrix sentra getuk pisang based on mckinsey's 7s framework and pest. Jurnal Analisis Bisnis Ekonomi, 19(2), 86-103. https://doi.org/10.31603/bisnisekonomi.v19i2.5162

[101] Parmer, L., Dillard, J. E., & Hughes, M. (2023). Creative entrepreneurship and the mckinsey 7s framework: utilizing a servant leadership style. American Journal of Management, 23(3). https://doi.org/10.33423/ajm.v23i3.6360

vulnerabilities into competitive advantages by developing adaptive organizational capabilities.

The McKinsey 7S model, developed by Tom Peters and Robert Waterman in the 1970s, provides a framework for organizational analysis based on seven interconnected elements. These influence an organization's ability to change and perform effectively. The introduction of the model marked a turning point in thinking about organizational effectiveness, replacing the traditional focus on structure with a more complex approach. The new perspective emphasizes the need for effective coordination between all organizational elements (McKinsey, 2008)[102].

In the Moldovan business environment, the McKinsey 7S model can take on a unique dimension. The framework goes beyond the simple function of a corrective tool for systemic dysfunctions. Instead, it becomes a true mechanism for organizational transformation. The chronic economic instability, characteristic of the Moldovan context, is thus converted into a genuine competitive advantage. This process is achieved by developing superior adaptive organizational capabilities, which allow enterprises to thrive in conditions of increased uncertainty.

The central idea of the model is that the performance of a business depends on the harmonious coordination of these seven elements. For Moldovan enterprises, this coordination becomes essential. It transforms macroeconomic instability from a threat into a real competitive advantage. Thus, the structural limitations of the national economy are metamorphosed into opportunities for superior organizational development.

Analyzing the elements of the 7S model, we will start with the "Common Values" dimension. This takes on strategic significance in the Moldovan economic context, where GDP fluctuates in short periods between values of +13.9% and -5.4%. While organizations in stable economies can allow for the gradual development of

[102] McKinsey & Company (2008) Enduring Ideas: The 7-S Framework. https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/enduring-ideas-the-7-s-framework

organizational values, the Moldovan environment requires a different approach. They must develop concrete and measurable operational values. These values focus on three essential pillars: extreme adaptability, excellence in adverse conditions and non-negotiable commitment to quality. The quality of products or services must be maintained constantly, regardless of the internal or external context.

In the Moldovan reality, common values in agriculture crystallize around long-term sustainability and product quality, businesses being forced by the need to compete in demanding international markets. These values are not theoretical, but translate into concrete operational practices – from abandoning cheap but harmful chemicals to investing in soil conservation technologies even in times of financial constraints. Accordingly, these values are not simple motivational statements, but survival principles that allow for quick and correct decision-making when market information is incomplete or contradictory – a rare and extremely valuable ability in increasingly unpredictable global economies.

Similar to this dimension, we can say about the others, for example, the element "Strategy" is undergoing a fundamental reconceptualization in the Moldovan reality. Instead of rigid long-term planning, effective strategies become adaptive systems capable of operating in multiple scenarios simultaneously.

A Moldovan agro-processing company simultaneously develops capacities for the local market and for export according to EU standards, not as a traditional diversification, but as a survival mechanism that allows for immediate pivoting between markets depending on external shocks. Disruptions of trade routes to CIS markets, caused by the conflict in Ukraine, forced a strategic reorientation towards EU markets, where higher quality standards reward investments in efficient internal organization (Helvetas, 2024)[103]. This extreme strategic flexibility, forged in Moldovan volatility, provides significant competitive advantages when these

[103] Helvetas (2024) *Transforming Moldova's Agriculture by Leveraging Digital Solutions*. Disponibil la: https://www.helvetas.org/en/switzerland/how-you-can-help/follow-us/blog/agriculture-and-nutrition/Transforming-Moldovas-Agriculture-by-Leveraging-Digital-Solutions

companies expand into more stable foreign markets - they can respond to disruptions with a speed and efficiency that local competitors cannot match.

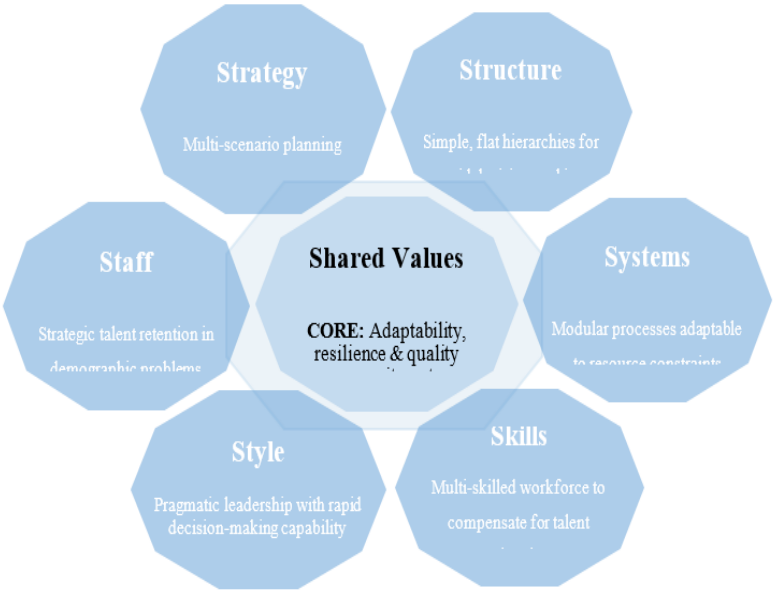

Figure 2.10. McKinsey 7s model adapted for Moldovan businesses

Source: adapted by author

The simple organizational structure, initially imposed by resource limitations, turns into a major competitive advantage. Structure is how a company is organized - the chain of command and accountability relationships that form its organizational chart, and in the Moldovan context, this simple structure with few hierarchical levels allows the entire organization to be mobilized in a matter of hours, not weeks. When global markets are hit by unforeseen crises, Moldovan companies, due to the lack of rigid formalities, can

implement comprehensive strategic responses while competitors in developed economies are still in the analysis and internal approval phases. This strategic flexibility requires sophisticated measurement frameworks. Valeeva et al. (2022)[104] demonstrate that digital transformation demands methodological rigor in assessing organizational readiness across multiple dimensions. Strategic adaptation must be systematically measured and optimized rather than left to intuitive management.

The "Systems" dimension perhaps highlights most clearly how limitations become sources of innovation. From the need to develop robust operational processes with minimal resources, Moldovan enterprises could create "modular systems" – operational architectures that can be expanded or contracted quickly without losing efficiency.

An illustrative example would be a vegetable farm that develops production systems capable of operating efficiently under various conditions, by standardizing critical processes and automating repetitive tasks. This operational modularity would allow rapid adaptation to fluctuations in market demand - expanding production in favorable seasons and contracting in periods of volatility, while maintaining profitability rates. This operational flexibility, developed from the need to manage limited resources, could provide significant competitive advantages in international markets, where the ability to adapt quickly to customer requirements is becoming increasingly valuable.

In the context of the massive emigration of qualified labor, the "Skills" dimension is undergoing a radical transformation. Skills refer to employees' abilities to complete tasks, and studies show that 45% of respondents report that skills gaps cause productivity losses (Whatfix, 2024) [105]. Low wages in the agricultural sector – among the lowest in the economy – and massive emigration forced the

[104] Valeeva, Yulia, Marina Kalinina, Lilia Sargu, Anastasia Kulachinskaya, and Svetlana Ilyashenko. 2022. "Energy Sector Enterprises in Digitalization Program: Its Implication for Open Innovation" *Journal of Open Innovation: Technology, Market, and Complexity* 8, no. 2: 81. https://doi.org/10.3390/joitmc8020081

[105] Whatfix (2024) *The McKinsey 7-S Model Framework, Explained (2025)*. Disponibil la: https://whatfix.com/blog/mckinsey-7s-model/

development of extreme versatility among the remaining employees (Helvetas, 2024). A Moldovan agricultural manager must combine advanced technical skills with commercial and financial skills, creating more complete professional profiles than those in specialized agriculture. This forced versatility, born of necessity, becomes a strategic asset when companies expand into foreign markets. It creates more agile and creative teams than rigidly specialized ones in developed economies. The integration of multifunctional competencies parallels findings from digital marketing research. Skhvediani et al. (2021)[106] reveal that promotion tools generate synergistic effects when strategically coordinated, suggesting that organizational resilience emerges not from isolated excellence, but from harmonious integration of multiple capabilities.

The "People" dimension reflects the transformation of demographic deficit into strategic advantage. This element represents the necessary talent pool, the size of the existing workforce and its motivations (Whatfix, 2024), and in Moldova, the scarcity of talent forces the development of innovative retention and motivation strategies. Companies offer accelerated professional development, varied responsibilities and participation in strategic decisions - elements that create employees with high loyalty and quickly developed managerial skills, representing human assets superior to those in markets with abundant labor.

Moldovan leadership style is evolving towards a unique hybrid of economic pragmatism and deep empathy. Managers in the agricultural sector, for example, are learning to manage climate uncertainty, price volatility, and demographic pressures simultaneously, developing crisis management capabilities superior to those in more predictable sectors. This experience in navigating chronic adversity creates exceptionally resilient and adaptable leaders.

The implementation of the 7S model in the Moldovan context does not follow the standard sequence in the specialized literature, but

[106] Skhvediani, A., Plotnikov, A., Ivanov, A., & Sargu, L. (2021). Development of methodology for assessing effectiveness of online store promotion tools. In *Global Challenges of Digital Transformation of Markets* (pp. 533-548). Nova Science Publishers, Inc.

adapts to the reality of resource limitations through innovative approaches. Organizational alignment becomes a continuous process of micro-adjustments that allow organizations to maintain performance while navigating constant change. This continuous realignment capacity, developed in the Moldovan environment, provides superior organizational resilience in the face of external disruptions.

The central paradox of adapting the McKinsey 7S model to the Moldovan reality is that what appears to be a structural limitation – extreme economic volatility, resource scarcity, labor migration – turns into superior adaptive organizational capabilities that confer significant competitive advantages in international markets. Enterprises forged in Moldovan instability develop an agility, creativity, and resilience that allow them not only to survive, but to thrive in contexts that paralyze competitors from more stable environments. Instead of being a limitation, Moldovan economic volatility thus becomes the catalyst for the development of exceptional adaptive organizational capabilities.

Recommendations for building resilience

In the context of the identified systemic vulnerabilities and the demonstrated potential to transform limitations into competitive advantages, a differentiated approach to strategies for strengthening organizational resilience in the Moldovan business environment is required. The effective implementation of the principles of the McKinsey 7S model requires a gradual progression adapted to the local specifics, which maximizes the impact with moderate resources and takes advantage of the opportunities offered by the European integration process.

For Moldovan enterprises, the immediate priority is the gradual implementation of the adapted 7S model, starting with the consolidation of concrete operational values that guide decisions in times of extreme uncertainty. This value foundation must be followed by the development of multi-scenario adaptive strategies, capable of operating effectively in contradictory economic contexts, then by the optimization of simple but efficient organizational structures and modular systems that allow rapid scalability. The process culminates

in the development of multi-scenario skills of personnel and the hybrid leadership style necessary to navigate contemporary complexity.

Even in this difficult context characterized by multiple structural vulnerabilities, research demonstrates that certain organizations manage to develop remarkable resilience strategies through strategic investments in technological modernization, calculated access to diversified financing sources, and accelerated development of multifunctional human capital. Turning constraints into opportunities represents another essential pillar of the resilience strategy. Resource limitations should be used as a stimulus for the development of modular operational systems and multi-skilled employees, while the demographic deficit can be compensated by creating intensive professional development programs that train employees with high loyalty and accelerated management skills. This approach transforms apparent disadvantages into strategic assets that confer competitive superiority in foreign markets.

Developing rapid realignment capabilities forms the foundation of organizational resilience in the Moldovan context. Enterprises must create organizational mechanisms that allow for the simultaneous adaptation of all 7S elements to unforeseen external changes, transforming macroeconomic volatility from a threat into an opportunity to demonstrate adaptive superiority. This capacity for rapid organizational reconfiguration is becoming a major competitive advantage in increasingly unpredictable international markets.

At the business level as a whole, strengthening strategic collaboration networks can facilitate access to complementary resources and reduce individual vulnerabilities by sharing risks and opportunities. The development of these cooperation ecosystems allows Moldovan enterprises to overcome individual structural limitations and create synergies that amplify the adaptive capacities of each participant. Priority investments in multi-skilling represent the strategic response to the devastating demographic syndrome identified earlier, as compensating for the demographic deficit by accelerated training of employees in multiple areas of expertise not only solves the problem of labor shortages, but also creates more versatile and creative teams than the rigidly specialized ones in developed economies.

Building business resilience against systemic economic pressures requires implementing a multidimensional strategy:

- market diversification with priority focus on the EU to reduce vulnerability to regional shocks;
- sustained investments in modern technologies and digitalization processes as a competitive imperative;
- development of multifunctional employee competencies for maximum organizational adaptability;
- integration of sustainability principles into business models;
- strategic diversification of financing sources for tactical and strategic flexibility.

For policymakers, supporting European integration processes by facilitating local enterprises' access to EU standards and markets can transform compliance requirements into opportunities for organizational modernization. This approach allows for the capitalization of the competitive advantages developed in the Moldovan environment in markets with superior purchasing power and demanding quality standards. Developing the support infrastructure for the implementation of adaptive organizational systems, including facilitating access to specialized consulting and resilience assessment tools, can accelerate the process of transforming the Moldovan business environment into a model of adaptive excellence with international relevance.

Truly resilient companies will be those that maintain the strategic balance between expansion and operational prudence, avoiding both excessive optimism in periods of apparent stability and paralyzing pessimism in moments of acute crisis.

Conclusions

The research confirms that the Moldovan business environment operates in a context of multiple and interconnected systemic pressures that transcend business cycles. The analysis highlights the existence of a fundamental paradox: the apparent structural limitations of the Moldovan economy - extreme macroeconomic volatility with GDP fluctuations between +13.9% and -5.4%, the devastating demographic deficit and the fragility of the entrepreneurial ecosystem – are transformed, through the intelligent application of adaptive

organizational principles, into sources of sustainable competitive advantage. This conclusion finds convergent support across diverse empirical contexts – from elderly populations' adaptive media strategies during COVID-19 (Sargu et al., 2023) to digital transformation methodologies in energy sectors (Valeeva et al., 2022) and integrated marketing approaches (Skhvediani et al., 2021) – confirming that resilience consistently emerges through systematic transformation of constraints into adaptive capabilities.

The application of the McKinsey 7S model to the Moldovan reality demonstrates that organizational resilience does not derive from the abundance of resources, but from the capacity for effective coordination of all organizational elements in adverse conditions. The concrete operational values, multi-scenario adaptive strategies, simple but effective organizational structures, modular systems, multi-purpose skills, strategic personnel management and hybrid leadership style developed by Moldovan enterprises create a unique organizational profile, capable of thriving in uncertainty.

The identified vulnerabilities – the negative net balance of enterprises with -2474 units in 2024, the negative contribution of agriculture to GDP of -1.3 percentage points, the major productivity gap compared to European standards – do not represent only challenges to be overcome, but catalysts for the development of superior organizational capabilities that confer competitive advantages in increasingly volatile international markets.

However, these systemic challenges must be viewed within a broader temporal context that acknowledges both persistent constraints and emerging opportunities. Looking forward, organizational resilience will continue to be tested in 2025 through persistent and interconnected challenges: regional instability generated by the Ukrainian conflict that disrupts traditional trade routes, risks to external energy security that amplify operational costs, and domestically, budget deficit combined with political uncertainty. Simultaneously, significant opportunities emerge through available European financing, accelerated advancement of EU integration processes, and demonstrated potential for sectoral recovery in areas such as IT and telecommunications.

Building business resilience against systemic economic pressures requires implementing a multidimensional strategy: market diversification with priority focus on the EU to reduce vulnerability to regional shocks; sustained investments in modern technologies and digitalization processes as a competitive imperative; development of multifunctional employee competencies for maximum organizational adaptability; integration of sustainability principles into business models; and strategic diversification of financing sources for tactical and strategic flexibility.

The evidence suggests that Moldova's economic instability, rather than representing merely an obstacle, creates a unique testing environment for developing superior organizational capabilities. Organizations likely to succeed in this context will be those that cultivate systematic approaches to transforming structural pressures into innovation catalysts and sustainable growth mechanisms. The research indicates that competitive advantage increasingly belongs to enterprises that demonstrate rapid learning capabilities and efficient adaptation to evolving market realities.

The central research question therefore shifts from whether Moldova's economy will achieve conventional stability to whether specific organizations can leverage locally developed adaptive capabilities as strategic assets in international markets. This transformation potential represents both the ultimate test of organizational resilience and the pathway for converting systemic constraints into sources of competitive differentiation on a global scale.

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Chapter 3
Labour Market Integration of Young People in Moldova: Evidence from a Survey Study

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Abstract: *This chapter examines how young people in the Republic of Moldova enter and navigate the labour market after completing vocational education and training programmes. The transition from education to employment remains a major policy concern, particularly in economies undergoing structural transformations. The Republic of Moldova is a particularly pressing case due to the persistent challenges related to youth unemployment, labor migration, skills mismatches, and uneven regional development.*

This process is shaped by several persistent challenges, including skills mismatches, limited practical experience and gaps between education and labour market requirements.. Career choices often do not match labor market demand in certain sectors. There is a noticeable trend among young people to choose humanities rather than technical fields, leading to a surplus of humanities graduates and a shortage of specialists in technical fields. As a result, many graduates either work in positions unrelated to their major or require retraining to obtain a suitable job.

The study is based on empirical data collected through a structured follow-up survey among young people who have recently completed training or education programmes designed to support their entry into the labour market. The study examines employment outcomes, the sectoral distribution of employment, income levels, job quality indicators and job search behaviour. Particular attention is paid to the extent to which acquired skills are applied in the workplace and how young people

perceive the importance of vocational training for their participation in the labour market.
The findings suggest that many respondents were able to secure employment after completing training programmes, although the quality and stability of these jobs vary considerably across groups. The results also highlight persistent challenges, such as income volatility, occupational mismatch, and varying levels of job security among young workers. These findings provide a more clear understanding of youth labour market integration in Moldova and point to areas where policy intervention may be needed. The findings have implications for labor market policies, vocational education strategies, and programs aimed at supporting youth employment and economic integration.
Keywords: *NEET, employment, labor market, social, youth*

1. Introduction

Although Moldova has the highest proportion of NEET (Not in Employment, Education, or Training) youth in the region, this rate has shown a declining trend in recent years. Data from the National Bureau of Statistics (NBS) indicate that the NEET rate for individuals aged 15–29 decreased from 31.2% in 2020 to 20.3% in 2024. According to the study NEET Youth in Republic of Moldova (Council of Europe, 2024), the NEET rate among females is higher than that of males. According to data from the National Bureau of Statistics (NBS), the most significant gender gap is observed in the 15–34 age group, where 31.2% of females are classified as NEET compared with 17.8% of males. This disparity is largely influenced by social, economic, and cultural factors that restrict women's access to educational and vocational opportunities.

Over half (51.8%) of NEET youth are found in rural areas. This prevalence can be attributed to limited access to educational and employment opportunities, as infrastructure and resources in rural regions are often insufficient. A lack of investment further contributes to the social and economic exclusion of young people in these areas. From an educational perspective, individuals who have completed only secondary education are the most likely to become NEET, as confirmed by NEET Youth Survey data.

Financial support for NEET youth is predominantly provided by

spouses or other household members. Survey data indicate that the spouse's salary is the most commonly reported source of income, accounting for 50% of cases. This reliance highlights the economic vulnerability of NEET youth, stemming from difficulties in accessing the labor market or further education.

The majority of NEET young people who have dropped out of formal education, holding at most a high school diploma, do not plan to return to schooling. Many NEET youth have low educational attainment; according to NBS data, 36.6% of NEETs aged 15–34 have completed only secondary education.

Financial constraints, family responsibilities, and the perceived relevance of studies are the main barriers preventing NEET youth from pursuing formal specialized education. NEET Youth Survey data show that 40% of young people consider the cost of education beyond their financial means, a challenge most acute in rural areas. Family responsibilities pose the greatest barrier for women, while men are primarily limited by the perceived relevance of their studies. The unequal distribution of caregiving responsibilities places a disproportionate burden on women, often forcing them to forgo career opportunities and personal or professional development.

In many transition economies, including Moldova, the integration of young people into the labour market remains a persistent policy concern. The transition from education to employment is a critical stage in the life course of young people, shaping not only their immediate economic opportunities but also their long-term career trajectories and social mobility. In emerging economies, the challenges associated with youth employment are often intensified by structural changes in labour markets, demographic shifts, and the rapid evolution of skills demanded by employers.

In Moldova, the integration of young people into the labour market has been influenced by several factors, including economic restructuring, international migration, and disparities between urban and rural regions. Young individuals frequently encounter barriers when attempting to secure stable employment. These barriers may include limited professional experience, insufficient information about job opportunities, and a mismatch between educational

outcomes and labour market requirements. As a result, understanding the mechanisms that facilitate or hinder successful labour market integration among youth is of considerable importance for policymakers, educational institutions, and employers.

The surveys offer a practical way to assess what happens to individuals after completing education or training programmes. By tracking their post-training experience, it becomes possible to observe not only whether they find employment, but also the type of jobs they obtain, the stability of these positions, and the extent to which acquired skills are actually used in practice. This information also make it possible to better understand how young people search for jobs and what obstacles they encounter when entering the labour market.

This monograph examines how young people in Moldova transition from training into employment, drawing on original survey data collected among programme participants. Rather than offering a purely descriptive perspective, the analysis focuses on identifying the factors that shape employment outcomes and the extent to which acquired skills translate into real labour market opportunities.

The analysis focuses on three main questions related to employment outcomes, job characteristics and the role of acquired skills. First, to what extent do young individuals successfully transition from education or training into employment? Second, what are the characteristics of the jobs obtained by young workers in terms of sectoral distribution, income, and employment conditions? Third, how do young people perceive the role of acquired competences in facilitating their labour market integration?

The findings presented in this monograph aim to provide evidence-based insights that can support the development of more effective youth employment policies and training programmes in Moldova.

2. Literature Review

Youth labour market integration has been widely examined in both academic research and policy-oriented studies, particularly in the context of transition economies. The Republic of Moldova, in particular, has attracted the attention of researchers and international organizations studying the structural barriers and institutional

arrangements affecting youth employment. A recurring discussion subject in the literature is the transition from education to work, which remains long and complex in Moldova and other transition countries. Young people often face high unemployment and underemployment due to rapid changes in the labour market, skills mismatches and weak links between educational institutions and employers.

In Moldova, considerable attention is paid to the NEET indicator (young people not in education, employment or training), which reflects the level of youth participation in economic activity. Over a quarter of young people are classified as NEET, indicating structural problems in matching educational potential with labour market needs. This phenomenon has long-term consequences, including low incomes, limited career opportunities and risks of social marginalization.

Numerous reports by international organizations highlight the specific characteristics of youth employment in Moldova. In particular, research shows that young people in rural areas, especially women, face longer job search periods, low employment rates and a high proportion of informal work. A key factor is the underutilization of skills acquired in educational institutions.

In addition to technical skills, researchers focus on developing young people's social and life skills, such as teamwork, critical thinking, communication and stress resistance. The lack of these skills reduces the effectiveness of integration into work and limits opportunities for sustainable professional growth.

International cooperation institutions, as well as national and regional projects, demonstrate that effective integration of young people requires joint efforts of public employment services, employers and educational institutions. Partnership programs focused on job creation, training of young specialists, internships and entrepreneurship contribute to reducing unemployment and expanding self-employment opportunities.

Analyses of structural and institutional factors highlight the persistent gap between the skills of graduates and the requirements of employers in Moldova. Many young people have inappropriate qualifications for the jobs they occupy, while employers report a lack

of practical and social skills. These gaps are exacerbated by unequal access to educational resources and restrictions in certain regions of the country, especially in rural areas.

Some studies also highlight gender differences and the impact of family socioeconomic status on youth employment. Young women and people from low-income families are more likely to experience difficulties in finding a job and a lack of career opportunities. A comparative analysis with other countries in the region shows that the challenges faced by the Republic of Moldova are not unique: the Eastern Partnership countries face similar challenges related to the mismatch between education and labor market requirements, a long transition from school to employment, and a high proportion of young people forced to take temporary or low-paid jobs.

Overall, existing research points to a combination of factors shaping youth labour market outcomes, including individual skills, institutional frameworks and broader economic conditions. Effective strategies include a combination of educational programs, career counseling, active labor market measures, support for entrepreneurship, and partnerships between public, private, and educational institutions. This multi-layered approach not only increases youth employment, but also creates conditions for sustainable economic and social development in the country.

3. Methodology

The analysis draws on data collected through a tracer survey conducted among young people who previously participated in vocational training programmes. Tracing surveys are an especially effective tool for evaluating the results of educational interventions, as they allow collecting information about how participants apply the knowledge and skills they have acquired in real working conditions and how it affects their professional trajectories.

A tracer approach was selected because it allows tracking participants beyond programme completion and observing their labour market outcomes over time. . Firstly, this method allows not only to assess the current employment status of the participants, but also to reveal the long-term effects of training, including stability of employment, income, job satisfaction and the use of acquired skills.

Secondly, the tracing survey provides an opportunity to analyze factors that influence the success of integration into the labor market, such as region of residence, gender, type of educational program and availability of practical experience.

The target research group included young people who completed participation in programs aimed at increasing employability and facilitating access to jobs. A structured questionnaire covering the following key blocks was used for data collection: current employment status, job nature, income level, working conditions, job search practices, and subjective assessment of participation in training programs. Structured questions allowed to collect quantitative indicators, while open questions provided an opportunity for a deeper understanding of the personal experience of the participants and the identification of factors that promote or hinder labor integration.

Data collection was carried out by computer-assisted telephone interviewing method (Computer-Assisted Telephone Interviewing, CATI). The survey was carried out by specially trained interviewers who followed standardized instructions to ensure the consistency and reliability of the data. The use of CATI effectively covered respondents in different regions of the country and provided a single interview format, minimizing the human factor and data entry errors.

The final sample included approximately 200 respondents, balanced by gender and representing both urban and rural areas. The interview was conducted in the preferred language of the respondents — Romanian or Russian, which allowed for accuracy and completeness of answers. Special attention was paid to the inclusion of participants from different sectors and regions to obtain a representative view of the integration of youth into the labor market.

Collected data were processed and analyzed using statistical software. Descriptive statistical methods were used for quantitative data, including calculation of frequencies, percentage distribution, mean and median values, as well as intergroup comparisons on the main demographic and social characteristics. This approach allowed to identify key regularities in the experience of labor integration of youth, to determine the ratio of employees in different sectors of the economy, level of income and working conditions.

The analysis of open questions was carried out by the method of thematic coding, which allowed to identify recurring motifs and regularities in the evaluations of program participants. Key topics were highlighted, including perception of the usefulness of training, satisfaction with acquired skills, perception of practical internships and recommendations for program improvement. Such a combined approach, combining quantitative and qualitative data, allowed to get a comprehensive view of the results of the programs and their impact on youth.

Ethical aspects occupied an important place in the research process. Participation in the survey was voluntary, respondents were informed about the purposes of the study, the confidentiality of the information provided and the possibility to refuse participation at any time. All data were anonymized, which ensured the protection of personal data and the confidentiality of respondents.

Despite the significant merits of the methodological approach, certain limitations should be taken into account. The sample included only those participants who were available and agreed to participate, which may not fully reflect the experience of all program participants. In addition, the data are self-assessed, and some indicators, such as income level or skill assessment, may be subjective. However, the obtained results provide a reliable empirical basis for the analysis of the integration of youth into the labor market and the identification of factors influencing employment success.

In addition, the methodology included measures to improve data quality. The interviewers underwent preliminary training, including simulations and practical tests to minimize variability in conducting the survey. Data verification procedures were implemented at the input and processing stages. The approach combines quantitative indicators with qualitative insights, allowing for a more complete understanding of participants' experiences. This allows not only to assess the immediate impact of educational programs, but also to formulate recommendations for their improvement and optimization within the framework of future initiatives to increase youth employment.

4. Employment Outcomes

This section examines the employment situation of respondents following their participation in training programmes.. The analysis reveals a wide range of labour market outcomes, highlighting the diverse pathways that young people take from education to employment.

A large share of respondents reported being employed at the time of the survey. The work included both dependent and self-employed activities, with dependent employment being the predominant form. This conclusion indicates that many young people managed to get positions in existing organizations, using the obtained education for integration into already existing workplaces. In contrast to this, the minority of respondents were engaged in entrepreneurial activity, which suggests that, although training may contribute to the development of basic skills, additional measures may be required to encourage self-employment and create your own business.

Another remarkable regularity is the ongoing participation of some respondents in educational or educational programs. This reflects the dynamic and non-linear nature of transitional periods in the lives of young people, when periods of employment can alternate with further professional training or professional development. For many young people, further professional training is a concrete strategy to increase their competitiveness in the labor market, acquire advanced skills and improve long-term career prospects.

The survey also identified respondents who were actively looking for a job or were temporarily inactive in the labour market. Such situations are common at the beginning of their working lives, when young people are experimenting with career options, overcoming temporary obstacles or adapting to changing labour market conditions. These patterns suggest a continued need for support mechanisms such as career guidance and job matching services.

The distribution of employment by sector among respondents shows a relatively balanced presence in the industrial and service sectors. Manufacturing is particularly important within the industrial sector, reflecting the significant role of manufacturing as a source of employment for young workers. In the service sector, employment is

spread across a wide range of activities, including retail, hospitality, information technology, education and healthcare. This distribution highlights the diversity of opportunities available to young people and the importance of aligning skills development with the labour market needs of each sector. An analysis of the occupational structure shows that a significant proportion of respondents occupy professional or skilled positions, indicating that training programmes have contributed to developing skills in demand in the professional labour market. However, some respondents reported working in positions that did not fully match their qualifications, indicating a persistent skills mismatch. This mismatch may be due to limited information about the labor market, geographic restrictions, or a mismatch between training programs and employers' expectations. An online analysis of professional structure revealed that some respondents ignored professional positions, which emphasized that the training programs contributed to high demand in the professional labor market. However, some respondents reported working in positions that did not fully match their qualifications, which indicates a continuing mismatch of skills. This discrepancy may be due to limited information about the labor market, geographic restrictions or a mismatch between training programs and employers' expectations.

Further descriptive analysis reveals that employment outcomes are influenced by numerous factors, including education level, field of study, geographical location and gender. For example, urban respondents are more likely to find employment in the formal sector and in professional fields, while rural respondents often face fewer opportunities and may remain in informal or temporary jobs. Gender differences are also evident: young women are more likely to work in education or services, while men are more represented in the manufacturing and technical sectors. Overall, the survey results indicate that many young people have successfully entered the labour market and started to build their professional careers. However, the diversity of employment pathways, persistent skills mismatches and inequality of opportunities across regions and demographic groups highlight the complexity of integrating young people into the labour market. These findings highlight the need for continued policy

attention, targeted training programs, and support measures to promote sustainable employment and career advancement for young people in the Republic of Moldova.

5. Income and Job Quality

Income and job quality provide an important perspective on how sustainable labour market integration actually is. Having a job does not in itself guarantee economic stability or satisfactory working conditions. Therefore, the study collected detailed information on respondents' income levels and the characteristics of their employment relationships.

Analysis of income data reveals significant variability among young workers. A significant proportion of respondents reported monthly incomes in moderate salary ranges, reflecting typical income levels at the beginning of their careers in Moldova. However, a smaller proportion reported higher income levels, suggesting that some young workers were able to obtain relatively well-paid positions.

In addition to the basic salary, respondents reported receiving various forms of additional compensation. These include productivity bonuses, transportation allowances, and benefits in kind, such as meals provided by the employer. Such additional forms of compensation can play an important role in improving workers' overall financial well-being.

Job quality was also assessed using indicators related to employment contracts and access to social benefits. The majority of employed respondents indicated that they had written employment contracts, indicating that their work was carried out in the formal economy. Formal employment typically offers greater stability and access to legal protections compared to informal work. Many respondents also reported access to social benefits, such as health insurance and pension contributions. These results are encouraging, as they indicate that young workers are in jobs that offer at least some degree of long-term security.

However, the survey also revealed differences in job stability. Some respondents reported temporary or short-term contracts, which can create uncertainty about future income. In addition, some respondents indicated that their income level does not fully meet

minimum wage standards.

Overall, the data show that while many young people access formal employment, job quality and income stability remain uneven.

6. Job Search Behaviour

Examining how young people search for jobs helps explain the challenges they face when entering the labour market. Therefore, the survey included a series of questions designed to determine the job search strategies and experiences of respondents who were currently unemployed.

Respondents rely on a mix of job search strategies, combining online platforms, personal networks and direct contact with employers. Online job search platforms have become one of the most frequently used channels, reflecting the growing importance of digital technologies in labor market mediation. By browsing job postings online and submitting online applications, young people can access a wider range of employment opportunities than would otherwise be possible through traditional channels.

Informal networks also play an important role in the job search process. Many respondents reported asking friends, relatives, or acquaintances for information about potential vacancies. Social media often provides valuable information about job opportunities that may not be publicly advertised.

Direct contact with employers is another common job search strategy. Some respondents reported contacting companies directly or sending unsolicited job applications. This proactive approach can increase the likelihood of receiving an interview invitation, especially in labor markets where formal hiring processes are limited. The survey also found that some respondents registered with public employment agencies for job search assistance. Public employment agencies can provide valuable support through career counseling, training opportunities, and information about vacancies.

Despite these efforts, the job search process can be fraught with significant uncertainty and long waiting periods. Some respondents reported having multiple interviews before receiving a job offer, while others have not yet received an interview invitation despite submitting multiple applications.

These findings highlight the importance of effective labor market information systems and career guidance services in supporting young people in the job search process.

7. Skills Utilisation and Relevance of Training

A key dimension of labour market integration is whether individuals are able to use the skills acquired during training in their actual work. Therefore, as part of the subsequent survey, the respondents' perception of the relevance of professional training for their current or previous professional experience was studied.

A significant part of the respondents reported that their current job is related to the content of the professional training they had previously completed. This suggests that training programs can play an important role in equipping participants with skills that are directly applicable in the context of the labor market.

The respondents also rated how well the training programs prepared them for employment. The majority expressed positive opinions, indicating that professional training contributed to preparation for professional work. This perception is especially important because it reflects the subjective experience of people who tried to translate the knowledge they received into practical skills.

The survey also studied whether the respondents actively use the skills obtained during professional training in their current work. Many respondents indicated that they largely apply these skills in their everyday work. The results obtained testify to the success of the training program in providing knowledge relevant to the solution of real tasks in the workplace.

However, not all respondents noted a strong correlation between the content of professional training and employment. Some indicated that their work was only partially related to the level of education. Such situations may arise when people accept job offers, even if these positions do not fully correspond to their qualifications.

Overall, the findings show that training programmes improveemployability, particularly when they include practical components.

8. Discussion

The findings provide a clearer pictureof how young people

navigate the transition into the labour market. The analysis confirms that participation in training programmes has a positive impact on employment opportunities, but the transition from education to a stable job corresponding to qualifications remains a complex and often difficult process.

An important aspect highlighted by the data is the relatively high share of young people who managed to get a job after completing training programmes. This suggests that practically oriented training contributes to increasing employment, especially when the skills acquired are relevant to market requirements. At the same time, the predominance of employment as an employee, to the detriment of self-employment, indicates that, although training programmes facilitate access to jobs, they have a lower impact on the development of entrepreneurial initiative. This situation can be explained by the existence of structural constraints, such as limited access to finance or insufficient business support mechanisms.

Another significant element is the fact that some respondents continue to be involved in education or training. This phenomenon reflects the increasingly non-linear nature of the transition from school to work. In practice, young people's career paths often include alternations between periods of employment, unemployment and further training. In this context, continuing their studies can be interpreted as a strategy for adapting to changing labour market demands and economic uncertainty.

At the same time, the existence of young people looking for a job or temporarily inactive highlights persistent barriers to access to employment. These may include a lack of appropriate opportunities, limited professional experience or geographical discrepancies between labour supply and demand. From this perspective, the labour market can be seen as segmented, and young people tend to concentrate in areas characterised by low stability and limited prospects for advancement. The frequency of temporary contracts or jobs unrelated to professional training confirms this reality.

The distribution by economic sector also reflects important structural features. The significant role of manufacturing as a point of entry into the labour market for young people is evident, especially in

economies undergoing transformation. In parallel, the expansion of the service sector, including in areas such as information technology, education or health, indicates the emergence of new opportunities associated with the knowledge-based economy.

However, the results also highlight the persistence of mismatches between acquired skills and job requirements. A significant number of respondents occupy positions that do not correspond to their level or field of qualification, which suggests an insufficient alignment between the education system and market needs. These imbalances can affect productivity, income levels and professional stability. In the national context, they are amplified by the lack of effective labour market information mechanisms and limited cooperation between educational institutions and the economic environment.

Another important aspect is related to structural inequalities, especially those of a territorial and gender nature. Urban-rural disparities in access to employment opportunities reflect wider disparities in economic development and infrastructure. Young people in rural areas are more likely to face limited options and are more at risk of inactivity or informal employment. At the same time, gender differences are influenced by social norms and the unequal distribution of family responsibilities, which can restrict women's participation in the labour market.

The results show that vocational training supports labour market entry, but does not fully address structural constraints. Broader interventions are needed, combining skills development with measures aimed at job creation, strengthening labour market institutions and reducing inequalities. These include adapting curricula to the demands of the economy, developing career guidance services and strengthening cooperation between the education system and employers.

The integration of young people into the labour market remains shaped by a combination of structural conditions, institutional support and individual pathways. Although employment outcomes are encouraging, challenges related to skills mismatch, inequalities and career instability persist.

9. Policy Implications

The findings highlight several areas where policy intervention could improve youth employment outcomes. Strengthening the integration of young people into the labour market requires coordinated efforts across education, policy, and employer domains. Evidence from the survey and national labour statistics underscores both the challenges and opportunities in this domain.

9.1. Strengthening Vocational Education and Training (VET)

The survey results indicate that young individuals who participated in vocational and technical training programmes reported higher employment rates than those with general education. Specifically, 72% of VET graduates found employment within six months of completing their training, compared to 49% of general secondary education graduates. Among employed respondents with VET backgrounds, 41% reported that their current roles were directly related to the skills acquired during their training, highlighting the relevance of practical and applied learning.

Table 3.1. Employment Outcomes by Education Type and Practical Experience

Education Type	Internship Completed	Employment Rate (%)	Median Time-to-Employment (months)	Role Related to Training (%)
Vocational (VET)	Yes	81	2.8	41
Vocational (VET)	No	65	4.2	29
General Secondary	Yes	58	3.5	22
General Secondary	No	49	5.1	15

The data shows that practical experience, such as internships, is closely associated with faster and more stable employment. For

example, among respondents who completed at least one internship during training, the employment rate increased to 81%, with a median time-to-employment of 2.8 months, compared to 5.1 months for those without internship experience.

9.2. Enhancing Career Guidance Services

Labour market policies should also focus on improving the accessibility and effectiveness of career guidance services. Survey data indicate that only 37% of respondents reported having received formal career guidance during their studies, while those who did receive guidance experienced an average 25% shorter job search period. Additionally, respondents with access to career counselling were more likely to report employment aligned with their qualifications (46% vs 28%) and higher job satisfaction scores.

This evidence aligns with international research showing that targeted career guidance reduces information asymmetry in the labour market and supports faster, more efficient transitions from education to employment.

9.3. Supporting Youth Entrepreneurship

The data further highlight the potential role of entrepreneurship in fostering youth employment. Approximately 12% of respondents reported engaging in self-employment, with 70% of these individuals stating that their business activities were initiated during or shortly after training programmes. Among these young entrepreneurs, 38% received some form of financial or mentoring support, which correlated with higher sustainability of business ventures (measured as continued operation after 12 months).

Policies aimed at supporting entrepreneurship — through access to start-up financing, mentorship, and incubator programmes — can create new employment opportunities and reduce pressure on traditional labour markets. For example, countries in the region with structured youth entrepreneurship schemes report self-employment rates among graduates between 15–20%, compared to Moldova's 12%, suggesting a tangible opportunity for policy intervention.

9.4. Strengthening Employer-Education Cooperation

Finally, the alignment of educational programmes with labour market needs is crucial. Survey results indicate that only 33% of

respondents felt that their training adequately reflected the skills demanded by employers, and 41% reported needing additional training after graduation to meet job requirements. This gap underscores the importance of collaborative mechanisms between educational institutions and employers to ensure curricula and practical training remain relevant.

Table 3.2. Youth Entrepreneurship and Support Received

Support Type	% of Young Entrepreneurs	Business Continuity After 12 Months (%)
Financial Support	38	78
Mentoring/Incubator	38	74
No Support	62	55

Cooperation can include joint curriculum design, employer-led workshops, real-time labour market feedback systems, and internship or apprenticeship placements. International experience shows that such partnerships can increase graduate employment rates by up to 20% and reduce skill mismatch significantly.

10. Conclusion

This study examined how young people in Moldova enter and navigate the labour market after completing training programmes.. The results highlight a complex picture of youth professional insertion, characterized by both positive developments and a series of persistent difficulties.

On the one hand, the data show that a significant number of young people have managed to integrate into the labor market, being employed in various economic sectors. A good part of the respondents stated that they benefit from formal labor contracts and social protection, which suggests that training programs contribute not only to facilitating access to employment, but also to obtaining relatively stable and regulated jobs. These results confirm the importance of interventions based on vocational training, internships and on-the-job learning in increasing the employment chances of young people.

On the other hand, the analysis highlights the existence of

significant challenges. Income levels remain a problem for a significant proportion of young people, with many reporting earnings below the national or sectoral average. There is also a frequent mismatch between skills acquired and the requirements of jobs held, indicating an incomplete valorisation of human capital. The employment process is often difficult and long, involving multiple attempts, periods of uncertainty and episodes of inactivity. These aspects suggest that, while training programmes are relevant, they need to be supported by broader policies, including effective career guidance services, mentoring and mechanisms to stimulate employers to integrate young people into the workforce.

Another important result is related to the entrepreneurial potential of young people. Although the share of those initiating self-employment is still low, there are signs of growth, especially among those benefiting from financial or advisory support. Strengthening the entrepreneurial ecosystem, by facilitating access to financing, advisory services and mentoring programs, could contribute to diversifying economic opportunities and creating new jobs, especially in regions with limited employment options.

Further research should focus on the studies that track the evolution of young people over time. Such an approach would allow for a better understanding of the sustainability of professional insertion, career dynamics and the long-term impact of training programs on income, occupational stability and professional development. Also, comparative analyses at regional level could provide useful benchmarks on good practices and effective policies in the field of youth employment.

The integration of young people into the labour market is shaped by several interrelated factors, including the quality of training programmes, the effectiveness of labour market institutions and the extent to which employers are actively engaged in the transition process. To fully harness the potential of young people, a coherent and sustained approach is needed, based on constant investment, rigorous monitoring and continuous adaptation of policies to economic and social realities. The results presented in this paper highlight both the capacity of young people in the Republic of Moldova to contribute to

economic development and the need to create favorable conditions for this potential to be harnessed sustainably.

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Chapter 4
Regional and Sectoral Enterprise Competitiveness in the Context of Economic Sustainability and Resilience

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Abstract: *The research objective of this chapter is to assess the competitiveness of Moldovan enterprises at the mesoeconomic level. The novelty of this work lies in the development of two new composite indices: the Sectoral Enterprise Competitiveness Index, comprising 24 indicators grouped into six pillars, and the Regional Enterprise Competitiveness Index, comprising 26 indicators grouped also into six pillars: Business structure and scale, Entrepreneurial base, and labour engagement, Productivity and resource efficiency, Financial results and profitability, Financial stability and capital structure, and Growth dynamics and intangible potential. The application of these indices to the analysis of regional and sectoral disparities revealed that the business sector in districts near customs checkpoints with the heaviest international freight traffic is the most competitive. In contrast, districts located away from major trade flows face challenges, such as low enterprise productivity and efficiency, and deteriorating infrastructure. The developed indices identify key institutional, structural, technological, and financial barriers. An analysis of enterprise competitiveness by sector of the national economy revealed that the lowest competitiveness was observed among enterprises in Sector D: Electricity, Gas, Steam, and Air Conditioning Supply. During the COVID-19 pandemic lockdown, the competitiveness of enterprises in Sector I: Accommodation and Food Service Activities significantly declined. However, in 2020, the competitiveness of enterprises in Sector N: Public Administration and Defense, Compulsory Social Security increased significantly. Sector J:*

Information and Communication is one of the most competitive sectors of the national economy, so this chapter proposes tools for enhancing regional resilience through digital transformation.
Keywords**:** *enterprise competitiveness, regional development, composite index, economic sustainability, productivity, financial stability, digital transformation.*

Introduction

In 2022, Moldova became a candidate for European Union membership. Therefore, in the coming years, it is necessary to harmonize Moldova's legislation with the European Union (EU) legislation and to increase the competitiveness of Moldovan enterprises so they can compete with the European Union's entrepreneurship sector. After the proclamation of independence, Moldova, in its economic development, went through a period of deindustrialization, caused by the severance of production and cooperation ties with producers from the CIS (Commonwealth of Independent States) countries. As a consequence, the industry's share of GDP (Gross Domestic Product) has decreased crucially from 39% in 1993 to 8% in 2024. Over the past 35 years, the flows of commodities and services have gradually been reoriented from the CIS market to the EU market.

However, in this market, the standards for merchandise differ substantially from the standards applied in Moldova, and competition is much fiercer in the EU. Therefore, assessing the competitiveness of enterprises and elaborating a competitiveness index that accounts for the specifics of Moldovan entrepreneurship has become a vital necessity for the country's European path. The relevance of this research lies in the large gap in enterprise competitiveness across sectors of the national economy. The disproportionate development of the economy poses a considerable barrier to improving the country's economic sustainability. Qualified personnel and investments are driving forces of enterprises' competitiveness. However, in Moldova, due to the low standard of living and limited prospects, an upward trend in the exodus of the young and able-bodied population has emerged. As a result, demographic aging is taking place. The

reduction in population leads to a decrease in both the workforce and the number of consumers, i.e., to a constraint of the local market. Businesses are struggling to find qualified personnel, and potential investors are not interested in districts where the population exodus was most severe.

The novelty and purpose of this chapter are to develop the composite index of enterprise competitiveness. Determining the impact factors of competitiveness to establish the result indicators is one of the research objectives. Another objective is to estimate the competitiveness of enterprises at the regional and sectoral levels of the national economy, in the context of determining the main challenges (access to financing, innovation) and identifying regional competitive advantages (resources, human capital, infrastructure).

Theoretical aspects and literature review

Scientific and technological progress influences not only the development of applied technologies, production, and the economy, but also the theoretical aspects of fundamental economic concepts. The concept of competitiveness has also undergone significant evolution. As a result of the fourth industrial revolution, the list of factors influencing competitiveness has expanded. In addition to traditional factors (resource costs, productivity), these have been supplemented by the following: innovation potential, stability, business adaptability, the ability to implement advanced technologies, and the degree of digitalization of production. These factors, particularly digitalization, are also notable for Moldova (Bickauske et al., 2021)[107].

In recent years, several versions of the enterprise competitiveness index have been developed (Table 4.1), but none of these indices count the distinctive characteristics of the Moldovan entrepreneurship sector. Only one index accounts for Moldova's specifics, but it was designed to assess SMEs (Small and Medium-sized Enterprises)

[107] Bickauske, D., Bickauske, D., Simanaviciene, Z., Sergiienko, L., & Baranovska, T. (2021). Digital transformation as a factor of ensuring country competitiveness: Moldova case analysis. *Independent Journal of Management & Production, 12*(6). https://doi.org/10.14807/ijmp.v12i6.1779

competitiveness (Gutium, 2025)[108]. A comparative analysis revealed that these indices differ both in the indicators they include and in the pillars in which these indicators are grouped.

Table 4.1. Comparative analysis of the Enterprise Competitiveness Indices

Authors, source	Pillars	Number of indicators	Limitation
Huang, P.-Y., Wu, C.-H., Huang, Y.-S., Chang, X., Yan, L., & Sun, X. (Huang et al., 2026)[109]	Productivity, Beneficialness, Image, Stability, Growth	16	This index does not take into account business structure and scale, the allocation or misallocation index, and intangible potential.
Kao, C., Wu, W.-Y., Chang, W.-S., Liu, S.-T., Huang, C.-H., Huang, Y.-S., Wu, C.-H., Li, D.-C., & Wang, I.-L. (Kao et al., 2025)[110]	Productivity, Profitability, Image, Stability, Growth	19	This index does not take into account enterprise density, the diversification index, the allocation or misallocation index, intangibles intensity, and the CAGR (Compound Annual Growth

[108] Gutium, T. G. (2025). Measuring and mapping the competitiveness of small and medium enterprises at the district level: evidence from Moldova. *Information and Innovations, 20*(1), 5-15. https://doi.org/10.31432/1994–2443.2025.01

[109] Huang, P.-Y., Wu, C.-H., Huang, Y.-S., Chang, X., Yan, L., & Sun, X. (2026). A survey of enterprise competitiveness for listed companies in Singapore. *Asia Pacific Management Review, 31*(1), 100388. https://doi.org/10.1016/j.apmrv.2025.100388

[110] Kao, C., Wu, W.-Y., Chang, W.-S., Liu, S.-T., Huang, C.-H., Huang, Y.-S., Wu, C.-H., Li, D.-C., & Wang, I.-L. (2025). A business function approach for measuring enterprise competitiveness: An illustration with Taiwanese listed companies. *Asia Pacific Management Review, 30*(3), 100369. https://doi.org/10.1016/j.apmrv.2025.100369

			Rate) of intangibles.
Ivanova, M., Varyanichenko, O., Sannikova, S., & Faizova, S. (Ivanova et al., 2018)[111]	Competitiveness of supply process, Competitiveness of production process, Competitiveness of sales process	20	Although the number of indicators is comparatively greater, the number of pillars is smaller, and not all competitiveness parameters are included. There are no indicators that reflect the business's structure and scale, growth dynamics, and sustainable potential.
Poufinas, T., Galanos, G., & Papadimitriou, P. (Poufinas et al., 2018)	3 pillars: Compete, Connect, Change 3 levels: Firm capabilities, Immediate business environment, National environment	8	In calculating this index, macro indicators are mainly used, although only SMEs' competitiveness is assessed, and there are no indicators specific to enterprises' activities.

Source: author's systematization

A common drawback of all the listed indices is the presence of *hidden double-counting and multicollinearity*. For example, in calculating the SME competitiveness index, T. Poufinas et al. included indicators such as Population, GDP, and GDP per capita in the

[111] Ivanova, M., Varyanichenko, O., Sannikova, S., & Faizova, S. (2018). Assessment of the competitiveness of enterprises. *Economic Annals-XXI, 173*(9-10), 26-31. https://doi.org/10.21003/ea.V173-04

algorithm. Another pair of hidden double-counting indicators is Return on Assets (ROA) and Return on Equity (ROE). This pair of indicators is present in the index elaborated by M. Ivanova et al. Another pair of hidden double-counting indicators was identified in the indices developed by Po-Yao Huang et al. and by Chiang Kao et al., such as gross profit margin and net profit margin. These pairs of indicators were included not only in the same index but also in the same pillar. Their presence introduces bias into the index toward the characteristic reflected by these indicators. Other pairs of hidden double-counting indicators were also found in the listed indices. All identified shortcomings were taken into account in developing the Enterprise Competitiveness Index presented in this chapter.

Methodological concept and tools for assessing competitiveness

A new composite index (ECI – Enterprise Competitiveness Index) was developed and used to conduct an in-depth analysis of enterprise competitiveness at the sectoral and Administrative-Territorial Unit (ATU) levels. This index is based on a methodology adapted to Moldova's specific characteristics. The index structure is presented in Table 4.2. The ECI comprises six pillars, with 26 indicators by region and 24 by sector. All indicators are calculated using available data from the National Bureau of Statistics (NBS).

The first pillar, "Business structure and scale," reflects the competitive position of enterprises in terms of structure. According to the NBS, Moldova has seen a downward trend in the number of medium-sized enterprises and an increase in microenterprises in recent years. The number of medium-sized enterprises decreased by 68, while the number of microenterprises increased by 8,788 between 2021 and 2024 (National Bureau of Statistics of the Republic of Moldova, n.d.). The smaller the enterprise, the less opportunity it has to invest in innovation and advanced technologies. Large and medium-sized enterprises have the greatest opportunities, so three of the five indicators (Enterprise size ratio, Index of relative size of medium-sized enterprises, Sales revenue share of medium-sized enterprises) answer the question "To what extent do medium-sized enterprises hold a significant and strong position in the economic structure?". To ensure that the first pillar reflects the fragmentation and scalability of

the entrepreneurship sector, two more indicators were added to the three already mentioned (Diversification index, Enterprise density).

Table 4.2. Structure of the Enterprise Competitiveness Index

Pillar (*P*)	Indicators (*X*)	Type of correlation
Business structure and scale	Enterprise size ratio (medium vs. small and micro)	↑
	Index of relative size of medium-sized enterprises (by employment)	↑
	Sales revenue share of medium-sized enterprises	↑
	Diversification index	↑
	Enterprise density per 1,000 inhabitants	↑
Entrepreneurial base and labour engagement	Employment share in medium-sized enterprises	↑
	Compound Annual Growth Rate (CAGR) of employment (3-year)	↑
	Average number of employees per enterprise	↑
	Enterprise employment per 1,000 inhabitants	↑
Productivity and resource efficiency	Relative productivity ratio of medium-sized enterprises to small and micro enterprises	↑
	Sales to labor cost ratio	↑
	Capital to labor cost ratio	↑
	Operating expense ratio	↓
	Misallocation index	↓
Financial results and profitability	Operating profit margin	↑
	Return on Equity (ROE)	↑
	Share of profitable enterprises	↑
	Share of enterprises without sales	↓
Financial stability and capital structure	Financial autonomy ratio	↑
	Ratio of financial investments to total assets	↑

	Current debt ratio	↓
	Financial leverage (debt to equity ratio)	↓
Growth dynamics and intangible potential	Intangibles intensity	↑
	CAGR of intangible share (3-year)	↑
	CAGR of average revenue per enterprise (3-year)	↑
	Employment elasticity of sales (3-year)	↓

Source: author's elaboration

The depth of the entrepreneurial base and labor engagement is assessed using the second pillar. The indicators in this pillar answer the question, "How many people are involved in entrepreneurship and how broad is this sector?" One of the goals we pursued in developing this pillar was to quantify employee-level business activity and assess engagement. The indicator "Enterprise employment per 1000 inhabitants" shows the extent to which the population is actually involved in the entrepreneurship sector.

The third pillar is the "core" of competitiveness and answers the question, "How efficiently are resources used?" Using the indicators of this pillar, one can assess whether competitiveness results from high productivity or is achieved solely through an increase in resource volumes, i.e., through an extensive approach.

The fourth pillar reflects the viability of enterprises and answers the question, "Are enterprises profitable?" Since there are cases where, despite high productivity, an enterprise's net profit volume is insignificant or zero, indicating structural problems in the market or price pressure, the main purpose of the indicators in this pillar is to assess enterprises' real competitiveness.

A fifth pillar was developed to assess enterprises' financial stability. The indicators of this pillar reflect the degree to which enterprises are independent of external debt and the balance of their capital structure. Two of the four indicators in this pillar reflect capital structure (Financial autonomy ratio and financial leverage). This pillar answers the question, "How financially resilient is the enterprise to

risks and shocks?"

The sixth pillar assesses enterprises' long-term competitiveness. It reflects the intensity of expansion and answers the question, "Has the enterprise created a foundation for future growth, or is its competitiveness merely short-term?" Growth can be assessed in various ways. The Compound Annual Growth Rate (CAGR) was chosen because it smooths out volatility and makes indicators comparable, while the classic growth rate is sensitive to fluctuations and crises.

We followed the causal chain described in Figure 4.1 in developing the ECI.

Figure 4.1. The causal chain of the new Enterprise Competitiveness Index

Since the units of measurement for all 26 indicators are not identical, they must ***first*** be normalized. Each indicator is normalized separately for each year across districts or sectors. For indicators with a positive impact, the following formula was used:

$$\tilde{X}_{(+)} = \frac{x - x_{\min}}{x_{\max} - x_{\min}}, \tag{4.1}$$

In case of indicators with a negative impact, the following formula was used:

$$\tilde{X}_{(-)} = \frac{x_{\max} - x}{x_{\max} - x_{\min}}, \tag{4.2}$$

where: x – original value,

x_{max} – the maximum value of the indicator x,

x_{min} – the minimum value of the indicator x,

$\tilde{X}$ – normalized value.

In ***the second stage***, the pillar values (P) are calculated as the arithmetic mean of the indicators comprising each pillar.

$$P = \frac{\sum_{j=1}^{n} \tilde{X}_j}{n}, \tag{4.3}$$

In ***the third stage***, the ECI is determined as the arithmetic mean of the six pillars.

$$ECI = \frac{\sum_{i=1}^{6} P_i}{6}, \tag{4.4}$$

where: P_i – pillar (sub-index) i of enterprise competitiveness.

Sectoral Enterprise Competitiveness Index: estimation, challenges and advantages

The Sectoral Enterprise Competitiveness Index (SECI) consists of 24 indicators. It has two indicators fewer than the regional index.

Table 4.3. Sectoral Enterprise Competitiveness Index, Pillar 1. Business structure and scale

Sectors	2018	2019	2020	2021	2022	2023	2024
A: Agriculture, Forestry, and Fishing	0.5070	0.5221	0.5181	0.4348	0.4480	0.4872	0.5044
B: Mining and Quarrying	0.7047	0.5963	0.5187	0.5287	0.5526	0.5813	0.5865
C: Manufacturing	0.3507	0.3067	0.3037	0.3233	0.3256	0.3506	0.3940
D: Electricity, Gas, Steam, and Air Conditioning Supply	0.0385	0.0401	0.0212	0.0703	0.0495	0.0720	0.1172

E: Water Supply, Sewerage, Waste Management, and Remediation Activities	0.3905	0.3400	0.3639	0.3265	0.4456	0.5160	0.5597
F: Construction	0.4554	0.4209	0.4153	0.4410	0.4584	0.5115	0.5062
G: Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles	0.3447	0.3376	0.3308	0.3447	0.3394	0.3641	0.3784
H: Transportation and Storage	0.4119	0.3982	0.4040	0.3588	0.3558	0.3803	0.4158
I: Accommodation and Food Service Activities	0.4808	0.4781	0.4806	0.4331	0.4220	0.4457	0.4961
J: Information and Communication	0.3053	0.3461	0.3408	0.3727	0.4088	0.4360	0.4709
K: Financial and Insurance Activities	0.1879	0.3252	0.3246	0.3839	0.3940	0.3695	0.4170
L: Real Estate Activities	0.4794	0.4562	0.4907	0.4731	0.4784	0.4525	0.4968
M: Professional, Scientific, and Technical Activities	0.4943	0.5084	0.4979	0.4767	0.4964	0.4637	0.4936
N: Administrative and Support Service Activities	0.4373	0.4370	0.4743	0.3927	0.3841	0.4123	0.4517
O: Public	0.000	0.262	0.256	0.250	0.250	0.250	0.250

Administration and Defense, Compulsory Social Security	0	5	9	0	0	0	0
P: Education	0.3314	0.6167	0.5717	0.4897	0.5084	0.5830	0.5728
Q: Human Health and Social Work Activities	0.4904	0.4163	0.3896	0.3604	0.3848	0.4666	0.4776
R: Arts, Entertainment and Recreation	0.6310	0.4705	0.3948	0.1834	0.1949	0.2018	0.2168
S: Other Service Activities	0.5250	0.5498	0.5022	0.5119	0.4587	0.5049	0.5103

Source: author's calculation

This index does not include indicators that relate solely to the regional aspect of enterprise competitiveness, such as Enterprise density per 1,000 inhabitants and Enterprise employment per 1,000 inhabitants. The dynamics of competitiveness in terms of business structure and scale ***(Pillar 1)*** are reflected in Table 4.3.

The highest level of consolidation was recorded in 2018, 2021, 2022, and 2024 for Sector B: Mining and Quarrying. This is due to the industry's capital intensity. For sand, crushed stone, and rubble extraction to be competitive, it should be carried out by larger enterprises than micro-enterprises due to the high cost of equipment.

Sector D: Electricity, Gas, Steam, and Air Conditioning Supply has the lowest level of competitiveness in terms of business structure and scale. This sector recorded the lowest level of diversification in 2024 (0.1416) and the largest increase in the number of microenterprises from 2018 to 2024 (by 6.3 times). This industry is also capital-intensive, and as noted above, microenterprises do not have the same investment opportunities as medium-sized and large enterprises. The presence of a large number of microenterprises in this sector will lead to higher electricity prices due to the increase in the number of operators, each of whom adds a trade markup to the price without creating additional kilowatts. Energy prices are rising due to higher

purchase prices on the European market. Moldova is integrating into the European market and purchasing energy resources there.

An analysis of ***Pillar 2*** of the SECI (Table 4.4) revealed profound structural imbalances in the national economy. A paradoxical situation has emerged in Moldova. The real sector, which should underpin growth (manufacturing and agriculture), is losing competitiveness, while the public sector is performing strongly. The competitiveness of the entrepreneurial base and labor engagement in Sector C: Manufacturing has halved (from 0.5340 in 2018 to 0.2493 in 2024). Concomitantly, this kind of competitiveness in Sector O: Public Administration and Defense, Compulsory Social Security has increased sixfold (from 0.1253 in 2018 to 0.7633 in 2024) and in Sector P: Education has increased twofold (from 0.2160 in 2018 to 0.4332 in 2024).

The value of this sub-index (Pillar 2) indicates labor force engagement. Although the sector J: Information and Communication recorded high values for this sub-index, thanks to the expansion of incentives within the Moldova IT Park (Moldova Innovation Technology Park), this sub-index declined in 2024, indicating the exhaustion of extensive growth factors and increased competition for qualified personnel. The sector I: Accommodation and Food Service Activities was heavily affected during the COVID-19 pandemic lockdown. However, in the following years, it recovered relatively quickly, focused on domestic tourism, and adapted to new market conditions, using digital tools to promote its services. The manufacturing industry has experienced a deep recession, posing a major challenge to the economy's competitiveness and the country's sustainable development. The decline in the competitiveness of the entrepreneurial base and labor engagement in Sector C: Manufacturing reflects deindustrialization, rising production costs driven by increasing gas and electricity prices, and a loss of competitive advantages in domestic and foreign markets.

The decline in this kind of competitiveness in Sector A: Agriculture, Forestry, and Fishing is due to low productivity, frequent climate shocks, and an ineffective entrepreneurial base, which consists predominantly of small and micro-farms. Sector F: Construction has

recorded an annual decline in labor engagement due to the outflow of skilled workers abroad. The CAGR of employment (3-year) was negative in the construction sector for 2022-2024.

Table 4.4. Sectoral Enterprise Competitiveness Index, Pillar 2. Entrepreneurial base and labour engagement

Sectors	2018	2019	2020	2021	2022	2023	2024
A: Agriculture, Forestry, and Fishing	0.3613	0.2662	0.3105	0.2400	0.2907	0.3107	0.2504
B: Mining and Quarrying	0.4715	0.4191	0.3913	0.4221	0.4263	0.3485	0.3327
C: Manufacturing	0.5340	0.3490	0.3366	0.2674	0.3020	0.2739	0.2493
D: Electricity, Gas, Steam, and Air Conditioning Supply	0.3900	0.3495	0.3893	0.3751	0.3465	0.2993	0.2395
E: Water Supply, Sewerage, Waste Management, and Remediation Activities	0.4791	0.3847	0.4617	0.4367	0.4332	0.4146	0.4500
F: Construction	0.3466	0.3273	0.3228	0.3091	0.2946	0.2566	0.2068
G: Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles	0.3222	0.2134	0.2200	0.1623	0.1982	0.1908	0.1540
H: Transportation and Storage	0.3277	0.2006	0.2257	0.1678	0.1832	0.2083	0.1720
I: Accommodation and Food Service Activities	0.3958	0.3092	0.2021	0.1158	0.1871	0.4408	0.4804
J: Information and Communication	0.3945	0.3375	0.3386	0.3478	0.4761	0.4696	0.3322
K: Financial and Insurance Activities	0.3049	0.1943	0.1808	0.1099	0.2106	0.1364	0.0907
L: Real Estate	0.1665	0.0817	0.1632	0.0804	0.1244	0.1300	0.1099

Activities							
M: Professional, Scientific, and Technical Activities	0.2236	0.1465	0.0983	0.0722	0.1063	0.2024	0.1583
N: Administrative and Support Service Activities	0.4871	0.3762	0.2993	0.2184	0.2530	0.3419	0.3586
O: Public Administration and Defense, Compulsory Social Security	0.1253	0.8048	0.7643	0.9845	0.6509	0.7642	0.7633
P: Education	0.2160	0.6501	0.7211	0.7409	0.5248	0.5198	0.4332
Q: Human Health and Social Work Activities	0.4535	0.3714	0.4573	0.4273	0.5149	0.5111	0.4442
R: Arts, Entertainment and Recreation	0.4096	0.3833	0.4501	0.3711	0.4411	0.5802	0.5343
S: Other Service Activities	0.4045	0.3020	0.1940	0.0615	0.0729	0.2321	0.2105

Source: author's calculation

An analysis of resource efficiency in Moldova (***Pillar 3*** of the SECI) revealed that economic sectors are highly sensitive to both external and internal shocks. The main constraints to improving resource efficiency include the small size of the domestic market, intense competition in the EU market (one of the main sales markets), and the low competitiveness of exported products in this market. The dynamics of resource productivity and efficiency in sector A: Agriculture, Forestry, and Fishing are characterized by high volatility (Table 4.5). Years of decline (2019, 2020, 2022, 2024) alternate with years of growth (2018, 2021, 2023).

This volatility reflects the agricultural sector's low adaptive capacity. The main cause is the degradation of irrigation systems, a large part of which were not modernized or restored during the country's independence. Another reason for the low level of adaptability is the country's loss of its former position in the seed

breeding and seed production sector. Moldova is an agricultural country and used to specialize in breeding and producing seeds for sowing, exporting them to other markets. However, due to protectionist policies in European countries, the country lost its role as an exporter of seeds for sowing and has increasingly come to rely on imports of such seeds.

Table 4.5. Sectoral Enterprise Competitiveness Index, Pillar 3. Productivity and resource efficiency

Sectors	2018	2019	2020	2021	2022	2023	2024
A: Agriculture, Forestry, and Fishing	0.3536	0.2873	0.2962	0.4244	0.4098	0.4279	0.3136
B: Mining and Quarrying	0.3890	0.2840	0.2937	0.4973	0.5157	0.4814	0.4468
C: Manufacturing	0.3509	0.2688	0.3030	0.3739	0.3994	0.4531	0.3535
D: Electricity, Gas, Steam, and Air Conditioning Supply	0.4879	0.5612	0.5117	0.4025	0.3390	0.4089	0.3264
E: Water Supply, Sewerage, Waste Management, and Remediation Activities	0.2452	0.1712	0.1515	0.2056	0.2782	0.4391	0.2842
F: Construction	0.4222	0.2325	0.3277	0.4073	0.4217	0.5139	0.3878
G: Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles	0.5835	0.3009	0.4295	0.4550	0.4650	0.5522	0.4339
H: Transportation and Storage	0.3977	0.3204	0.3260	0.3483	0.3978	0.4798	0.3894
I: Accommodation and Food Service Activities	0.3756	0.2876	0.3429	0.4276	0.4971	0.5019	0.4416
J: Information and Communication	0.3153	0.2324	0.3038	0.4271	0.4547	0.4957	0.3973

K: Financial and Insurance Activities	0.4214	0.1822	0.2945	0.4509	0.4737	0.4593	0.4944
L: Real Estate Activities	0.4397	0.3006	0.3731	0.5645	0.5641	0.4747	0.4959
M: Professional, Scientific, and Technical Activities	0.3031	0.2400	0.2937	0.4357	0.4979	0.4945	0.4182
N: Administrative and Support Service Activities	0.2503	0.1933	0.2377	0.2233	0.2715	0.3786	0.2796
O: Public Administration and Defense, Compulsory Social Security	0.5046	0.5000	0.6799	0.5374	0.4392	0.4044	0.4000
P: Education	0.3765	0.3143	0.3665	0.2967	0.3324	0.4741	0.3025
Q: Human Health and Social Work Activities	0.3595	0.2952	0.3641	0.4321	0.4111	0.4990	0.3681
R: Arts, Entertainment and Recreation	0.2796	0.1452	0.0509	0.1614	0.1879	0.2570	0.1328
S: Other Service Activities	0.3046	0.2233	0.3861	0.4340	0.4377	0.5222	0.4220

Source: author's calculation

In terms of resource efficiency, Sector C: Manufacturing ranks 13th out of 19. The main reason is low added value. The share of capital goods in the Moldovan industry is very low, while the share of consumer goods is very high. The energy crisis and the high tariff on energy resources have led to higher costs for manufactured and exported products and reduced efficiency. The disruption of supply chains is another reason for the sector's declining efficiency. A solution to this situation is to reduce the energy intensity of production, but this requires investment.

In 2024, the highest productivity and resource efficiency levels were recorded by the sectors L: Real Estate Activities and K: Financial and Insurance Activities. However, these sectors do not create

material wealth, so their high efficiency cannot be extrapolated to the real sector. The banking sector, although damaged by the billion-dollar theft, recovered thanks to state support. This support will continue in 2026. While previously it was possible to pay electricity and other utility bills at the post office, this can now only be done at banks, which charge a commission. Alternatively, you need to open a bank account, get a Visa card, and then use internet banking. This solution is very beneficial for banks and will continue to improve their efficiency, but it is disadvantageous for pensioners, who are unfamiliar with new digital technologies. An in-depth analysis revealed that excess liquidity, not allocated to investment lending in the real sector, is a barrier to the greater competitiveness of both the real sector and the national economy. Previous studies have found that SMEs have low access to credit (Gutium & Speian, 2022)[112].

Table 4.6. Sectoral Enterprise Competitiveness Index, Pillar 4. Financial results and profitability

Sectors	2018	2019	2020	2021	2022	2023	2024
A: Agriculture, Forestry, and Fishing	0.5184	0.4484	0.4488	0.8194	0.6545	0.3694	0.4139
B: Mining and Quarrying	0.3439	0.5273	0.8281	0.5744	0.5608	0.4463	0.4545
C: Manufacturing	0.3688	0.3461	0.6325	0.4728	0.5138	0.4268	0.4576
D: Electricity, Gas, Steam, and Air Conditioning Supply	0.2335	0.1444	0.2891	0.0908	0.0433	0.1141	0.0701
E: Water Supply, Sewerage, Waste	0.4186	0.2727	0.6593	0.3429	0.3275	0.3220	0.3666

[112] Gutium, T., & Speian, O. (2022). Access to finance by Moldovan small and medium enterprises: main obstacles and solutions. *The Journal Contemporary Economy*, *7*(3), 97-108.

Management, and Remediation Activities							
F: Construction	0.5486	0.5017	0.7125	0.5149	0.5256	0.4859	0.4739
G: Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles	0.4029	0.3926	0.6198	0.4981	0.5229	0.4311	0.4423
H: Transportation and Storage	0.3737	0.3611	0.6088	0.4269	0.5854	0.4902	0.4662
I: Accommodation and Food Service Activities	0.3086	0.4323	0.1243	0.4889	0.6704	0.6470	0.6082
J: Information and Communication	0.4399	0.4474	0.7472	0.6039	0.6617	0.6132	0.6284
K: Financial and Insurance Activities	0.5696	0.7242	0.7505	0.7095	0.7759	0.7005	0.6918
L: Real Estate Activities	0.4587	0.4756	0.6695	0.5824	0.5808	0.5570	0.5668
M: Professional, Scientific, and Technical Activities	0.6591	0.6636	0.9043	0.8136	0.8562	0.7922	0.7736
N: Administrative and Support Service Activities	0.4408	0.4604	0.5487	0.5432	0.6773	0.5951	0.5621
O: Public Administration and Defense, Compulsory Social Security	0.3846	0.1071	0.4126	0.0329	0.2270	0.0260	0.0000
P: Education	0.2415	0.3729	0.5905	0.2814	0.3773	0.3663	0.3958
Q: Human Health and	0.4702	0.6492	0.7124	0.5956	0.5960	0.6142	0.6491

Social Work Activities							
R: Arts, Entertainment and Recreation	0.1161	0.2201	0.1244	0.3002	0.4051	0.3792	0.3908
S: Other Service Activities	0.4363	0.4350	0.5358	0.5667	0.5800	0.6315	0.6343

Source: author's calculation

The lowest level of financial results and profitability (***Pillar 4***) in 2024 was recorded by the sectors O: Public Administration and Defense, Compulsory Social Security, and D: Electricity, Gas, Steam, and Air Conditioning Supply (Table 4.6).

The implementation of the Third Energy Package and the purchase of energy resources from the EU (itself an energy importer) inevitably affected the financial results and profitability in sector D.

The Moldovan government decided to partially compensate the population for increased energy tariffs during the heating season (Ministry of Labor and Social Protection, 2023)[113]. This policy led to tariff deviations and cash flow gaps. Since the beginning of 2026, all compensation has been cancelled, indicating that the value of this pillar will increase this year.

The agricultural sector's profitability dynamics are highly volatile. Favorable weather conditions in 2021 resulted in a bumper crop and the highest Return on Sales (ROS) and Return on Equity (ROE) for the period under review (23.14% and 30.79%, respectively). However, subsequent years have exposed the sector's structural vulnerabilities. The main factors that led to ROS and ROE being lower in 2023 and 2024 are the rising energy prices, the purchase of energy resources by importing companies during periods of peak prices, disruption of established supply chains, abandonment of traditional market in

[113] Ministry of Labor and Social Protection. (2023). *Notă informativă cu privire la volumele maxime și prețurile compensate la energie pentru perioada noiembrie 2023–martie 2024* [Information note on maximum volumes and compensated energy prices for November 2023–March 2024]. https://social.gov.md/wp-content/uploads/2023/11/Nota-informativa-privind-programul-de-compensatii-%E2%80%9EAjutor-la-contor-sezonul-2023-2024.pdf

Russia, and the reorientation of commodity flows to the EU market, where applies stricter regulatory standards than those use in the markets of CIS countries.

The lowest level of financial stability (***Pillar 5***) was achieved in 2024 by sectors S, D, E and N. Analysis of the dynamics of financial stability and capital structure showed that the largest decline for 2018-2024 was recorded by the following sectors E: Water Supply, Sewerage, Waste Management, and Remediation Activities (by 3.4 times), S: Other Service Activities (by 2.7 times), P: Education (by 2.5 times), D: Electricity, Gas, Steam, and Air Conditioning Supply (by 2.1 times), N: Administrative and Support Service Activities (by 2.0 times) (Table 4.7).

According to the OECD report, "the water supply and sanitation (WSS) sector is financially unsustainable" (Organisation for Economic Co-operation and Development, 2017)[114]. But according to our results, the financial autonomy rate of sector E was above 0.5 in 2018, indicating high sustainability, and fell to 0.3 (an acceptable level) in 2024. In our country, some sectors have a lower financial autonomy rate than sector E.

Table 4.7. Sectoral Enterprise Competitiveness Index, Pillar 5. Financial stability and capital structure

Sectors	2018	2019	2020	2021	2022	2023	2024
A: Agriculture, Forestry, and Fishing	0.4790	0.4477	0.5168	0.5518	0.4939	0.4834	0.4107
B: Mining and Quarrying	0.7647	0.7681	0.8175	0.7901	0.7628	0.6961	0.6733
C: Manufacturing	0.5301	0.5124	0.5718	0.5514	0.4850	0.5334	0.5582
D: Electricity,	0.2516	0.1960	0.3104	0.1759	0.2655	0.2800	0.1207

[114] Organisation for Economic Co-operation and Development. (2017). *Improving domestic financial support mechanisms in Moldova's water and sanitation sector*. https://www.oecd.org/en/publications/improving-domestic-financial-support-mechanisms-in-moldova-s-water-and-sanitation-sector_9789264252202-en.html

Gas, Steam, and Air Conditioning Supply							
E: Water Supply, Sewerage, Waste Management, and Remediation Activities	0.5296	0.4887	0.5825	0.5288	0.2902	0.2030	0.1549
F: Construction	0.4319	0.3752	0.5119	0.4520	0.3941	0.3442	0.2980
G: Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles	0.4053	0.4383	0.5497	0.5104	0.5108	0.5319	0.5102
H: Transportation and Storage	0.5421	0.5805	0.6079	0.5772	0.5301	0.4926	0.4389
I: Accommodation and Food Service Activities	0.1992	0.1560	0.1046	0.1442	0.3046	0.4046	0.4832
J: Information and Communication	0.5641	0.5364	0.6044	0.6525	0.6485	0.6850	0.6967
K: Financial and Insurance Activities	0.5864	0.5564	0.7487	0.6842	0.6355	0.6386	0.5716
L: Real Estate Activities	0.4663	0.3886	0.5007	0.5054	0.4089	0.4397	0.4212
M: Professional, Scientific, and Technical Activities	0.4280	0.4017	0.5159	0.5419	0.4725	0.5852	0.5093
N: Administrative and Support Service Activities	0.3419	0.2003	0.4312	0.3844	0.1690	0.1853	0.1743
O: Public Administration	0.7334	0.6388	0.6575	0.5252	0.5719	0.6738	0.6589

and Defense, Compulsory Social Security							
P: Education	0.6345	0.6829	0.6959	0.6197	0.5688	0.3761	0.2540
Q: Human Health and Social Work Activities	0.5513	0.6047	0.6463	0.6652	0.5845	0.5921	0.6216
R: Arts, Entertainment and Recreation	0.1982	0.4529	0.4790	0.5497	0.5373	0.5533	0.5383
S: Other Service Activities	0.2891	0.1705	0.3825	0.2429	0.0803	0.0851	0.1085

Source: author's calculation

However, the financial stability of the water supply and sanitation sector is very low due to low investment volumes. The ratio of financial investments to total assets is around a quarter of a percent – an extremely low level, not even approaching one percent. Water transport and distribution networks are in extremely poor condition. Replacing and modernizing them requires financial resources that enterprises in this sector don't have. Enterprises of this sector are on the verge of bankruptcy due to high electricity bills.

The financial stability sub-index for sector P: Education began to decline in 2021, decreasing by 2.7 in 2024 compared to 2020. This decrease is due to a twofold decline in the financial autonomy ratio and a fourfold increase in the financial leverage (debt-to-equity) ratio. The main factors driving the downward trend in financial stability are the declining birth rate and youth exodus. In Moldova, educational institutions are funded using a standard per-student formula. As student numbers declined, funding declined as well, while heating and electricity tariffs increased. Some educational institutions faced budget deficits. To address this problem, the government decided to continue closing educational institutions with low enrollment. Previous school closures have shown that this will result in an increased exodus of young people from villages to cities or abroad, leading to the extinction of villages and a ruin of enterprises in rural areas.

Table 4.8. Sectoral Enterprise Competitiveness Index, Pillar 6. Growth dynamics and intangible potential

Sectors	2018	2019	2020	2021	2022	2023	2024
A: Agriculture, Forestry, and Fishing	0.5627	0.1343	0.0218	0.1143	0.1591	0.2357	0.2574
B: Mining and Quarrying	0.4438	0.0497	0.2636	0.3913	0.4183	0.5059	0.4513
C: Manufacturing	0.5046	0.1618	0.2964	0.2052	0.1927	0.2638	0.3731
D: Electricity, Gas, Steam, and Air Conditioning Supply	0.2935	0.3970	0.2891	0.2384	0.0838	0.1659	0.1643
E: Water Supply, Sewerage, Waste Management, and Remediation Activities	0.6735	0.2896	0.5240	0.3162	0.1149	0.1443	0.1850
F: Construction	0.4419	0.2917	0.3135	0.3161	0.1467	0.2325	0.3220
G: Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles	0.6605	0.1519	0.2974	0.1390	0.1936	0.2228	0.2555
H: Transportation and Storage	0.5512	0.1288	0.2636	0.3131	0.1602	0.2060	0.2932
I: Accommodation and Food Service Activities	0.5829	0.1481	0.3058	0.3494	0.2254	0.2412	0.3412
J: Information and Communication	0.6394	0.3699	0.5056	0.3161	0.2996	0.2962	0.3452
K: Financial and Insurance	0.6007	0.1368	0.2620	0.1429	0.1788	0.2368	0.4244

Activities							
L: Real Estate Activities	0.7327	0.1487	0.3185	0.2677	0.2124	0.2545	0.3247
M: Professional, Scientific, and Technical Activities	0.5565	0.1733	0.2996	0.2260	0.1986	0.1544	0.2144
N: Administrative and Support Service Activities	0.6032	0.1364	0.3146	0.3086	0.2487	0.2523	0.3145
O: Public Administration and Defense, Compulsory Social Security	0.2396	0.4357	0.6123	0.5307	0.2185	0.1628	0.1191
P: Education	0.5638	0.1091	0.2629	0.0754	0.4453	0.4946	0.5708
Q: Human Health and Social Work Activities	0.6331	0.1747	0.2773	0.1362	0.1341	0.2249	0.2701
R: Arts, Entertainment and Recreation	0.3413	0.1788	0.2984	0.1982	0.3463	0.4209	0.3228
S: Other Service Activities	0.5403	0.1570	0.2599	0.2447	0.1867	0.1618	0.1834

Source: author's calculation

Sector J: Information Technology and Communications has the highest level of financial stability. This sector has received government support. The Moldova IT Park was established, providing residents with a single turnover tax, which contributed to increased financial stability, enabled the accumulation of significant equity capital, and attracted domestic and foreign investment.

An analysis of ***Pillar 6*** by sector revealed that half of the 19 sectors are relatively uncompetitive in terms of growth dynamics and intangible potential in 2024 and lack the foundation for future growth. Only three sectors have the potential to become more competitive in the future (Table 4.8).

One of these is the P-Education sector, which recorded a 17.5-fold increase in its intangible asset share in 2022. Due to the pandemic, educational institutions accelerated the adoption of digital technologies in the educational process, contributing to an increase in the sector's overall capitalization.

The high volatility of the sub-index "growth dynamics and intangible potential" for sector A: Agriculture, Forestry, and Fisheries is due to the sector's significant vulnerability. The main factors negatively impacting agricultural development include extreme weather events, which have become more frequent in recent years (2020, 2022, and 2024), a lack of intangible potential and innovation, rural labor outmigration, and the monopolization of agricultural product distribution channels by large intermediaries, which leads to a decrease in farm margins. Farmers face difficulties obtaining long-term loans. Most innovations can be acquired abroad. Investment is essential for the development of domestic innovation. Nevertheless, R&D (research and development) expenditure in 2024 amounted to only 0.22% of GDP (National Bureau of Statistics of the Republic of Moldova, 2025)[115].

An analysis of the ***Sectoral Enterprise Competitiveness Index (SECI)*** showed that the competitiveness of most sectors declined in 2019 and was lower than in 2020, the year of the COVID-19 pandemic. Only the competitiveness of sectors I: Accommodation and Food Service Activities and R: Arts, Entertainment, and Recreation continued to decline in 2020 (Table 4.9).

[115] National Bureau of Statistics of the Republic of Moldova. (2025). *Activitatea de cercetare-dezvoltare în anul 2024* [Research and development activity in 2024]. https://statistica.gov.md/ro/activitatea-de-cercetare-dezvoltare-in-anul-2024-9454_61750.html

Table 4.9. Sectoral Enterprise Competitiveness Index

Sectors	2018	2019	2020	2021	2022	2023	2024
A: Agriculture, Forestry, and Fishing	0.4637	0.3510	0.3520	0.4308	0.4093	0.3857	0.3584
B: Mining and Quarrying	0.5196	0.4407	0.5188	0.5340	0.5394	0.5099	0.4909
C: Manufacturing	0.4399	0.3241	0.4074	0.3657	0.3697	0.3836	0.3976
D: Electricity, Gas, Steam, and Air Conditioning Supply	0.2825	0.2814	0.3018	0.2255	0.1879	0.2234	0.1730
E: Water Supply, Sewerage, Waste Management, and Remediation Activities	0.4561	0.3245	0.4572	0.3595	0.3149	0.3398	0.3334
F: Construction	0.4411	0.3582	0.4339	0.4067	0.3735	0.3908	0.3658
G: Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles	0.4532	0.3058	0.4078	0.3516	0.3716	0.3821	0.3624
H: Transportation and Storage	0.4340	0.3316	0.4060	0.3654	0.3688	0.3762	0.3626
I: Accommodation and Food Service Activities	0.3905	0.3019	0.2600	0.3265	0.3844	0.4469	0.4751
J: Information and Communication	0.4431	0.3783	0.4734	0.4534	0.4916	0.4993	0.4784
K: Financial and Insurance Activities	0.4451	0.3532	0.4268	0.4135	0.4447	0.4235	0.4483

L: Real Estate Activities	0.4572	0.3086	0.4193	0.4122	0.3948	0.3848	0.4025
M: Professional, Scientific, and Technical Activities	0.4441	0.3556	0.4350	0.4277	0.4380	0.4487	0.4279
N: Administrative and Support Service Activities	0.4267	0.3006	0.3843	0.3451	0.3339	0.3609	0.3568
O: Public Administration and Defense, Compulsory Social Security	0.3312	0.4582	0.5639	0.4768	0.3929	0.3802	0.3652
P: Education	0.3940	0.4577	0.5348	0.4173	0.4595	0.4690	0.4215
Q: Human Health and Social Work Activities	0.4930	0.4186	0.4745	0.4361	0.4376	0.4847	0.4718
R: Arts, Entertainment and Recreation	0.3293	0.3085	0.2996	0.2940	0.3521	0.3987	0.3559
S: Other Service Activities	0.4166	0.3063	0.3767	0.3436	0.3027	0.3563	0.3449

Source: author's calculation

The index's decline in 2019 was caused by domestic political instability and government changes. Thus, the competitiveness of the entrepreneurship sector is more sensitive to political crises than pandemic-related lockdowns.

After ranking sectors by competitiveness level for 2024 (according to the division criterion presented in Table 4.10), the top three were identified: sector B: Mining and Quarrying, sector J: Information and Communication, and sector I: Accommodation and Food Service Activities (Table 4.11). The lowest competitiveness (19^{th} rank) was recorded by sector D: Electricity, Gas, Steam, and Air Conditioning Supply.

Table 10. Division criterion by the enterprise competitiveness at the sectoral level, 2024

Interval	Degree of sectoral enterprise competitiveness (SEC)
$0.4594 \leq SEC_i$	**Very high degree of competitiveness**
$0.4279 \leq SEC_i < 0.4594$	**High degree of competitiveness**
$0.3964 \leq SEC_i < 0.4279$	**Medium degree of competitiveness**
$0.3649 \leq SEC_i < 0.3964$	**Low degree of competitiveness**
$SEC_i < 0.3649$	**Very low degree of competitiveness**

Source: author's elaboration

The high competitiveness of IT enterprises is due to the opportunity to operate in a stable tax environment as residents of the Moldova IT Park (MITP). These residents are subject to a single 7% tax on turnover. According to Law No. 77/2016, the tax rules for MITP residents will not change until 2035, which is fundamental to increasing investor confidence (Parlamentul Republicii Moldova, 2016)[116].

Table 4.11. Rank of enterprise competitiveness by sectors, 2024

Sectors	Rank							Degree of SEC
	Pillar 1	Pillar 2	Pillar 3	Pillar 4	Pillar 5	Pillar 6	SECI	
A: Agriculture, Forestry, and Fishing	6	10	15	14	13	13	14	**Very low**
B: Mining and Quarrying	1	8	3	12	2	2	1	**Very high**
C: Manufacturing	15	11	13	11	6	4	9	**Medium**
D: Electricity, Gas, Steam, and Air Conditioning Supply	19	12	14	18	18	18	19	**Very low**

[116] Parlamentul Republicii Moldova. (2016). *Lege cu privire la parcurile pentru tehnologia informației (Nr. 77 din 21 aprilie 2016)*. Monitorul Oficial al Republicii Moldova, Nr. 157–162 art. 318. https://www.legis.md/cautare/getResults?doc_id=93161&lang=ro#

E: Water Supply, Sewerage, Waste Management, and Remediation Activities	3	4	17	17	17	16	18	**Very low**
F: Construction	5	14	11	9	14	9	10	**Low**
G: Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles	16	17	5	13	8	14	13	**Very low**
H: Transportation and Storage	14	15	10	10	11	11	12	**Very low**
I: Accommodation and Food Service Activities	8	3	4	6	10	6	3	**Very high**
J: Information and Communication	11	9	9	5	1	5	2	**Very high**
K: Financial and Insurance Activities	13	19	2	2	5	3	5	**High**
L: Real Estate Activities	7	18	1	7	12	7	8	**Medium**
M: Professional, Scientific, and Technical Activities	9	16	7	1	9	15	6	**High**
N: Administrative and Support Service Activities	12	7	18	8	16	10	15	**Very low**
O: Public Administration and Defense, Compulsory Social Security	17	1	8	19	3	19	11	**Low**
P: Education	2	6	16	15	15	1	7	**Medium**
Q: Human Health and Social Work Activities	10	5	12	3	4	12	4	**Very high**
R: Arts, Entertainment and Recreation	18	2	19	16	7	8	16	**Very low**
S: Other Service Activities	4	13	6	4	19	17	17	**Very low**

Source: author's calculation

According to a report by the Ministry of Economic Development and Digitalization, by the end of 2024, the number of MITP residents reached 2,154 enterprises, and the number of countries from which foreign capital originates reached 42 (Ministerul Dezvoltării Economice și Digitalizării, 2025)[117].

Regional Enterprise Competitiveness Index: estimation, challenges and advantages

The use of the Regional Enterprise Competitiveness Index in the analysis enabled the identification of development asymmetry between Administrative-Territorial Units (ATU).

Table 4.12. Regional Enterprise Competitiveness Index, Pillar 1. Business structure and scale

ATU	2018	2019	2020	2021	2022	2023	2024
Balti municipality	0.2256	0.1968	0.2048	0.2998	0.2232	0.2463	0.3090
Briceni	0.4947	0.3590	0.3881	0.3397	0.2846	0.3406	0.3671
Donduseni	0.6300	0.5980	0.5924	0.5139	0.5357	0.5116	0.5283
Drochia	0.1680	0.1698	0.1488	0.1905	0.1903	0.1427	0.1753
Edinet	0.2523	0.2271	0.2443	0.3100	0.3365	0.3485	0.2182
Falesti	0.4291	0.3502	0.3201	0.3665	0.3738	0.3352	0.3224
Floresti	0.4104	0.3477	0.3228	0.3207	0.2749	0.2271	0.2462
Glodeni	0.4890	0.4277	0.4663	0.4339	0.5069	0.4717	0.5089
Ocnita	0.5814	0.4771	0.5369	0.4982	0.5212	0.5128	0.5704
Riscani	0.5048	0.3791	0.4023	0.3787	0.3364	0.2850	0.4011
Singerei	0.3523	0.3142	0.3288	0.2765	0.2568	0.2516	0.2289
Soroca	0.4040	0.3718	0.4716	0.4656	0.4327	0.4247	0.4022
Chisinau municipality	0.3784	0.2916	0.3180	0.4033	0.3698	0.3452	0.3586
Anenii Noi	0.2990	0.2640	0.2853	0.3183	0.2602	0.3416	0.2713
Calarasi	0.5663	0.5096	0.5802	0.5275	0.4856	0.4851	0.3975
Criuleni	0.3377	0.3112	0.2532	0.4324	0.5118	0.5464	0.5158
Dubasari	0.3410	0.3504	0.3158	0.2825	0.2214	0.3914	0.3780

[117] Ministerul Dezvoltării Economice și Digitalizării. (2025). *Raport de evaluare a activității parcului pentru tehnologia informației „Moldova IT Park" în anul 2024* [Evaluation report on the activity of the information technology park "Moldova IT Park" in 2024]. https://mded.gov.md/wp-content/uploads/2025/10/1-Raport-de-evaluare-Moldova-IT-park_2024.signed.signed.signed.signed.signed.signed.semnat.semnat.pdf

Hincesti	0.5004	0.3154	0.4354	0.4714	0.4176	0.4450	0.4553
Ialoveni	0.2656	0.1641	0.2228	0.3976	0.3567	0.3685	0.3875
Nisporeni	0.3314	0.2141	0.3262	0.1886	0.1843	0.2558	0.2788
Orhei	0.4171	0.2704	0.3328	0.3153	0.2659	0.2786	0.2580
Rezina	0.2650	0.1877	0.2062	0.2175	0.3292	0.3579	0.3904
Straseni	0.4550	0.2639	0.3656	0.4914	0.5144	0.4681	0.5669
Soldanesti	0.5191	0.4948	0.5164	0.4241	0.4234	0.4066	0.4649
Telenesti	0.2455	0.3753	0.3957	0.2846	0.3569	0.3266	0.3832
Ungheni	0.3785	0.3486	0.3862	0.3988	0.4267	0.4243	0.4514
Basarabeasca	0.5679	0.5192	0.5549	0.3170	0.3364	0.3156	0.4093
Cahul	0.5745	0.5005	0.4737	0.4825	0.4939	0.5485	0.5621
Cantemir	0.3014	0.2178	0.2695	0.3120	0.5094	0.5151	0.6002
Causeni	0.4344	0.4924	0.3495	0.4574	0.4903	0.4089	0.4559
Cimislia	0.3754	0.5451	0.4980	0.4880	0.4331	0.5803	0.6038
Leova	0.5036	0.4969	0.4558	0.3727	0.3907	0.3456	0.4268
Stefan Voda	0.4906	0.4090	0.4247	0.4417	0.4836	0.4419	0.4914
Taraclia	0.5661	0.3994	0.3922	0.3972	0.4779	0.4815	0.4939
ATU Gagauzia	0.4840	0.3928	0.4358	0.4885	0.4991	0.5217	0.4993

Source: author's calculation

The results of the assessment of competitiveness in terms of business structure and scale (***Pillar 1***) challenge the assumption that Chisinau leads competitiveness rankings across all criteria, showing that the capital does not occupy a leading position on separate competitiveness criteria (Table 4.12). In Chisinau, some micro-businesses close each year, and others open. The cost of commercial real estate in the capital is very high, which makes scaling too expensive. For this reason, the business intentionally remains in the small or micro categories in order to preserve the simplified taxation regime.

The high enterprise size ratio (medium vs. small and micro) and the medium-sized enterprises' sales revenue share ensured that the districts of Cantemir and Cimislia held a leading position in the regional ranking of competitiveness in terms of business structure. In the southern region, the rate of active enterprises is higher than in the northern or central regions, and even higher than in Chisinau municipality. Among the central districts, Straseni district has the greatest comparative advantages, as it has a high enterprise density per 1,000 inhabitants and a high diversity index.

Table 4.13. Regional Enterprise Competitiveness Index, Pillar 2. Entrepreneurial base and labour engagement

ATU	2018	2019	2020	2021	2022	2023	2024
Balti municipality	0.5408	0.5388	0.5984	0.5722	0.5510	0.6264	0.6214
Briceni	0.5649	0.4901	0.4376	0.3077	0.3102	0.4150	0.4572
Donduseni	0.3754	0.3648	0.3727	0.4998	0.4733	0.6131	0.5542
Drochia	0.3863	0.2598	0.2902	0.2675	0.3446	0.3494	0.3288
Edinet	0.5617	0.5284	0.5963	0.5833	0.5473	0.5233	0.4752
Falesti	0.4888	0.3958	0.3901	0.3489	0.3469	0.3857	0.3820
Floresti	0.4531	0.3962	0.3734	0.2403	0.2578	0.1707	0.1639
Glodeni	0.5197	0.4277	0.4220	0.3612	0.4365	0.4811	0.4718
Ocnita	0.5319	0.5027	0.5106	0.4968	0.5566	0.5131	0.5010
Riscani	0.3567	0.2632	0.2973	0.2326	0.2862	0.3138	0.3533
Singerei	0.2331	0.2250	0.2290	0.2134	0.2713	0.2796	0.1838
Soroca	0.3655	0.3287	0.2930	0.2738	0.2955	0.4326	0.2953
Chisinau municipality	0.5275	0.4929	0.5005	0.4834	0.5170	0.5969	0.6044
Anenii Noi	0.2791	0.2676	0.3354	0.2699	0.3144	0.3739	0.4212
Calarasi	0.4555	0.4139	0.4475	0.3695	0.3139	0.4247	0.3054
Criuleni	0.3176	0.2901	0.2423	0.2917	0.2703	0.3703	0.3563
Dubasari	0.2773	0.2458	0.2358	0.1527	0.2417	0.3781	0.3258
Hincesti	0.3740	0.2922	0.3790	0.3062	0.3185	0.3413	0.3623
Ialoveni	0.3332	0.2761	0.2715	0.1620	0.2054	0.2570	0.3646
Nisporeni	0.3958	0.3260	0.2957	0.1551	0.1528	0.3338	0.3789
Orhei	0.3327	0.4055	0.4104	0.3333	0.2580	0.3327	0.3758
Rezina	0.4543	0.3954	0.3805	0.3616	0.3572	0.3554	0.3415
Straseni	0.3170	0.3275	0.2945	0.3504	0.3451	0.4406	0.4222
Soldanesti	0.4157	0.4150	0.4567	0.2800	0.2595	0.3097	0.3438
Telenesti	0.3448	0.3568	0.3919	0.3298	0.3933	0.1706	0.1590
Ungheni	0.3905	0.3514	0.3667	0.3456	0.3367	0.3664	0.2504
Basarabeasca	0.4962	0.2944	0.3807	0.2063	0.3432	0.5500	0.4438
Cahul	0.5161	0.4636	0.4466	0.3967	0.4216	0.5359	0.4970
Cantemir	0.5477	0.3249	0.3469	0.2833	0.4104	0.6261	0.4230
Causeni	0.3876	0.4206	0.4205	0.3813	0.3706	0.2774	0.3594
Cimislia	0.5240	0.3868	0.3563	0.3231	0.3618	0.5625	0.4208
Leova	0.4200	0.3893	0.3121	0.3147	0.3774	0.4076	0.3808
Stefan Voda	0.5206	0.4081	0.4062	0.3885	0.4961	0.5499	0.4581
Taraclia	0.5201	0.4038	0.4154	0.4507	0.5579	0.7062	0.6821
ATU Gagauzia	0.4814	0.4275	0.4392	0.4172	0.4163	0.5091	0.3934

Source: author's calculation

Taraclia district, Balti and Chisinau municipalities lead in competitiveness in terms of entrepreneurial base and labor engagement (***Pillar 2***) (Table 4.13). Despite demographic decline and population exodus, Taraclia district recorded a 15% increase in employment in the entrepreneurship sector from 2018 to 2024, and a high average number of employees per enterprise. Chisinau and Balti municipalities traditionally lead in employment concentration. Enterprise employment per 1,000 inhabitants in Chisinau was 504, while in Balti it was 394 in 2024. Thus, in Chisinau, every second inhabitant is involved in entrepreneurial activity.

A 2.8-fold decrease in competitive advantages in terms of entrepreneurial base and labor engagement was observed in Floresti district, and a 2.2-fold decrease in Telenesti district for the period 2018–2024, which is why these districts are ranked last in pillar 2. The main reason for this negative trend is the negative level of CAGR of employment (3-year). For example, in Floresti district, the employment rate declined much more than the population did. From 2018 to 2024, the employment rate fell by 29.9%, while the usually resident population dropped by 15.2%.

The interaction of internal resources and external institutional conditions shapes enterprise performance in Moldova. Productivity is a key factor in assessing competitiveness and reflects the efficient use of not only equipment and technology, but also labor and other resources. Efficient use of all resources is key to economic growth. The distribution of districts by productivity and resource efficiency (***Pillar 3***) revealed an asymmetry between municipalities and peripheral districts (Table 4.14). The highest level among districts for the indicator "Sales to labor cost ratio" and a high level of the indicator "Capital to labor cost ratio" ensured that Dubasari district topped the ranking for this competitiveness criterion (Table 4.14). In the regional ranking of pillar 3, Criuleni district ranks second after Dubasari district, having recorded the highest relative productivity ratio of medium-sized enterprises to small and micro enterprises. The districts of the northern region, Glodeni and Falesti, remain at a low level due to low indicator values for "Sales to labor cost ratio" and "Capital to labor cost ratio," and a high "Operating Expenses Ratio."

Table 4.14. Regional Enterprise Competitiveness Index, Pillar 3. Productivity and resource efficiency

ATU	2018	2019	2020	2021	2022	2023	2024
Balti municipality	0.4117	0.4933	0.3647	0.3127	0.3960	0.5034	0.4506
Briceni	0.3216	0.3321	0.4097	0.4099	0.4632	0.5078	0.4618
Donduseni	0.4421	0.4998	0.5213	0.4716	0.6553	0.5948	0.5447
Drochia	0.5911	0.6395	0.5402	0.5479	0.5455	0.5858	0.5862
Edinet	0.5304	0.5037	0.4306	0.4298	0.5563	0.6030	0.5543
Falesti	0.2774	0.3140	0.2668	0.3069	0.3723	0.4057	0.3085
Floresti	0.3768	0.4642	0.3411	0.3902	0.4655	0.4747	0.4612
Glodeni	0.2064	0.2306	0.2078	0.2533	0.4213	0.3587	0.2775
Ocnita	0.3164	0.3014	0.3433	0.5168	0.5403	0.4922	0.4447
Riscani	0.4603	0.4255	0.4242	0.4136	0.4242	0.4945	0.4580
Singerei	0.4216	0.4677	0.4363	0.4372	0.5235	0.5359	0.4273
Soroca	0.4190	0.3694	0.4043	0.3476	0.4150	0.4257	0.4282
Chisinau municipality	0.4471	0.5031	0.4292	0.3669	0.4565	0.5042	0.5062
Anenii Noi	0.4257	0.4419	0.4813	0.4761	0.5564	0.6591	0.5828
Calarasi	0.3573	0.3366	0.3143	0.2918	0.3276	0.3761	0.3920
Criuleni	0.4692	0.5268	0.4305	0.4163	0.5290	0.7065	0.6952
Dubasari	0.3489	0.6766	0.5589	0.3854	0.5413	0.7070	0.8031
Hincesti	0.4500	0.4458	0.2770	0.3530	0.4324	0.5179	0.5830
Ialoveni	0.6276	0.5934	0.5759	0.5188	0.6002	0.6841	0.5911
Nisporeni	0.4031	0.4267	0.3659	0.2869	0.5146	0.4697	0.3957
Orhei	0.4794	0.5455	0.4878	0.3457	0.4213	0.5030	0.4517
Rezina	0.4033	0.4630	0.4100	0.5004	0.6345	0.4779	0.5100
Straseni	0.5076	0.3648	0.3353	0.3501	0.5030	0.4810	0.5415
Soldanesti	0.3146	0.3861	0.3120	0.3581	0.4164	0.4494	0.4548
Telenesti	0.3222	0.2585	0.2897	0.4130	0.4697	0.5509	0.5229
Ungheni	0.4206	0.4527	0.4500	0.3336	0.3551	0.4459	0.4229
Basarabeasca	0.3814	0.4049	0.4111	0.3993	0.3921	0.3425	0.2873
Cahul	0.4194	0.4173	0.3431	0.4097	0.4319	0.4936	0.4425
Cantemir	0.4501	0.4468	0.4474	0.5517	0.4631	0.3072	0.3806
Causeni	0.3888	0.4827	0.2588	0.3511	0.4964	0.4864	0.4637
Cimislia	0.3686	0.5515	0.4270	0.4264	0.4409	0.6147	0.6191

Leova	0.3558	0.4297	0.3402	0.4331	0.4735	0.3938	0.3171
Stefan Voda	0.3334	0.3735	0.3198	0.4248	0.4568	0.4462	0.5362
Taraclia	0.3290	0.3514	0.3853	0.4100	0.4843	0.4888	0.5095
ATU Gagauzia	0.4542	0.4507	0.4561	0.4349	0.5096	0.5350	0.5273

Source: author's calculation

An analysis of enterprise competitiveness, by district, in terms of financial results and profitability (***Pillar 4***), revealed that the Moldovan economy is polarized (Table 4.15). The geographic distribution of enterprise profitability closely correlates with proximity to transport and logistics hubs, the location of customs checkpoints with the most intensive international transport traffic, and the concentration of agricultural enterprises, whose profitability depends on weather conditions. Briceni rightfully leads the ranking of districts with the most profitable entrepreneurship sector.

This district has the highest share of profitable enterprises in the country and the lowest share of enterprises without sales, as well as enterprises with a comparatively high operating profit margin.

Table 4.15. Regional Enterprise Competitiveness Index, Pillar 4. Financial results and profitability

ATU	2018	2019	2020	2021	2022	2023	2024
Balti municipality	0.3810	0.3761	0.4935	0.2275	0.3837	0.6149	0.4977
Briceni	0.8690	0.9505	1.0000	0.6677	0.7344	0.9028	0.8906
Donduseni	0.6480	0.7244	0.5573	0.7638	0.9136	0.8376	0.7182
Drochia	0.3813	0.4736	0.6181	0.5666	0.5095	0.7198	0.5183
Edinet	0.6455	0.6631	0.7768	0.5643	0.6815	0.7170	0.6109
Falesti	0.5628	0.5370	0.7110	0.6197	0.5239	0.7715	0.5871
Floresti	0.6019	0.6561	0.5730	0.6228	0.4927	0.6739	0.5875
Glodeni	0.3897	0.6980	0.7509	0.6531	0.6093	0.6336	0.4044
Ocnita	0.6811	0.7008	0.8750	0.6547	0.6973	0.8022	0.7273
Riscani	0.6582	0.7164	0.7497	0.6092	0.5284	0.7838	0.6024
Singerei	0.5530	0.6413	0.4088	0.6191	0.5820	0.6325	0.5754
Soroca	0.4507	0.4906	0.5232	0.3459	0.3721	0.6177	0.4768

Chisinau municipality	0.3631	0.3656	0.4257	0.2218	0.3109	0.6138	0.5613
Anenii Noi	0.3997	0.5823	0.5890	0.4225	0.6020	0.8197	0.7869
Calarasi	0.5624	0.5066	0.7106	0.4296	0.4431	0.7704	0.7271
Criuleni	0.5116	0.3326	0.4322	0.3573	0.3787	0.6942	0.6757
Dubasari	0.5319	0.3900	0.5609	0.5635	0.6923	0.6783	0.7212
Hincesti	0.3726	0.3161	0.3757	0.3143	0.4038	0.5576	0.5525
Ialoveni	0.4698	0.4507	0.5210	0.3435	0.4390	0.6627	0.5877
Nisporeni	0.3586	0.3018	0.6005	0.2570	0.4488	0.7317	0.6755
Orhei	0.3773	0.2773	0.4244	0.3865	0.3635	0.6348	0.5490
Rezina	0.6425	0.6589	0.6381	0.6749	0.8096	0.6961	0.6853
Straseni	0.5468	0.4373	0.4736	0.2364	0.4591	0.6721	0.6090
Soldanesti	0.6860	0.9032	0.7172	0.7572	0.7391	0.7653	0.7232
Telenesti	0.6311	0.5149	0.3968	0.4162	0.3367	0.5821	0.4363
Ungheni	0.3039	0.2670	0.3554	0.1987	0.0000	0.3200	0.2970
Basarabeasca	0.5010	0.2771	0.1792	0.7013	0.6016	0.7655	0.5732
Cahul	0.5001	0.4672	0.6210	0.5979	0.5279	0.7620	0.6357
Cantemir	0.5497	0.5380	0.3375	0.8423	0.4803	0.2146	0.2358
Causeni	0.4268	0.3693	0.2389	0.3727	0.4864	0.6660	0.4972
Cimislia	0.5692	0.5440	0.4379	0.5118	0.4702	0.6475	0.6067
Leova	0.6297	0.7017	0.3753	0.8706	0.6776	0.6126	0.4314
Stefan Voda	0.6510	0.5344	0.5932	0.4966	0.6512	0.6753	0.6711
Taraclia	0.4909	0.4493	0.6162	0.6050	0.4862	0.6922	0.6376
ATU Gagauzia	0.5887	0.4761	0.4932	0.5511	0.5492	0.6816	0.6132

Source: author's calculation

Cantemir is proof that, in some districts, competitiveness in terms of financial results and profitability (Pillar 4) depends on the concentration of agricultural enterprises. In 2021, this district recorded a record-high grain yield, resulting in a Financial Results and Profitability Index score of 0.8423. However, this indicator declined in subsequent years. As a result, Cantemir ranked last in 2024. The profitability of enterprises in this district depends on weather conditions, as the share of agricultural enterprises ranges from 37.34% to 44.50% in 2018-2024. Although three other districts (Briceni, Donduseni, and Soldanesti) recorded a similar share of agricultural enterprises, they are located in other agroclimatic zones. In 2022-

2024, yields in these districts were 1.4-2.1 times higher than in Cantemir.

Nisporeni and Drochia districts top the enterprise competitiveness rankings in terms of financial stability and capital structure (***Pillar 5***) (Table 4.16). The main reason for this is the predominance of microenterprises, whose share in Nisporeni district is 93% and in Drochia district 85% in 2024. Therefore, in the pillar 1 ranking, these districts receive the lowest rankings. Respectively, Drochia district ranks 35th, and Nisporeni district ranks 29th. Microenterprises have low levels of liabilities because they are largely financed with equity capital.

Table 4.16. Regional Enterprise Competitiveness Index, Pillar 5. Financial stability and capital structure

ATU	2018	2019	2020	2021	2022	2023	2024
Balti municipality	0.4300	0.3916	0.3040	0.1526	0.2205	0.2864	0.5719
Briceni	0.6665	0.6807	0.7043	0.6449	0.6571	0.5699	0.5986
Donduseni	0.5234	0.5514	0.4896	0.4623	0.6085	0.6189	0.6179
Drochia	0.7777	0.6371	0.7986	0.7949	0.8292	0.8177	0.7666
Edinet	0.5490	0.4945	0.5281	0.4127	0.6048	0.5087	0.5754
Falesti	0.5927	0.5326	0.5352	0.5442	0.5348	0.4735	0.5456
Floresti	0.5033	0.4166	0.4332	0.4276	0.6173	0.5264	0.5703
Glodeni	0.4559	0.4279	0.4356	0.4051	0.4680	0.3106	0.4150
Ocnita	0.6033	0.5119	0.5975	0.5467	0.6003	0.4967	0.5474
Riscani	0.6953	0.6866	0.7091	0.7054	0.6592	0.6835	0.6236
Singerei	0.4391	0.5316	0.3840	0.4092	0.4462	0.3776	0.4411
Soroca	0.5267	0.4918	0.5187	0.4473	0.5228	0.4097	0.5500
Chisinau municipality	0.6397	0.5613	0.6042	0.4624	0.5660	0.5252	0.6417
Anenii Noi	0.5990	0.5687	0.5051	0.3537	0.4435	0.3975	0.5877
Calarasi	0.5050	0.4419	0.4754	0.3745	0.4164	0.3743	0.5157
Criuleni	0.4707	0.4147	0.2864	0.3004	0.3349	0.2633	0.4477
Dubasari	0.4239	0.1207	0.1092	0.0984	0.3150	0.1406	0.4076
Hincesti	0.5731	0.5142	0.5266	0.4740	0.5175	0.4446	0.5833

Ialoveni	0.5408	0.4820	0.4862	0.3826	0.4447	0.4327	0.5277
Nisporeni	0.7821	0.7779	0.8601	0.7803	0.8994	0.6967	0.7890
Orhei	0.3695	0.1926	0.1745	0.1423	0.2632	0.2710	0.4755
Rezina	0.6615	0.5302	0.5449	0.1829	0.6807	0.6731	0.7625
Straseni	0.5911	0.4743	0.5106	0.3793	0.3410	0.3652	0.5143
Soldanesti	0.3259	0.2711	0.3692	0.3729	0.5275	0.5620	0.5681
Telenesti	0.3062	0.6565	0.5779	0.5124	0.6550	0.6001	0.6918
Ungheni	0.6463	0.7108	0.7871	0.5097	0.4675	0.3554	0.4689
Basarabeasca	0.5005	0.5229	0.5131	0.5155	0.5494	0.2511	0.2514
Cahul	0.6019	0.5620	0.5973	0.6156	0.6191	0.5581	0.6079
Cantemir	0.6642	0.6275	0.5132	0.6191	0.6277	0.2914	0.3163
Causeni	0.4922	0.2594	0.2304	0.0473	0.2339	0.2176	0.4371
Cimislia	0.5739	0.5479	0.5401	0.5439	0.5842	0.4277	0.4924
Leova	0.4937	0.4992	0.3468	0.4682	0.5670	0.3448	0.4410
Stefan Voda	0.6705	0.6194	0.6159	0.6288	0.6496	0.5877	0.5637
Taraclia	0.1503	0.1631	0.2192	0.5411	0.6810	0.5156	0.4994
ATU Gagauzia	0.6100	0.4977	0.4683	0.4056	0.5240	0.4898	0.5882

Source: author's calculation

In Nisporeni district, the share of agricultural enterprises among all enterprises has doubled from 2018 to 2024. These enterprises finance their assets through their own funds, use their own land and equipment, and therefore enjoy high financial autonomy. Other causal factors are low capital intensity among enterprises and limited access to bank financing due to stringent banking requirements. Telenesti district ranks 4th, as it has the highest financial investment to total assets ratio.

The lowest level of competitiveness in terms of financial stability and capital structure was recorded in Basarabeasca district. This indicator decreased by 2.2 times in 2023 compared to 2022. The main indicator whose change affected pillar 5's value was the financial leverage (debt to equity ratio). This indicator increased by 1.9 times in 2023 and by 2.4 times in 2024 compared to the previous year. The increase in financial leverage was due to an increase in non current liabilities: a 2.3-fold increase in 2023 and a 2.5-fold increase in 2024. Borrowed funds were used to finance working capital and current operations rather than investments.

Table 4.17. Regional Enterprise Competitiveness Index, Pillar 6. Growth dynamics and intangible potential

ATU	2018	2019	2020	2021	2022	2023	2024
Balti municipality	0.3005	0.4173	0.3997	0.2364	0.5096	0.4497	0.4273
Briceni	0.2812	0.4199	0.4020	0.3280	0.4906	0.3712	0.4005
Donduseni	0.0030	0.2062	0.1491	0.3353	0.7467	0.6530	0.5829
Drochia	0.2768	0.2130	0.2235	0.2438	0.5492	0.4254	0.4010
Edinet	0.1502	0.3748	0.4043	0.3423	0.4204	0.2945	0.2300
Falesti	0.2818	0.3649	0.4245	0.2706	0.4853	0.3335	0.3051
Floresti	0.2770	0.4081	0.3052	0.4058	0.6096	0.4939	0.3952
Glodeni	0.2938	0.4052	0.5432	0.4653	0.5816	0.4125	0.3769
Ocnita	0.2807	0.3286	0.5422	0.2582	0.5321	0.3289	0.4293
Riscani	0.3580	0.4559	0.3386	0.2526	0.4465	0.3706	0.3818
Singerei	0.3078	0.4019	0.4239	0.2809	0.5463	0.3948	0.3115
Soroca	0.2675	0.4183	0.5679	0.3807	0.6478	0.3095	0.3585
Chisinau municipality	0.4173	0.5570	0.4696	0.3521	0.5632	0.5030	0.4847
Anenii Noi	0.6581	0.4535	0.4294	0.2005	0.5521	0.3936	0.3841
Calarasi	0.2550	0.3681	0.4294	0.2214	0.4784	0.3230	0.3854
Criuleni	0.5001	0.6583	0.6567	0.4820	0.7532	0.6084	0.6221
Dubasari	0.4236	0.5553	0.5936	0.4143	0.5539	0.3283	0.4172
Hincesti	0.3499	0.3911	0.3474	0.2542	0.4767	0.3763	0.4255
Ialoveni	0.3273	0.4709	0.4295	0.2931	0.4452	0.3543	0.3885
Nisporeni	0.3527	0.4298	0.3735	0.2823	0.4624	0.4620	0.3630
Orhei	0.2992	0.4713	0.4431	0.3028	0.5085	0.4700	0.3825
Rezina	0.4394	0.5576	0.3583	0.2737	0.4044	0.0822	0.1562
Straseni	0.3235	0.4720	0.5466	0.3318	0.5825	0.3378	0.3414
Soldanesti	0.2975	0.4420	0.3504	0.3118	0.4457	0.4037	0.3262
Telenesti	0.4119	0.4062	0.3160	0.3710	0.4471	0.4178	0.3679
Ungheni	0.2571	0.4262	0.6564	0.4132	0.4212	0.3146	0.4076
Basarabeasca	0.2160	0.2362	0.3046	0.3116	0.4677	0.4634	0.4133
Cahul	0.3433	0.4669	0.3939	0.2687	0.4490	0.3962	0.3298
Cantemir	0.1701	0.3610	0.3620	0.2177	0.0498	0.0000	0.1586
Causeni	0.3752	0.6259	0.4206	0.3012	0.4017	0.4132	0.3414
Cimislia	0.2462	0.3691	0.2969	0.2983	0.5435	0.4407	0.3918
Leova	0.2349	0.3577	0.3093	0.2373	0.4523	0.3822	0.5317
Stefan Voda	0.3272	0.4120	0.3685	0.2463	0.5071	0.3798	0.3582
Taraclia	0.3520	0.3551	0.3972	0.3076	0.5432	0.3475	0.3983
ATU Gagauzia	0.2518	0.3454	0.3676	0.3321	0.5562	0.3945	0.2023

Source: author's calculation

The highest share of intangible assets in the country is held by enterprises located in Chisinau municipality. In 2018-2024, the capital was home to 60-64% of all enterprises in the country, as well as to Moldova IT Park and to the majority of universities, including research institutes. Therefore, Chisinau municipality enterprises are relatively highly competitive in terms of growth dynamics and intangible potential (***Pillar 6***), ranking fourth in 2024, behind only the districts of Criuleni, Donduseni, and Leova (Table 4.17).

Criuleni district enterprises recorded the highest level of intangible intensity, placing this district as the leader in competitiveness in terms of growth dynamics and intangible potential. A significant increase in intangible assets was facilitated by changes in the district's economic structure. Sectors typically rich in intangible assets are sector J: Information and Communication, and sector M: Professional, Scientific, and Technical Activities. A part of the newly registered enterprises in Criuleni belong to these sectors. The number of enterprises in Sector J increased by 3.2-fold, and in Sector M by 1.8-fold, from 2018 to 2024.

Another sector that recorded an increase in the number of enterprises was Sector G: Wholesale and Retail Trade, which rose 1.5-fold. These enterprises have fewer tangible assets and more intangible ones. Another factor driving the growth of this competitiveness criterion is that Criuleni district is located near Chisinau, and IT enterprises and service firms are registering in suburban areas, which allows for lower costs, primarily rent.

The ***Regional Enterprise Competitiveness Index (RECI)*** recorded significant growth for the Donduseni and Taraclia districts, which are at the top of the ranking (first rank and third rank, respectively) in 2018-2024 (Table 4.18).

Table 4.18. Regional Enterprise Competitiveness Index

ATU	2018	2019	2020	2021	2022	2023	2024
Balti municipality	0.3816	0.4023	0.3942	0.3002	0.3807	0.4545	0.4797
Briceni	0.5330	0.5387	0.5569	0.4497	0.4900	0.5179	0.5293
Donduseni	0.4370	0.4908	0.4471	0.5078	0.6555	0.6382	0.5910

Drochia	0.4302	0.3988	0.4366	0.4352	0.4947	0.5068	0.4627
Edinet	0.4482	0.4653	0.4967	0.4404	0.5245	0.4992	0.4440
Falesti	0.4388	0.4157	0.4413	0.4095	0.4395	0.4508	0.4085
Floresti	0.4371	0.4481	0.3914	0.4012	0.4530	0.4278	0.4041
Glodeni	0.3924	0.4362	0.4710	0.4287	0.5039	0.4447	0.4091
Ocnita	0.4991	0.4704	0.5676	0.4952	0.5746	0.5243	0.5367
Riscani	0.5055	0.4878	0.4869	0.4320	0.4468	0.4885	0.4700
Singerei	0.3845	0.4303	0.3685	0.3727	0.4377	0.4120	0.3613
Soroca	0.4056	0.4118	0.4631	0.3768	0.4477	0.4367	0.4185
Chisinau municipality	0.4622	0.4619	0.4579	0.3816	0.4639	0.5147	0.5262
Anenii Noi	0.4434	0.4297	0.4376	0.3402	0.4548	0.4976	0.5057
Calarasi	0.4503	0.4294	0.4929	0.3691	0.4108	0.4589	0.4538
Criuleni	0.4345	0.4223	0.3835	0.3800	0.4630	0.5315	0.5521
Dubasari	0.3911	0.3898	0.3957	0.3161	0.4276	0.4373	0.5088
Hincesti	0.4367	0.3792	0.3902	0.3622	0.4278	0.4471	0.4936
Ialoveni	0.4274	0.4062	0.4178	0.3496	0.4152	0.4599	0.4745
Nisporeni	0.4373	0.4127	0.4703	0.3250	0.4437	0.4916	0.4801
Orhei	0.3792	0.3604	0.3788	0.3043	0.3467	0.4150	0.4154
Rezina	0.4777	0.4655	0.4230	0.3685	0.5360	0.4404	0.4743
Straseni	0.4568	0.3900	0.4210	0.3566	0.4575	0.4608	0.4992
Soldanesti	0.4265	0.4854	0.4537	0.4173	0.4686	0.4828	0.4802
Telenesti	0.3769	0.4281	0.3947	0.3878	0.4431	0.4413	0.4269
Ungheni	0.3995	0.4261	0.5003	0.3666	0.3345	0.3711	0.3831
Basarabeasca	0.4438	0.3758	0.3906	0.4085	0.4484	0.4480	0.3964
Cahul	0.4925	0.4796	0.4793	0.4619	0.4906	0.5490	0.5125
Cantemir	0.4472	0.4193	0.3794	0.4710	0.4235	0.3257	0.3524
Causeni	0.4175	0.4417	0.3198	0.3185	0.4132	0.4116	0.4258
Cimislia	0.4429	0.4907	0.4260	0.4319	0.4723	0.5456	0.5224
Leova	0.4396	0.4791	0.3566	0.4494	0.4897	0.4144	0.4215
Stefan Voda	0.4989	0.4594	0.4547	0.4378	0.5408	0.5135	0.5131
Taraclia	0.4014	0.3537	0.4043	0.4519	0.5384	0.5386	0.5368
ATU Gagauzia	0.4783	0.4317	0.4433	0.4382	0.5091	0.5219	0.4706

Source: author's calculation

To identify which districts fall into the very high and relatively high competitiveness categories, as well as the very low and relatively low competitiveness categories, the interval boundaries were established and are presented in Table 4.19.

Table 4.19. Division criterion by the enterprise competitiveness at the Administrative-Territorial Unit, 2024

Interval	Degree of regional enterprise competitiveness (REC)
$0.5433 \leq REC_i$	**Very high degree of competitiveness**
$0.4956 \leq REC_i < 0.5433$	**High degree of competitiveness**
$0.4479 \leq REC_i < 0.4956$	**Medium degree of competitiveness**
$0.4001 \leq REC_i < 0.4479$	**Low degree of competitiveness**
$REC_i < 0.4001$	**Very low degree of competitiveness**

Source: author's elaboration

An analysis of the ranking of ATUs across all RECI's criteria revealed that only one district, Donduseni, ranked among the top 10 districts with the highest competitiveness levels across all six pillars in 2024 (Table 4.20). All other districts ranked highly in some pillars but lower in others. For example, Criuleni district ranks first in the competitiveness pillar of Growth Dynamics and Intangible Potential, and second in Productivity and Resource Efficiency. Meanwhile, this district ranks 24th in Entrepreneurial Base and Labor Engagement, and 28th in Financial Stability and Capital Structure.

Table 4.20. Rank of enterprise competitiveness by Administrative-Territorial Unit, 2024

ATU	Rank							Degree of REC
	Pillar 1	Pillar 2	Pillar 3	Pillar 4	Pillar 5	Pillar 6	RECI	
Balti municipality	28	2	23	28	14	6	16	**Medium**
Briceni	25	10	18	1	9	12	5	**High**
Donduseni	6	4	9	7	7	2	1	**Very high**
Drochia	35	28	5	27	2	11	21	**Medium**
Edinet	34	7	8	15	13	32	23	**Low**
Falesti	27	17	33	21	20	31	30	**Low**
Floresti	32	34	19	20	15	14	31	**Low**
Glodeni	8	8	35	33	32	21	29	**Low**

Ocnita	3	5	24	3	19	5	4	**High**
Riscani	19	25	20	18	6	20	20	**Medium**
Singerei	33	33	27	22	29	30	34	**Very low**
Soroca	18	31	26	30	18	24	27	**Low**
Chisinau municipality	26	3	16	24	5	4	6	**High**
Anenii Noi	30	14	7	2	11	18	11	**High**
Calarasi	20	30	30	4	22	17	22	**Medium**
Criuleni	7	24	2	9	28	1	2	**Very high**
Dubasari	24	29	1	6	33	8	10	**High**
Hincesti	14	22	6	25	12	7	13	**Medium**
Ialoveni	22	21	4	19	21	16	17	**Medium**
Nisporeni	29	19	29	10	1	23	15	**Medium**
Orhei	31	20	22	26	26	19	28	**Low**
Rezina	21	27	14	8	3	35	18	**Medium**
Straseni	4	13	10	16	23	27	12	**High**
Soldanesti	12	26	21	5	16	29	14	**Medium**
Telenesti	23	35	13	31	4	22	24	**Low**
Ungheni	15	32	28	34	27	10	33	**Very low**
Basarabeasca	17	11	34	23	35	9	32	**Very low**
Cahul	5	6	25	13	8	28	9	**High**
Cantemir	2	12	31	35	34	34	35	**Very low**
Causeni	13	23	17	29	31	26	25	**Low**
Cimislia	1	15	3	17	25	15	7	**High**
Leova	16	18	32	32	30	3	26	**Low**
Stefan Voda	11	9	11	11	17	25	8	**High**
Taraclia	10	1	15	12	24	13	3	**High**
ATU Gagauzia	9	16	12	14	10	33	19	**Medium**

Source: author's calculation

Such a wide dispersion of rankings for the same ATUs, but based on different competitiveness criteria, indicates that for most districts, the achieved level of competitiveness does not guarantee its maintenance. Moldovan enterprises' competitiveness is only short-term. Therefore, a more in-depth analysis of enterprise competitiveness in terms of Growth Dynamics and Intangible Potential allows us to assess the potential for further competitiveness improvement. It revealed that only four of 35 districts have a high or very high level of this kind of competitiveness.

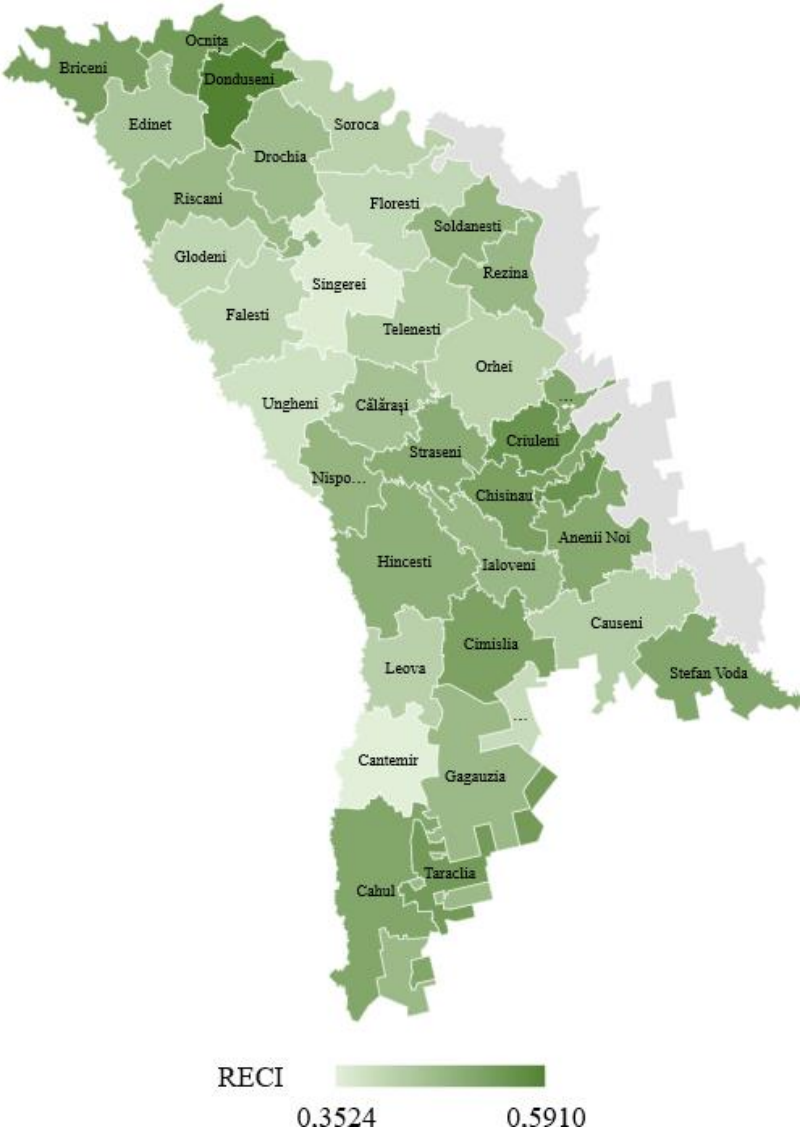

Figure 4.2. ***Regional Enterprise Competitiveness Index, 2024***
Source: author's elaboration

An analysis of the Regional Enterprise Competitiveness Index map showed that most districts with high competitiveness are located either along the national borders, where customs checkpoints with significant flows of goods are located, or in districts with commodity centers and intensive freight transport routes, as well as in the capital and districts adjacent to it (Figure 4.2). In 2024, the highest level of competitiveness in the northern region was recorded by enterprises in Donduseni, Ocnita, and Briceni districts.

The economies of the northern districts of Donduseni (ranked 1), Ocnita (ranked 4), and Briceni (ranked 5) are largely diversified due to their agricultural processing capacities. An agro-industrial cluster has developed in Donduseni district, where enterprises engage in both crop cultivation and processing. Large volumes of crop and livestock products are produced in the district, including grains, industrial crops (sugar beet and sunflower), fruits, and eggs.

However, it should be noted that although this district ranks among the leaders in competitiveness and possesses considerable development potential, numerous obstacles to further growth remain. Despite its potential and the large-scale cultivation of sugar beets, the sugar factory "Zahăr-Dondușeni" ("Magt-Vest") went bankrupt. As noted earlier, this situation reflects the challenges associated with Moldova's orientation toward the European market, where competition is particularly intense. Under such conditions, the bankruptcy of large enterprises with outdated equipment and limited access to affordable (cheaper) energy resources becomes increasingly likely. The lack of access to low-cost energy resources and intense market competition limit enterprises' ability to accumulate sufficient capital to modernize production processes.

Currently, the following enterprises are active in Donduseni district: Rom Cris and Avicola Teovera, Climautanul-Agro, Frukt-Laine, Exportfruct, Curtea Dacilor, and Recom-Grup. Rom Cris is the largest egg producer in Moldova, equipped with modern technology and equipment, and exports eggs to the European Union market. Avicola-Teovera is a poultry farm that uses automated poultry farming systems and is part of a family business (the Rom-Cris). Climautanul-Agro is one of the largest agricultural enterprises, cultivating grains,

legumes, and oilseeds, and operating its own grain elevator.

The agricultural enterprise Frukt-Laine cultivates fruits and seed crops and operates a cold storage facility for fruit sorting and packaging. Exportfruct is an enterprise specializing in the purchase, storage, sorting, and preparation of fruits and vegetables for wholesale trade and export, as well as other agricultural products. The enterprise Curtea Dacilor is equipped with a grain elevator and specializes in the wholesale trade of agricultural products, not only grain, but also feed and unprocessed tobacco. The enterprise Recom-Grup operates a sunflower processing unit that produces sunflower kernels for the food industry and for export. This enterprise's products are exported to EU countries.

In the central region, enterprises located in the capital, Chisinau municipality, as well as in the districts surrounding the capital, such as Criuleni and Straseni, are among the most competitive. Hincesti district borders Romania. A customs checkpoint is in Leuseni through which a significant flow of international trade passes. However, this district is not in the green competitiveness area (high degree of REC), but rather in the yellow one (medium degree of REC), ranking 22nd in the Entrepreneurial Base and Labor Engagement sub-index. Given that the distance between Chisinau and Hincesti can be covered in approximately 30–35 minutes by car, some residents of Hincesti work for enterprises located in Chisinau. At the same time, certain specialists, for example, in the healthcare sector, who reside in Chisinau, work part-time at Hincesti medical institutions. Overall, more residents of Hincesti district are employed by enterprises located in Chisinau than residents of the capital who are employed by enterprises in Hincesti district.

Four of the ten ATUs in the southern region are highly competitive. Two of these districts host customs checkpoints: Cahul and Stefan Voda (Palanca and Tudora). Of the four districts with the lowest competitiveness levels (the red area), two are located in the southern region. This further illustrates the regional polarization of the Moldovan economy.

Conclusion

The newly developed competitiveness indices enabled a deep analysis of enterprises' competitive advantages across economic sectors and ATUs. The analysis revealed sectoral imbalances in the national economy, which undoubtedly pose a barrier to sustainable economic development. Moldova is an agricultural country, and its agricultural sector is in the red area in terms of competitiveness. Of the 19 sectors, ten have low or very low competitiveness. Capital- and energy-intensive sectors are uncompetitive, as is expected. Therefore, the Moldovan economy's sectoral structure is characterized by the dominance of the service sector. Competitive enterprises are also in Sector J: Information and Communication, which are financially stable. Addressing sectoral imbalances in the economy requires large-scale capital investment and technological modernization. However, competitive sectors should not be overlooked.

An analysis of enterprise competitiveness at Administrative-Territorial Unit levels revealed that regional polarization is increasing in Moldova. Enterprises located in specialized clusters (Donduseni district), in districts with customs checkpoints with the intensive international transport traffic (Ocnita, Briceni, Stefan Voda, Cahul, and Hincesti districts), and in Chisinau municipality and the districts surrounding the capital are more competitive. Enterprises from districts located far from major trade flows have the lowest competitiveness. Inequality in regional enterprise development creates serious risks for economic stability, economic growth, and social equality.

A synthesis of sectoral and regional analyses of enterprise competitiveness enabled the identification of the main obstacles to sustainable economic development. The first obstacle is the country's low level of scientific and technological development. The state expenditure for research and development activity amounts to only 0.22% of GDP. As a result, enterprises are forced to purchase modern equipment abroad. However, such purchases require foreign currency, which can be earned primarily through exports. At the same time, the main export market for Moldovan enterprises is the European market, where competition with firms equipped with modern technologies is

extremely intense. This creates a vicious circle that is difficult to break without state support.

The second obstacle is the shortage of skilled labour. The country's demographic situation is challenging, as the working-age population is declining due to both lower birth rates and emigration. Population ageing does not contribute to stable economic growth, because a key driver of GDP growth is an increase in the share of the working-age population. Moreover, a part of the working-age population is either employed abroad or works in the informal sector. It therefore does not pay taxes, which negatively affects the state budget and contributes to the growth of external debt.

The third challenge faced by enterprises in Moldova is the high and volatile prices of energy resources. To mitigate this challenge, further development of the renewable energy sector is necessary, as it has demonstrated a steady increase in electricity production in recent years.

Digitalization is essential for improving the competitiveness of Moldovan enterprises. International practice offers a wide range of tools that can be adapted for Moldovan businesses. To optimize business processes, they should be integrated into a unified digital management system. Appropriate tools include ERP systems (Enterprise Resource Planning), CRM systems (Customer Relationship Management), and e-invoicing solutions. The digital transformation of enterprises can significantly improve management efficiency and the quality of managerial decision-making. Technologies such as Big Data, business analytics (BI), artificial intelligence, and machine learning can support this process. Furthermore, e-commerce platforms and digital marketing can help enterprises expand their markets. At the same time, Industry 4.0 technologies, such as the Internet of Things (IoT), smart manufacturing systems, and robotics, can be applied to optimize production processes.

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Chapter 5
Resilience of Fiscal Control Mechanisms in the Republic of Moldova: Directions for Development in the Context of European Standards

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Abstract: *The analysis carried out in this article allows the formulation of the general conclusion that the harmonization of tax control mechanisms in the Republic of Moldova with European standards is a real and visible process, but still incomplete and uneven. The research conducted confirms that, in recent years, the tax administration in the Republic of Moldova has made significant progress in the direction of institutional modernization, digitalization of processes, expansion of voluntary compliance instruments and strengthening the dimension of international cooperation and transparency. In this regard, the activity reports of the State Tax Service for 2024 and 2025 highlight both the institution's orientation towards digital services and simplified interaction with the taxpayer, as well as the explicit assumption of modern standards of tax administration, transparency and good governance in the context of the European path of the Republic of Moldova.*
Keywords: *fiscal control, control mechanisms, development and harmonization, fiscal administration*

Assessment of the regulatory framework and fiscal control practices in the Republic of Moldova

After conceptually defining fiscal control and outlining the relevant European standards for organizing control mechanisms, the analysis must be shifted to the national reality. In the case of the Republic of Moldova, the assessment of the regulatory framework and

fiscal control practices is necessary not only to describe the functioning of the existing system, but also to understand to what extent the reforms promoted in recent years have produced real effects on fiscal administration. This stage of the research is essential, because harmonization cannot be assessed exclusively through the lens of legislative formulations, but must also be verified at the level of procedures, institutional instruments and effective administrative practices. The Fiscal Code remains the basic act regulating fiscal relations and the execution of fiscal obligations in the Republic of Moldova, and the State Fiscal Service is the central institution responsible for fiscal administration and the exercise of fiscal control.

At the same time, the analysis of the national framework cannot be separated from the broader context of public finance reform and commitments to approach the European Union. The Strategy for the Development of Public Finance Management for 2023–2030, approved by Government Decision No. 71/2023, provides the general framework for institutional modernization, and the Economic Reform Program 2025–2027 explicitly highlights the objective of efficient tax administration, based on fairness, coherence and transparency. In parallel, the European Commission reports on the Republic of Moldova track developments in the field of taxation and administrative cooperation, which confirms that the efficiency of tax administration is already part of the broader assessment of institutional readiness for European integration.

From this perspective, the present section pursues three complementary directions. First, it is necessary to examine the normative and institutional framework that underpins fiscal control in the Republic of Moldova, in order to identify the relevant legal structure and administrative powers. Second, it is necessary to analyze recent trends in fiscal control practices, including elements indicating the orientation towards digitalization, the use of electronic fiscal services and the expansion of information tools made available to the tax administration and taxpayers. The State Fiscal Service already operates an infrastructure of electronic services and information tools, including the Personal Cabinet of the Taxpayer, online verification services and digital mechanisms for fiscal interaction, which shows

that the technological dimension of fiscal administration can no longer be treated as secondary. Third, the assessment must capture the persistent limits of the system, i.e. those normative, procedural and institutional vulnerabilities that continue to hinder the approximation of fiscal control to the European logic of risk-based administration, transparency and taxpayer protection.

Therefore, this section aims to provide a reasoned diagnosis of how fiscal control functions in the Republic of Moldova, not only as a legal institution, but also as an administrative practice. Such an assessment is indispensable for the next stages of the research, as it allows for the comparison of national mechanisms with European standards and, subsequently, the formulation of realistic directions for development and harmonization. In fact, only through a careful analysis of the existing framework can it be established whether the recent fiscal reforms have produced a change in substance or only a partial adjustment of the administrative architecture.

Fiscal control in the Republic of Moldova is essentially based on the provisions of the Fiscal Code, which regulates fiscal relations, the powers of fiscal administration bodies and the procedures for verifying the manner of execution of fiscal obligations. From an institutional point of view, the State Fiscal Service has the central role in the administration of taxes, fees and other payments to the national public budget, which means that the fiscal control activity must be analyzed not in isolation, but in close connection with the functions of recordkeeping, compliance, execution, information and digitalization of the fiscal administration. In reality, fiscal control is one of the operational components through which the SFS protects fiscal legality and ensures the functioning of the mechanism for accumulating public revenues.

In terms of procedure, the legal framework is complemented by the Regulation on the conduct of control by the State Tax Service, approved by Order SFS no. 265/2023, an act that clarifies the manner of initiating, conducting and capitalizing on the tax control. The importance of this regulation lies in the fact that it configures the tax control as a complete administrative process, not just as a simple verification. Thus, the conditions for initiating the control, the role of

the decision on initiating the control, the mechanisms for notifying the taxpayer, the possibility of conducting unannounced controls, as well as the duration of the on-site tax control are specified. Naturally, this framework offers a certain procedural stability, but it also shows that the Moldovan tax control system is a highly proceduralized one , with an emphasis on the formalization of the intervention stages.

The institutional role of the State Tax Service has become increasingly complex in recent years. The 2024 activity report shows that the SFS no longer acts only as a control authority in the classical sense, but as an institution that combines tax administration, voluntary compliance, risk monitoring and the development of electronic services. The fact that, at the end of 2024, 14 out of 19 public services provided by the institution were already available in electronic format, which means 73.68%, suggests that the institutional infrastructure of tax administration is gradually moving towards a more digitalized model and more accessible to taxpayers.

At the same time, the SFS report for 2025 explicitly emphasizes the idea that the tax administration assumes a role as a "trusted partner" for taxpayers and links institutional modernization to simplifying interaction, increasing predictability and orientation towards European values. In the same document, the European path of the Republic of Moldova is directly connected to "alignment with modern standards of tax administration, transparency and good governance", and passing the bilateral screening is presented as confirmation of the progress made and the institutional capacity to respond. This aspect is particularly important for the topic of the article, as it shows that the institutional basis of tax control can no longer be discussed exclusively in internal terms; it must also be examined from the perspective of compatibility with the requirements of accession to the European Union.

Therefore, the place of fiscal control in public revenue management must be understood in a twofold manner. On the one hand, fiscal control remains the instrument through which the state verifies the correct declaration and payment of tax obligations, thus protecting the budgetary interest. On the other hand, it is increasingly integrated into a broader mechanism of modern fiscal administration,

in which digitalization, voluntary compliance, data-based monitoring and approximation to European standards are gaining increasing importance. It is precisely this dual nature that explains why the assessment of fiscal control cannot be reduced to the number of controls carried out, but must also be related to the institutional evolution of the SFS.

The empirical analysis of tax control activity shows that the period 2024–2025 was dynamic, but not linear. If 2024 was characterized by the expansion of control activity and increased effectiveness , 2025 highlights a more nuanced combination: a lower number of controls, but a higher value of additionally calculated tax obligations. This evolution is important for understanding the transformation of the tax control model, as it suggests that the emphasis is gradually shifting from volume to selectivity and efficiency.

According to the SFS report for 2024, 30,917 tax audits were carried out during that year, 1,128 more than in 2023, which represents an increase of 3.79%. At the same time, the number of audits during which violations of tax legislation were established increased by 2,018, and the effectiveness of the audits reached 75%, compared to 71% in the previous year. At the same time, the amount of tax obligations calculated additionally to the budget as a result of tax audits amounted to 968.25 million lei, 145.99 million lei more than in 2023, respectively an increase of 17.76%. Of this amount, 709.71 million lei represented taxes, fees, late payment penalties and other payments, and 258.54 million lei were applied tax sanctions.

The summary of the main indicators of fiscal control activity in 2024–2025 is presented in the Table 5.1 below.

The report for 2024 also shows that 216.52 million lei of the calculated amounts were related to control cases related to the initiation of insolvency proceedings, and 297.53 million lei were calculated using indirect methods and sources, which means 30% of the total calculated amounts. As a result of the controls carried out and the decisions adopted, the amount of tax losses was reduced by 184.40 million lei, and the amount of VAT to be deducted by 65.57 million lei. These figures are relevant because they show that the efficiency of tax control is not expressed only by the additional obligations

calculated, but also by the impact on the reduction of tax losses and unjustified deducted amounts.

Table 5.1. Evolution of the main indicators of fiscal control activity in the Republic of Moldova

Indicator	2024	2025	Dynamics / observations
Total number of tax audits carried out	30,917	25,120	decrease by 5,797 controls
Number of successful checks	23,097	17,575	decrease by 5,522
Effectiveness of controls	75%	70%	decrease by 5 pp
Additional calculated tax obligations (million lei)	968.25	1,088.61	increase by 120.35 million lei
Taxes, fees, surcharges and other payments (million lei)	709.71	819.57	INCREASE
Tax sanctions applied (million lei)	258.54	269.04	moderate growth
Calculated amounts related to insolvency (million lei)	216.52	129.08	reduction
Amounts calculated through indirect methods and sources (million lei)	297.53	224.24	reduction
Share of collected obligations out of total eligible	—	90%	explicit indicator available for 2025
Reduced tax losses (million lei)	184.40	762.87	very strong growth
Reduced VAT for deduction (million lei)	65.57	58.26	slight decrease

Source: developed by the author based on the SFS activity reports for 2024 and 2025.

The year 2025 brings a different, but not necessarily worse, picture. According to the SFS report for 2025, 25,120 tax audits were carried out, 5,797 fewer than in 2024, i.e. a 19% reduction. The number of effective audits decreased to 17,575, and the effectiveness decreased to 70%, compared to 75% in 2024. However, the amount of tax obligations calculated additionally to the budget increased to 1,088.61

million lei, i.e. 120.35 million lei or 12% more than in the previous year. Of the total, 819.57 million lei represented taxes, fees, late payment penalties and other payments, and 269.04 million lei were tax penalties.

To more clearly highlight the change in the volume of tax control activity, the dynamics of the number of controls can be followed graphically as follows.

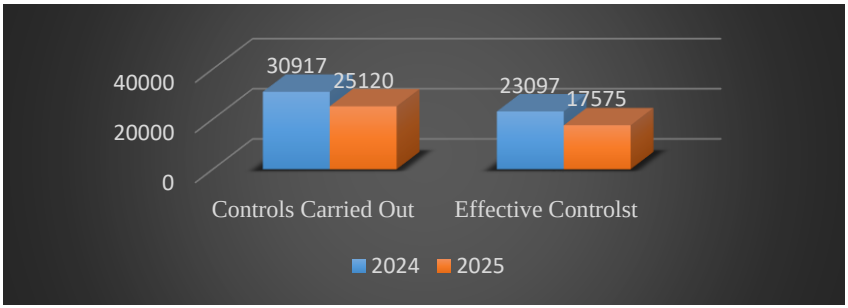

Figure 5.1. Dynamics of the number of tax audits

Source: developed by the author based on SFS reports for 2024 and 2025.

This combination – fewer checks, but higher additional amounts calculated – is particularly interesting for interpretation. It may suggest either a stronger focus of interventions on high-risk cases or a gradual maturation of risk-based selection. The same report shows that 90% of the additional obligations calculated were collected from the total amounts eligible for collection, with the exception of those estimated, related to insolvency, contested or subsequently reduced following the contestation. In addition, as a result of the checks and decisions adopted in 2025, the amount of tax losses was reduced by 762.87 million lei, and the amount of VAT to be deducted by 58.26 million lei.

The evolution of the value of tax obligations additionally calculated following the controls is suggestively captured in the following graph.

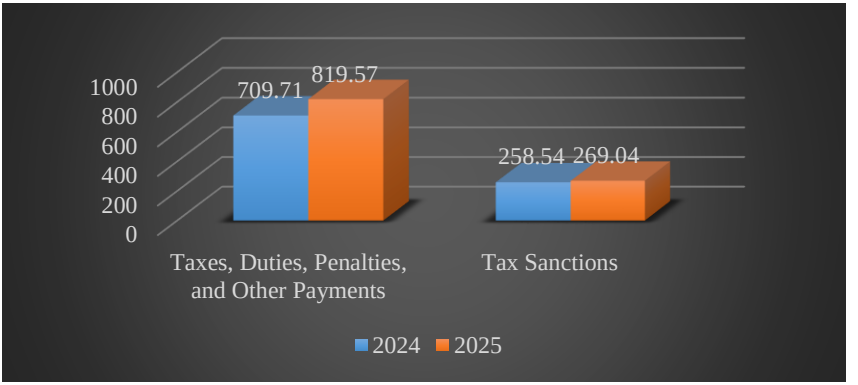

Figure 5.2. Evolution of amounts additionally calculated following controls

Source: developed by the author based on SFS reports for 2024 and 2025.

A very important element for the article is the increasingly clear focus on risk-based selection. In 2025, the annual control plan was implemented at a level of 99.1%, and the lists of unannounced controls based on risk analyses were implemented at a level of 79.7%. At the same time, 202 unannounced tax controls were planned in 2025, 70 more than in the previous comparable period, which is equivalent to an increase of 53.03%. This indicator is extremely valuable for the topic of harmonization, as it illustrates the transition from generic control to selective control, focused on areas of fiscal risk.

Modernization trends are also observed in the structure of operational controls. In 2024, the SFS focused on reducing the number of operational tax controls, except for those carried out on the basis of petitions, notifications and combating illicit activity, with 4,418 operational controls being carried out, 196 fewer than in the previous year, i.e. a decrease of 4.25%. In 2025, on the other hand, 3,855 operational tax controls were carried out, of which 2,754 were successful, with tax sanctions of 13.18 million lei and contraventions of 2.15 million lei being applied. The most targeted areas were retail trade, HoReCa, tobacco products, automotive services, leisure

services, metals and precious stones.

Another relevant empirical dimension is the relationship between tax control and voluntary compliance. In 2024, the SFS carried out 27,157 tax visits/questionnaires of an advisory nature, 6,048 more than in the previous comparable period, which means an increase of 28.65%. The same report shows that, for the segment of individuals targeted by indirect methods and sources of income estimation, voluntary compliance measures were taken against 441 taxpayers, 382 individual compliance meetings were held, and 140 individuals filed declarations for the years 2020–2023, declaring additional income and generating additional tax obligations.

The digitalization of tax control is, in turn, one of the most visible trends. The 2024 report confirms that 73.68% of the SFS public services are available in digital format. The 2025 report emphasizes the continued digitalization of processes and the increase in administrative efficiency, and at the level of international standards reveals the functioning of the automated exchange of information on financial accounts and the development of tools such as eVAT, described as a digital system through which the SFS collects, verifies and analyzes VAT information electronically, with the aim of increasing voluntary compliance, automating controls and simplifying reporting for taxpayers.

Taken together, the data from the SFS activity reports for 2024 and 2025 outline a real, but still uneven, transformation of fiscal control in the Republic of Moldova. If 2024 highlights an expansion of control activity and an increase in effectiveness , 2025 suggests a more selective stage, in which the number of controls decreases, but the value of the additional obligations calculated increases. At the same time, the strengthening of the consultative dimension, the focus on risk, the reduction of undirected operational controls and the digitalization of processes indicate that the fiscal control model is gradually moving towards the European logic of modern fiscal administration.

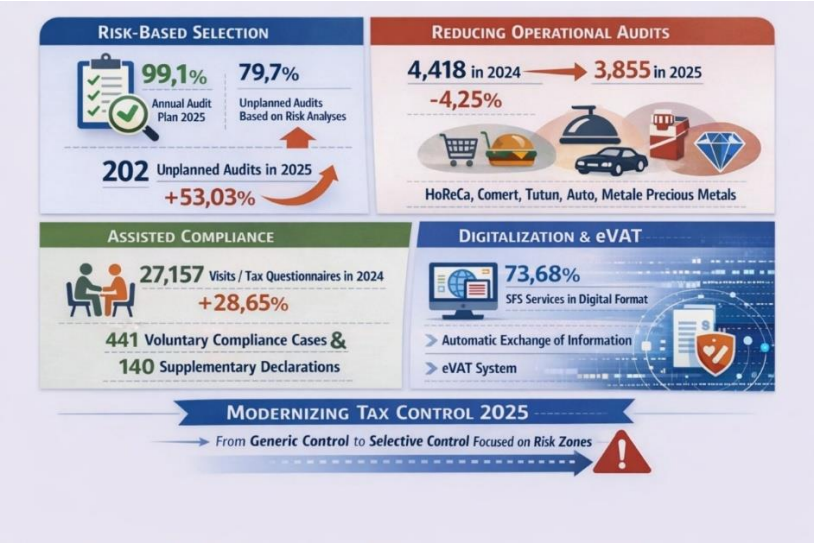

Figure 5.3. Trends in the modernization of fiscal control in the Republic of Moldova

Source: developed by the author based on SFS reports for 2024 and 2025.

Although the SFS activity reports highlight visible progress, they also allow the identification of structural limits that prevent the full maturation of fiscal control. The first of them concerns the still uneven nature of the institutional transformation. On the one hand, the documents emphasize prevention, communication, voluntary compliance and digitalization. On the other hand, the results for 2025 show a simultaneous decrease in the total number of controls and their effectiveness , which suggests that the streamlining of control is not yet linear and that the system is in a stage of recalibration, not of full stabilization.

A second limitation concerns procedural formalism. The Regulation on the conduct of tax audits creates a clear but very detailed framework, with a strong focus on notices, formal decisions, summonses and procedural durations. This strengthens legal

predictability, but may reduce administrative flexibility precisely in those situations where the audit should react quickly to emerging risks. In this regard, one of the major challenges is not the absence of rules, but adjusting them in such a way as to protect the taxpayer without unnecessarily slowing down the tax administration's responsiveness.

Interoperability and analytical capacity limitations also persist. The SFS reports clearly show that digitalization has advanced, and 2025 brings in addition the strengthening of automated information exchange and the eVAT system. However, the fact that these components are still presented as areas for consolidation and development indicates that the digital infrastructure is not yet fully exploited as a unified platform for analyzing, selecting and prioritizing tax risks. In other words, digitalization exists, but the analytical maturity of the system is still under construction.

A separate issue is the balancing of the tax authority with the rights of the taxpayer. The current model naturally retains an important coercive component. However, as tax control becomes more data-based, more selective and more digitalized, the demands regarding proportionality, predictability and taxpayer protection also increase. In such a context, simple administrative efficiency is no longer enough; it is equally important that the procedure is perceived as legitimate, understandable and fair. This is where the difference between a modern tax control and one that is only efficient in the accounting sense comes into play.

Finally, one of the most sensitive dysfunctions is the asymmetry between digital progress and methodological progress. The SFS reports show that the institution is moving rapidly towards electronic services, information exchange and automation. However, the profound transformation of the administrative culture of tax control seems slower: standardization of practices, advanced analytical use of data, fine-tuning of intervention and stabilization of a predictable risk-based control model. This gap does not cancel the reform, but shows that harmonization with European standards remains an ongoing process, not a completed stage.

Analysis of convergence between fiscal control mechanisms in the Republic of Moldova and European standards

After assessing the regulatory framework and recent tax control practices in the Republic of Moldova, the analysis must move towards a deeper question: to what extent the existing mechanisms not only function, but also effectively converge with European standards of modern tax administration. Such an analysis is essential, because harmonization cannot be assessed exclusively by the existence of compatible rules or by the adoption of specific administrative technologies. In reality, convergence implies a functional approximation between the national system and the European model, that is, a real compatibility at the level of rules, procedures, institutions and administrative practices.

In the case of the Republic of Moldova, this convergence is occurring in a dual context. On the one hand, the tax administration has begun to increasingly visibly integrate concepts such as voluntary compliance, risk analysis, digitalization of services and international cooperation. On the other hand, recent documents of the State Tax Service show that the process of alignment with modern tax administration standards is still ongoing, being explicitly linked to the European path, bilateral screening and the implementation of institutional and information development programs.

In order to assess the degree of convergence between the fiscal control mechanisms in the Republic of Moldova and European standards, it is necessary to use a set of criteria that allows for a comparison not only formal, but also functional. These criteria must reflect those requirements that, in the European space, define a modern fiscal control: legality, procedural clarity, proportionality, risk orientation, administrative efficiency, digitalization, taxpayer protection and institutional transparency.

A first criterion is represented by procedural legality and clarity. In this case, the analysis aims to determine whether the control mechanisms are regulated in a sufficiently clear manner, whether the procedures are predictable and whether the relationship between the tax administration and the taxpayer is built on intelligible and coherent rules. In the Republic of Moldova, the existence of the Tax Code and

the Regulation on the performance of tax control provides a detailed normative basis, which can be considered a point of convergence. However, simple procedural detail does not automatically equate to functional clarity, especially when excessive formalism can affect administrative flexibility.

The second criterion concerns proportionality. In relation to European standards, fiscal control must be calibrated according to the severity of the fiscal risk, the taxpayer's profile and the potential impact on the budgetary interest. From this perspective, a convergent system is not one that controls as much as possible, but one that controls more intelligently, avoiding excessive and undifferentiated interventions. This is where the analysis of how the SFS combines classic controls with voluntary compliance measures and targeted monitoring becomes relevant.

A third criterion is risk orientation, which is one of the most important dimensions of European convergence. In a modern system, tax control should not be based predominantly on generalised interventions, but on identifying and addressing risks of non-compliance. In recent SFS reports, explicit references appear to strengthen risk-based analysis, to select taxpayers for monitoring and to approve a plan to modernise the control programme for the years 2025–2029, which indicates that this dimension is already institutionally assumed.

The fourth criterion is administrative efficiency. This not only looks at whether the tax administration collects more, but also at whether it uses resources in a coherent way, whether procedures are simplified, whether institutional response is rapid, and whether results can be achieved without excessive administrative costs. In the 2025 SFS report, institutional modernization is directly linked to increased administrative efficiency and simplified interaction with the taxpayer, which provides a clear indicator of the orientation towards this standard.

A fifth criterion is digitalization. Currently, this is no longer an auxiliary dimension, but a structural one. Fiscal control close to the European model involves the integration of information systems, interoperability with other platforms, process automation and the use

of data for monitoring and selection purposes. In the case of the Republic of Moldova, the existence of a percentage of 73.68% of public services available digitally in 2024, the development of the SIA "Compliance Risk Management", the connection of the ECC to the MEV, the approval of the SFS Information System Development Program for the years 2025–2027 and the approval of the roadmap for interoperability with EU systems constitute clear benchmarks of convergence on this dimension.

A sixth criterion concerns the protection of the taxpayer. In the logic of European standards, the efficiency of tax control cannot be separated from the existence of procedural guarantees, fair treatment and an administrative relationship based on information and contestability. In the SFS reports, the emphasis on prevention, communication, practical guidance and open dialogue indicates a shift towards a tax administration that is less exclusively coercive and more oriented towards supporting compliance. However, the degree of convergence on this dimension must also be assessed in terms of the relationship between norm and practice, not just institutional formulations.

Finally, a final relevant criterion is institutional transparency. This implies not only the publication of information, but also the existence of open administrative conduct, explainable procedures and increasing participation in international standards for the exchange of information and good fiscal governance. In 2024, the Republic of Moldova, through the SFS, implemented the automated exchange of financial account data, obtained the “largely compliant” rating for AEOI and EOIR and received information from 28 jurisdictions, transmitting information to 33 jurisdictions. In 2025, the automated exchange was extended to 69 jurisdictions, of which 26 are in the EU, and the SFS activity report explicitly links European integration to transparency and good governance.

The comparative analysis shows that the Republic of Moldova has registered, in recent years, visible progress on several dimensions relevant for the approximation to European standards. These advances are not uniform, but neither are they purely declarative. In several areas, they are already gaining a concrete normative, procedural and

institutional expression.

First of all, we can talk about legislative and strategic improvements. The SFS report for 2025 shows that the fiscal area is already integrated into strategic programming documents directly related to the process of accession to the European Union, including the Reform Agenda related to the Growth Plan of the Republic of Moldova for 2025–2027 and the National Accession Program for 2025–2029. In addition, the SFS ensured the activity of Working Group 16 "Taxation", participated in the bilateral screening in May 2025 and approved an Action Plan on the modernization of the control program for 2025–2029. All this suggests that harmonization is no longer treated as an abstract objective, but as a concrete direction of institutional policy.

Secondly, convergence is visible in the digitalization of tax administration. In 2024, the SFS reported that 14 out of 19 public services were already provided in electronic format, which corresponds to a share of 73.68%, and important measures included the digitalization of some services for taxpayers, the automation of the process of identifying taxpayers who have not submitted VAT and excise tax returns by launching the SIA "Compliance Risk Management", as well as the expansion of the use of MPay . In 2025, these developments were continued by expanding the sorting criteria and traceability in the SIA "e-Invoice", the development of data exchange through MConnect , the integration of services in the "Personal Cabinet of the Taxpayer", automatic notification of VAT payers and the approval of the SFS Information System Development Program for 2025–2027.

Third, there is real progress in the use of analytical tools and the risk-based approach. The 2025 SFS report explicitly states that compliance work focused on strengthening risk-based analysis, promoting voluntary compliance and applying enforcement measures in areas of increased risk. Also in 2025, five priority segments of the national economy were identified and 2,170 taxpayers were selected for monitoring and applying voluntary compliance measures. This type of thematic and sectoral selection brings national mechanisms closer to the European model of differentiated risk management.

Another important progress is related to the streamlining of procedures. In recent documents of the SFS, the idea that the tax administration is trying to reduce unnecessary procedural burden and shift the emphasis towards prevention and more predictable interaction is increasingly evident. The report for 2025 speaks directly about prevention, communication, guidance, institutional modernization, simplification of interaction with the taxpayer and increasing administrative efficiency. This formulation is relevant not only for the tone of the institution, but also for its functional orientation, as it reflects a paradigm shift: from control perceived exclusively as a coercive intervention to control integrated into a broader tax compliance mechanism.

Last but not least, convergence is also visible in the field of tax transparency and international cooperation. The implementation of AEOI and EOIR, obtaining the "largely compliant" qualification, the expansion of automated information exchange and the development of technical cooperation with European tax administrations and Romania indicate that the tax mechanisms of the Republic of Moldova are increasingly aligned with European and international standards.

Despite the progress made, the convergence analysis shows that the harmonization of fiscal control mechanisms in the Republic of Moldova with European standards is still partial. In several areas, there is an obvious approximation at the level of institutional discourse, strategy or technology, but full transposition into practice remains incomplete.

The first important gap concerns the difference between the norm and the practice. Although the normative and institutional framework of fiscal control is better structured than in the past, this does not automatically guarantee the existence of a complete functional convergence. Furthermore, the Moldovan system retains a strong procedural-formalist dimension, and the balance between legality and administrative flexibility is not yet fully stabilized. It is here that one of the most frequent difficulties of harmonization reforms arises: legislative approximation can advance faster than the effective transformation of administrative practices.

Table 5.2. Matrix for assessing the degree of harmonization of fiscal control mechanisms in the Republic of Moldova with European standards

Evaluation criterion	Relevant European standard	The situation in the Republic of Moldova	Convergence level	Observations
Legality and procedural clarity	Clear rules, predictable procedures, consistent application	The existence of the Fiscal Code, the detailed procedural framework and the Regulation on the performance of fiscal control provide a relatively well-structured legal basis	Medium-high	The regulatory framework is sufficiently clear, but remains strongly proceduralized and still retains a certain administrative formalism.
Proportionality	Intervention calibrated according to risk, fiscal impact and taxpayer profile	There is a trend towards selectivity, targeted monitoring and combining control with voluntary compliance measures.	Environment	Progress is visible, but fiscal control is not yet fully differentiated and proportionate in all its segments
Risk orientation	Intelligent selection of controls and prioritization of non-compliance risks	SFS strengthens risk-based analysis, selects taxpayers by priority segments and approved a plan to modernize the control program for 2025–2029	Medium-high	The field is developing and represents one of the most promising dimensions of convergence, without being fully matured yet.

Administrative efficiency	Efficient use of resources, procedural simplification, relevant results with reasonable administrative costs	In 2025, there was a reduction in the number of controls, along with an increase in additionally calculated tax obligations and an emphasis on simplifying administrative interaction.	Environment	There are signs of efficiency improvement, but the evolution is not yet linear and completely stabilized.
Digitization	Information systems integration, automation, data utilization and interoperability	SFS expanded digital services, e-Invoice, MConnect, automated information exchange, eVAT and approved the Information System Development Program for 2025–2027	High	Digitalization is one of the most advanced dimensions of harmonization and one of the clearest signs of convergence with European standards.
Taxpayer protection	Procedural guarantees, fair treatment, contestability, information and assisted compliance	The institution emphasizes prevention, communication, practical guidance and voluntary compliance, and the relationship with the taxpayer is increasingly presented in terms of partnership.	Environment	There is clear progress at the discursive and procedural level, but tensions persist between the logic of the tax authority and the demands of a fully balanced model
Institutional transparency	Institutional openness, good governance, information	The Republic of Moldova participates in AEOI and	Medium-high	External institutional transparency and

	exchange and international cooperation	EOIR, has expanded automated exchange of information, obtained favorable compliance ratings and integrated the tax dimension into the European path		international cooperation have advanced considerably, although internal procedural transparency can still be strengthened.

Source: developed by the author based on the SFS activity reports for 2024 and 2025, the national regulatory framework and relevant European standards.

The second gap concerns the incomplete implementation of digitalization as an integrated control mechanism. The fact that information system development programs, roadmaps for interoperability with EU systems and tools such as eVAT or MConnect have been approved indicates undeniable progress. However, the existence of these tools does not automatically equate to a fully integrated tax administration, capable of using all available data in a unified, predictive and uniform way. In this sense, digitalization is real, but not yet definitively consolidated as a mature platform for tax control management.

A third gap concerns the partial nature of risk-oriented reforms. Even though the SFS reports increasingly speak about risk-based analysis and monitoring of taxpayers selected in priority segments, the tax administration model does not yet seem to be completely detached from the traditional logic of control as the predominant verification intervention. In other words, risk orientation is assumed and visible, but cannot yet be considered fully sedimented methodologically and culturally in the entire tax control system.

Another insufficiently harmonised aspect concerns the protection of the taxpayer in relation to the intensification of digital control and monitoring. As the tax administration uses more data, automation and notifications, it becomes increasingly important that procedures

remain clear, contestable and proportionate. In the absence of well-understood procedural guarantees and balanced administrative practice, technological progress can produce efficiency, but not necessarily legitimacy. From this perspective, convergence with European standards does not only imply more information and more control, but also a more transparent and fair relationship between the authority and the taxpayer.

Finally, an institutional maturity gap persists. The SFS reports for 2024 and 2025 are relevant precisely because they show a tax administration in an intense process of consolidation: information development, international cooperation, strategic alignment with the European agenda, expansion of electronic services, modernization of the control program. All of these are clear signs of progress. However, the fact that these elements appear simultaneously as achievements and as development priorities indicates that the reform is still ongoing. In other words, the Republic of Moldova is in a stage of accelerated convergence, but not yet in one of complete and stabilized harmonization.

Therefore, the comparative analysis suggests that the fiscal control mechanisms in the Republic of Moldova have already gone beyond the phase of a simple declarative compatibility with European standards, but have not yet reached the level of full functional convergence. There is real progress in the normative, digital, analytical and strategic plan, but also persistent gaps between the ambition of the reform and the level of its practical sedimentation. It is precisely this combination of progress and incompleteness that gives scientific substance to the assessment and justifies, in the next section, the formulation of more precise development directions and institutional recommendations.

Directions for developing fiscal control mechanisms in the perspective of European integration

The analysis of the convergence between the fiscal control mechanisms in the Republic of Moldova and the European standards shows that the harmonization process has gone beyond the phase of simple declarative compatibility, but has not yet reached the level of full functional convergence. Under these conditions, the next stage can

no longer be limited to identifying progress and gaps, but must be oriented towards formulating clear development directions. Such an approach is necessary not only from the perspective of internal administrative modernization, but also from that of European integration, which implies not only the assumption of European principles, but also the effective capacity to translate them into coherent institutional procedures, instruments and behaviors.

Naturally, the development of fiscal control mechanisms should not be conceived in the logic of a quantitative expansion of administrative intervention, but in the logic of a qualitative recalibration. In other words, the objective is not a more massive fiscal control, but a more intelligent, more proportionate, better informed fiscal control and more compatible with the taxpayer's rights. Precisely from this perspective, the development directions proposed below aim to move from control focused predominantly on reaction and sanction to a model oriented towards prevention, risk, digitalization, predictability and institutional professionalization.

One of the most important directions for the development of tax control mechanisms is to reorient the tax administration's intervention philosophy. In the traditional model, control was conceived mainly as a tool for subsequent reaction to deviations, with an emphasis on detection and sanctioning. In the context of European integration, such an approach becomes insufficient. Modern tax administration standards favor control that is not limited to identifying non-compliance that has already occurred, but also aims to prevent it and stimulate voluntary compliance.

In the case of the Republic of Moldova, this mutation is already visible at the institutional level. The SFS activity report for 2025 insists on prevention, communication, practical guidance and open dialogue with taxpayers, in the spirit of voluntary and responsible compliance. However, for this orientation to become a stable feature of the fiscal control mechanism, it must also be consolidated at the methodological level. In practice, this implies the development of preventive control, the expansion of compliance interventions before the initiation of formal checks and the reduction of the exclusive focus on sanctions as the main expression of the efficiency of fiscal control.

In this regard, a special role belongs to assisted voluntary compliance. It is not enough for the tax administration to require compliance with tax obligations; it must also create the necessary conditions for this compliance to become more accessible, more understandable and less expensive. Consultative tax visits, prior notifications, personalized guidance and monitoring of taxpayers selected on the basis of risk criteria must be used not only as auxiliary measures, but as integral elements of the modern control mechanism. The more effectively compliance is supported prior to coercive intervention, the more the administrative and conflictual cost of tax control can be reduced.

Equally important is the improvement of communication with the taxpayer. In a modern tax administration, communication has not only an informative role, but also a function of institutional legitimization. A taxpayer who understands why he is being monitored, who receives clear explanations and who can anticipate the consequences of his own tax conduct will perceive control in a less arbitrary manner and closer to the logic of good administration. From this perspective, the development of tax control mechanisms must also include the strengthening of procedural communication, early warning and administrative interaction oriented towards clarity and cooperation.

In conclusion, the reorientation of fiscal control from reaction to prevention and compliance does not imply weakening the fiscal authority, but using it in a more intelligent and efficient manner. A modern fiscal control is not one that sanctions more, but one that reduces non-compliance, stimulates correct fiscal behavior and intervenes coercively only where prevention and assisted compliance are no longer sufficient.

A second strategic development direction aims at strengthening risk-based tax control and advanced data use. In the context of European integration, intelligent selection of controls is no longer a simple technical option, but a basic condition for administrative efficiency and proportionality of tax intervention. In other words, tax control must rely less and less on large volumes of checks and more and more on identifying those taxpayers, sectors and transactions that present increased risks of non-compliance.

In the Republic of Moldova, this orientation is already visible in the recent practice of the SFS. In the activity reports of 2024 and 2025, explicit references appear to the strengthening of risk-based analysis, the selection of taxpayers by priority segments, and the plan to modernize the fiscal control program for 2025–2029. The direction is correct, but in order to become mature, it must be supported by more advanced methodological and technological tools.

Specifically, this development involves, first of all, the development and continuous updating of tax risk profiles. These should combine data on the taxpayer's history, declaration and payment behavior, sector of activity, unusual fluctuations in tax indicators, commercial connections and risk signals identified by interconnecting databases. In the absence of such robust profiles, the risk orientation risks remaining declarative or limited to too general criteria.

Secondly, it is necessary to make greater use of existing databases and information systems. The development of e-Invoice, MConnect , eVAT , MEV and other information platforms already provide the basic infrastructure for a more sophisticated selection of controls. However, the real benefit of these tools lies not only in the formal digitalization of processes, but in their ability to feed an integrated, predictive and operational fiscal analysis. From this perspective, one of the essential directions of development is the transition from data accumulation to their advanced analytical use in the process of planning and conducting controls.

Third, advanced analytical tools must be developed, capable of identifying patterns of non-compliance, hidden correlations and relevant deviations. In a modern tax administration, risk analysis is not limited to sorting taxpayers based on a few isolated indicators, but functions as a dynamic system for assessing and updating risks. The more refined the analysis mechanism becomes, the more selective, less intrusive and more effective tax control can be.

To summarize the major directions of tax control modernization, the proposed model can be illustrated as follows.

In essence, strengthening risk-based and data-driven control must transform fiscal control from a predominantly reactive mechanism

into an anticipatory, selective and intelligent one. This is one of the most important conditions for real approximation to European standards.

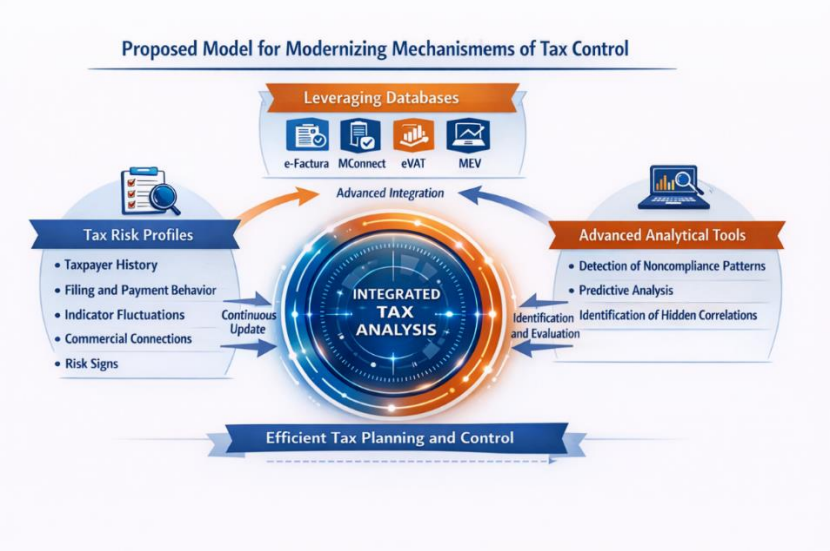

Figure 5.4. Proposed model for modernizing fiscal control mechanisms

Source: prepared by the author.

Another strategic direction of development concerns the standardization of procedures and the strengthening of guarantees offered to the taxpayer within the framework of fiscal control. In a modern system, the efficiency of control cannot be separated from the uniformity of administrative practices and the predictability of the procedure. Without them, even a well-structured regulatory framework can produce uneven results and perceptions of arbitrariness.

In the case of the Republic of Moldova, one of the obvious needs is the standardization of control practices. This involves developing clearer internal methodologies, standardizing the way of documenting

findings, harmonizing the approaches used by tax officials, and reducing unjustified variations in the application of procedures. A tax administration converging with the European model must ensure that comparable situations are treated comparably, and tax interventions are motivated according to clear and verifiable criteria.

Procedural traceability is equally important. Each stage of the tax control must be traceable, justified and verifiable. This is not only a requirement of administrative order, but also one of legal legitimacy. Traceability increases both the responsibility of the tax official and the taxpayer's ability to understand the mechanism of administrative intervention. In this regard, the digitalization of procedures must be coupled with their standardization, so that each control act is not only recorded electronically, but also framed within a coherent procedural logic.

A distinct emphasis must be placed on predictability. The taxpayer must be able to anticipate, to a reasonable extent, how the tax audit works, what obligations he has, what documents may be requested, what are the consequences of non-compliant tax behavior and what rights he has during the procedure. Predictability reduces conflict, increases institutional trust and makes the audit more compatible with the requirements of legal certainty.

At the same time, the development of fiscal control mechanisms must ensure more firmly the protection of the taxpayer. This does not mean diminishing the state's control capacity, but exercising it within clearer, more proportionate and more contestable limits. A procedurally protected taxpayer is not a favored taxpayer, but one placed in a framework of fair fiscal administration. From this perspective, the right to information, to explanation of findings, to contestation and to uniform treatment must become increasingly well-established components of fiscal control practice.

A final major development direction concerns the digitalization, interoperability and strengthening of the institutional capacity of the tax administration. If risk orientation provides the selection logic and procedural standardization provides the coherence of intervention, digitalization and institutional capacity provide the effective infrastructure without which the modernization of tax control cannot

be sustained in the long term.

First, it is necessary to expand and refine the exchange of data between institutions. A modern tax control cannot rely exclusively on information provided directly by the taxpayer or on spot checks. It must operate in a system of intelligent data circulation between the tax authority and other relevant institutions. The development of interconnection through MConnect , the strengthening of automated information exchange and the approximation to European infrastructures are important steps, but they must be continued through real functional integration and operational access to relevant data for the assessment of tax risks.

Secondly, it is necessary to develop integrated information systems that do not function as separate digital islands, but as a unitary ecosystem of tax administration. e-Invoice, eVAT , the taxpayer's personal cabinet, MEV and risk systems must communicate effectively with each other, so that tax control is based on a complete, updated and coherent picture of the taxpayer's tax behavior. In the absence of such integration, digitalization remains fragmented, and the analytical potential of the system is only partially exploited.

Third, the modernization of tax control requires continuous training of tax officials. Risk-based control, data analysis, the use of digital platforms and modern interaction with the taxpayer require different skills than those associated with the traditional control model. Therefore, institutional development must include professional training programs focused not only on knowledge of tax rules, but also on analytical, digital, procedural and communication skills.

Finally, it is essential to professionalize the control function. In a modern tax system, the control officer can no longer be just an executor of formal verification. He must be, at the same time, a risk assessor, a competent user of information, an interpreter of the tax norm and a participant in a complex institutional relationship with the taxpayer. That is why the development of tax control mechanisms must be accompanied by the consolidation of the professional culture of the tax administration, the promotion of integrity and the transition to a better-founded control model, more responsible and closer to the European requirements of good tax governance.

The summary of development directions, recommended measures and anticipated effects is presented in the Table 5.3 below.

Table 5.3. Development directions, recommended measures and anticipated effects

Development directions	Recommended measures	Anticipated effects
Reorienting fiscal control from reaction to prevention and compliance	Expanding preventive control, developing advisory tax visits, intensifying prior notifications, strengthening personalized guidance and voluntary compliance programs	Reducing the risks of non-compliance, increasing voluntary compliance, reducing conflict between the tax administration and the taxpayer, more efficient use of control resources
Strengthening risk-based control and data analysis	Developing and updating tax risk profiles, integrating databases, leveraging existing information systems, developing advanced analytical tools and intelligent selection of controls	Increasing the efficiency of fiscal intervention, focusing controls on high-risk areas, reducing indiscriminate checks, increasing the efficiency of fiscal control
Standardizing procedures and guaranteeing taxpayer rights	Standardizing administrative practices, ensuring procedural traceability, clarifying the stages of fiscal control, strengthening predictability and strengthening the taxpayer's procedural guarantees	More uniform application of procedures, increased legal certainty, reduced administrative arbitrariness, increased taxpayer confidence in the legitimacy of tax control
Digitalization, interoperability and institutional capacity development	Expanding data exchange between institutions, developing integrated information systems, strengthening interoperability with national and European platforms, continuous training of tax officials and professionalizing the control function	Accelerating administrative processes, improving risk analysis, more efficient use of tax information, strengthening institutional capacity and effectively approaching European tax administration standards

Source: prepared by the author.

Therefore, the development of fiscal control mechanisms in the perspective of European integration must be approached in a systemic logic. It is not enough to simply modify some procedures or expand some digital platforms. A coherent transformation is needed, in which prevention, risk analysis, standardization, taxpayer protection, interoperability and institutional professionalization work together. Only in such a framework can fiscal control become not only more efficient, but also more legitimate, more predictable and more compatible with European standards of modern fiscal administration.

Challenges of harmonizing fiscal control mechanisms with European standards

If the development directions indicate the desired path of tax control modernization, the challenges of harmonization reveal those obstacles that slow down, complicate or fragment this process. In the case of the Republic of Moldova, the problem does not lie in the total absence of reforms, but in the fact that the pace, depth and coherence of transformations are not always equal across all dimensions of the system. Recent reports of the State Fiscal Service show, on the one hand, an increasingly clear orientation towards modern tax administration standards, digitalization, international cooperation and voluntary compliance, and on the other hand, the fact that many of these developments appear simultaneously as achievements and as development priorities for the coming years.

In this sense, the challenges of harmonisation must be analysed separately from the directions of reform. While in the previous chapter the emphasis was on what needs to be done, in this section the emphasis falls on what prevents or slows down the transformation of tax control into a mechanism fully compatible with European standards. From a methodological point of view, this separation is important, as it avoids confusion between objectives and constraints and allows a more realistic assessment of the tax administration's capacity to internalise the European control model.

The first category of difficulties concerns the normative and procedural dimension. In fiscal matters, approximation to European standards does not only mean the adoption of new rules, but also the ability to integrate them into a coherent, stable and sufficiently flexible

framework. In practice, one of the most important challenges is legislative complexity. The more sophisticated and connected the fiscal system becomes to international standards, the greater the need to adjust the rules, clarify the procedures and make the various acts regulating fiscal administration and control compatible.

This issue is all the more relevant in the context of the Europeanization of the tax field. The SFS Report for 2025 shows that the institution is involved in the transposition of European Union legislation in the area of VAT and excise duties, in the activity of Working Group 16 "Taxation", as well as in the implementation of roadmaps and modernization programs related to international and European tax standards. It is precisely this densification of the normative agenda that produces continuous pressure on the national legal framework, which must be updated without losing internal coherence.

Secondly, there is the need for continuous adjustments. Normally, a tax administration in the process of convergence with European standards must successively modify procedures, methodologies, forms, information systems and rules of interaction with taxpayers. The problem is that such a process, although necessary, can generate procedural instability, difficulties in adaptation and the risk that practitioners operate, temporarily, in a framework in permanent reconfiguration. In other words, continuous modernization is indispensable, but it also has an institutional absorption cost.

Third, difficulties persist in uniform application. Even when rules are adopted, their uniform interpretation and application remain a challenge. European standards presuppose not only the existence of the rule, but also coherence in its administrative use. In a system in which fiscal control is in the process of modernization, the uniformity of practices is more difficult to achieve, especially when legislative and procedural changes follow relatively quickly. Therefore, one of the major challenges of harmonization is not only the production of the rule, but its uniform sedimentation in institutional practice.

The second category of difficulties concerns the effective institutional capacity of the tax administration. Naturally, harmonization with European standards cannot be achieved solely

through regulatory will; it depends decisively on resources, institutional culture and operational implementation capacity.

A first challenge here is related to human resources. Modernizing tax control involves officials capable of understanding not only the tax norm, but also the logic of risk analysis, the use of digital tools, information exchange, data protection, communication with the taxpayer and the requirements of good tax governance. The SFS reports provide clear signals regarding training and professional strengthening efforts. In 2024, five officials participated, through TAIEX, in a study visit to Lithuania on the topic of tax compliance risk management and the information systems used for this purpose, and in December 2024 TAIEX experts from Austria and Estonia provided support for the development of the SFS IT development document and for planning the interconnection with EU systems. In 2025, the SFS continued institutional consolidation and staff training, including on ethics, integrity and internal security, with 29 training sessions organized with the participation of 2,043 tax officials and a training dedicated to the Code of Ethics and Conduct, attended by 2,470 officials. These figures show the existence of the effort, but also indirectly confirm the extent of the need for professionalization.

Another challenge is resistance to change. Any tax administration that moves from a predominantly reactive and formalized model to one based on risk, digitalization and more sophisticated interaction with the taxpayer inevitably faces difficulties in internal adaptation. Even if the SFS reports use a language oriented towards modernization, cooperation and European values, real change in administrative practices and institutional reflexes is usually slower than the change in official discourse. In this sense, resistance to change should not be understood only as explicit opposition, but also as organizational inertia, dependence on old routines and difficulty in internalizing new working methods.

Added to these are administrative limitations. The parallel implementation of projects for digitalization, international cooperation, automated information exchange, modernization of the control program and transposition of EU legislation puts significant pressure on the administrative structure. The fact that in 2025 the

Court of Auditors had 29 recommendations for the SFS, of which only 10 were implemented and 19 were still in the process of implementation, suggests that the institution operates in a regime of continuous reform, in which the administrative absorption capacity is in intense demand.

Finally, a major challenge is represented by the pressures for immediate efficiency. In practice, tax administration is often evaluated by quick and visible indicators: additional amounts calculated, collection rate, results of controls. However, harmonization with European standards also implies investments in prevention, dialogue, digital infrastructure, training and procedural traceability, the effects of which are not always immediate. This tension between short-term performance and medium- and long-term modernization is one of the structural contradictions of tax control reform.

The third category of difficulties relates to the technological infrastructure and organizational culture within which fiscal control operates. Digitalization is apparently one of the most advanced dimensions of convergence. However, it is here that some of the most sensitive challenges also arise.

First of all, the issue of digital infrastructure remains important. The SFS reports for 2024 and 2025 indicate clear progress: the expansion of electronic services, the development of information systems, the integration of some processes in e-Invoice, MConnect and eVAT , as well as the approval of the SFS Information System Development Program for 2025–2027. However, the fact that the institution continues to treat IT development as a strategic priority shows that the digital infrastructure, although advanced compared to previous periods, cannot be considered definitively consolidated.

Secondly, the issue of incomplete interoperability persists. One of the most valuable findings of the 2024 report is that TAIEX experts provided specific support precisely for the IT development of the SFS in order to interconnect with EU systems. This suggests that interoperability is not yet a fully achieved fact, but a process under construction. Also, in 2025, memorandums and cooperation mechanisms with other tax institutions and authorities were continued, including with ANAF Romania and the State Financial Control

Inspectorate, which shows that the integration of information flows and administrative practices remains an active stake.

Third, there are challenges regarding analytical skills. Using a lot of data does not automatically mean having the ability to transform it into better control decisions. Compliance risk management, automated assessment of tax signals, intelligent use of information exchange and database correlation require more advanced methodological and analytical skills than those required by the traditional control model. The TAIEX study visit to Lithuania, focused precisely on the assessment, analysis and management of tax compliance risks, indirectly shows that the SFS is aware of this need for development.

Finally, the still too reactive control culture must also be mentioned. Even if the institutional documents of 2025 speak insistently about prevention, guidance and dialogue, the administrative reflex of fiscal control in a system in transition remains, to a large extent, focused on the detection of deviation and the subsequent response. This is precisely where one of the subtlest challenges of harmonisation lies: it is not enough to introduce new tools and new platforms if the dominant logic of intervention still remains closer to reaction than anticipation. Changing the organizational culture is usually the slowest dimension of reform.

The fourth category of difficulties concerns the relationship between the tax administration and the taxpayer, a dimension that becomes increasingly important as tax control transforms from a strictly coercive mechanism into a more complex one, also oriented towards compliance.

A first challenge concerns the level of trust. In a modern tax system, trust is not a decorative element, but one of the practical conditions for voluntary compliance. If the tax administration is perceived as predictable, explainable and fair, the taxpayer is more willing to cooperate and accept institutional intervention. Conversely, if control mechanisms are perceived as opaque, disproportionate or excessively formalized, even the best-intentioned reforms may encounter difficulties in legitimizing.

A second challenge is related to the perception of the fairness of tax control. European standards require not only efficiency, but also

fair treatment. However, in a context in which the tax administration is intensifying its use of data, expanding the automated exchange of information and developing digital monitoring tools, it becomes essential that the taxpayer perceives these mechanisms not as forms of additional pressure, but as legitimate instruments of a correct and proportionate administration. It is here that a difficulty typical of harmonisation processes arises: technological progress can advance faster than its social acceptance.

Third, there are challenges regarding the acceptance of modern compliance mechanisms. The 2025 SFS reports highlight numerous dialogue actions with the business environment, large taxpayers, SMEs, representatives of the HoReCa and tourism sectors, as well as information sessions and compliance councils. These initiatives are very important, but they also show that the tax administration feels the need to gradually build acceptance of these mechanisms. In other words, the transition from classic control to assisted compliance and smart monitoring is not only a technical issue, but also one of tax culture and institutional relations.

To summarize the main obstacles affecting harmonization, they can be represented by the Figure 5.5 below.

Overall, the challenges regarding the tax administration-taxpayer relationship are perhaps the most subtle, but also the most important in the long term. They are not always directly measured in quantitative indicators, but they profoundly influence the legitimacy of tax control and its sustainable efficiency. After all, harmonization with European standards means not only better rules and more efficient technologies, but also a more mature relationship between the authority and the taxpayer.

Therefore, the challenges of harmonizing fiscal control mechanisms with European standards are multiple and interdependent. They concern the regulatory framework, institutional capacity, technological infrastructure, organizational culture and the relationship with the taxpayer. It is precisely this complexity that explains why harmonization cannot be treated as a simple process of legislative takeover, but as a profound transformation of the way fiscal control is thought, organized and perceived. In the case of the Republic

of Moldova, progress is real, but its consolidation depends on the system's capacity to simultaneously manage the pressures of reform, European requirements and the need for institutional legitimacy.

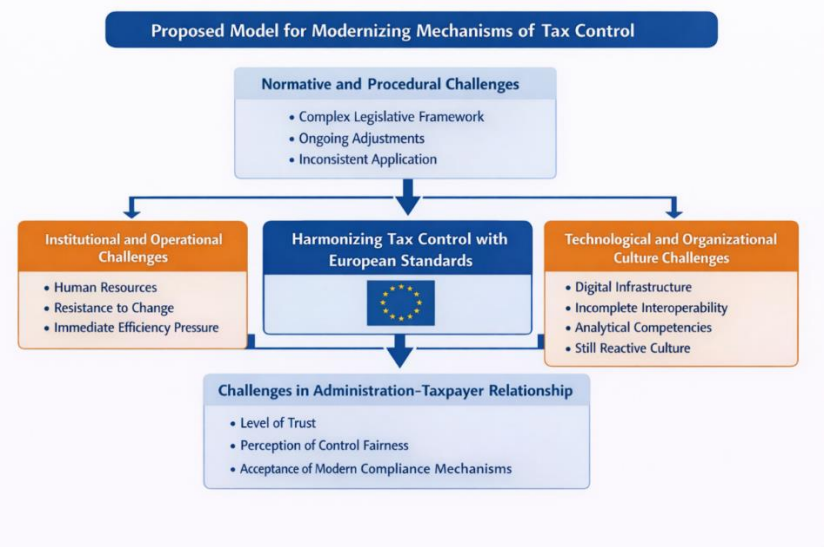

Figure 5.5. Map of the main challenges of harmonizing fiscal control in the Republic of Moldova

Source: developed by the author based on the analysis of the regulatory framework, the SFS reports for 2024 and 2025, and recent developments in tax administration.

Conclusions

The objective of the article was to assess the degree of convergence between the tax control mechanisms in the Republic of Moldova and European standards, as well as to identify the development directions and the main challenges of this process. From this perspective, the analysis demonstrates that the approach to European standards is more advanced in the field of digitalization, external institutional transparency and progressive risk orientation, but less consolidated in

terms of full proportionality of tax intervention, uniformity of control practices, sedimentation of a preventive administrative culture and sufficiently clear balancing of the tax authority with taxpayer protection. At the same time, the examination of the SFS reports reveals that in 2025 the institution continued to strengthen risk-based analysis, monitored 2,170 taxpayers from five priority segments and oriented its activity towards increasing voluntary compliance and reducing the risks of non-compliance.

One of the most important conclusions drawn from this article is that real harmonisation of tax control cannot be reduced to adjusting legal rules. Of course, a clearer legislative framework and better structured procedures are indispensable. However, genuine convergence with European standards also requires a deeper institutional and functional transformation: modernisation of the control programme, development of information systems, interconnection with European infrastructures, use of data for analytical purposes, professional strengthening of tax officials and a gradual change in the philosophy of control, from reaction and sanction to prevention and compliance. The fact that the Programme for the Development of the Information System of the SFS for the years 2025–2027, the Roadmap for Interoperability with EU Information Systems and the Action Plan for the Modernisation of the Control Programme for the years 2025–2029 were approved in 2025 confirms that this transformation is already being undertaken at a strategic level.

At the same time, the results of the analysis confirm that the modernization of fiscal control in the Republic of Moldova is taking place under the pressure of multiple challenges: regulatory complexity, the need for continuous adjustments, difficulties in unitary application, high requirements for the professionalization of human resources, pressures related to immediate efficiency, interoperability still in the process of consolidation and an organizational culture that has not yet completely broken away from the reactive logic of control. Even though the SFS reports emphasize prevention, communication and practical guidance, the transition from classic control to a fully risk-based model and voluntary compliance

remains a gradual process. Moreover, in the 2025 report, the tax administration itself explicitly states that it has emphasized prevention, communication and guidance, in parallel with the continued digitalization of processes and institutional modernization.

From a practical point of view, the conclusions of the article are directly relevant for tax policies and for the modernization of the State Tax Service. First, they support the need to continue the transition from tax control based predominantly on reaction to a model more strongly anchored in prevention, assisted compliance and smart selectivity. Second, they justify accelerating the integration of information systems and making better use of automated information exchange and digital tools such as eVAT , which aims to increase voluntary compliance, automate controls and simplify reporting for taxpayers. Third, the conclusions indicate the need to strengthen the human dimension of the reform, namely training tax officials, developing analytical skills and strengthening an institutional culture compatible with European standards of good tax administration. In this regard, the participation of SFS officials in the Fiscal Program and TAIEX missions in 2024 shows that this direction has already been started, but needs to be deepened.

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Chapter 6
Sustainable Organizational Market Strategy

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Abstract: *This chapter examines the role of sustainable organizational market strategy as a fundamental component of business marketing policy within the contemporary European economic context. In an increasingly competitive and dynamic environment, shaped by globalization, digital transformation, and the integration of sustainability requirements, organizations are compelled to adopt strategic approaches that balance economic performance with social responsibility and environmental protection. Sustainable marketing policy is conceptualized as a coherent system of strategies and tactics aimed at achieving long-term sustainability objectives, with market strategy representing its core element.*

The study highlights the essential components of a sustainable market strategy, including market definition and the development of an efficient and sustainability-oriented marketing mix. Particular emphasis is placed on the integration of strategic management principles, such as the definition of organizational activity, the establishment of measurable objectives aligned with sustainability indicators, and the formulation of growth strategies adapted to environmental conditions. Furthermore, the chapter analyzes the influence of internal and external factors, including organizational life cycle stages, resource potential, market dynamics, and European Union regulatory frameworks.

A comprehensive typology of market strategy alternatives is presented, based on key criteria such as market dynamics, structure, changes, requirements, and competition intensity. These strategic options - ranging from growth and differentiated strategies to adaptive and defensive approaches - are examined in relation to firms' capacity for

innovation, resource efficiency, and alignment with EU sustainability policies.
The findings emphasize that sustainable market strategy represents a dynamic and integrative process, requiring continuous adaptation, informed decision-making, and the coherent combination of strategic alternatives in order to ensure long-term competitiveness and organizational resilience.
Keywords: *Sustainable market strategy, Marketing policy, Organizational sustainability, Strategic management, Competitive positioning, European Union sustainability framework, Market dynamics and competition*

1. Sustainable market strategy as an essential component of business marketing policy

The modern economy of the European Union is currently facing significant challenges from other global actors such as the United States and China. On the one hand, EU regulations impose a series of environmental standards and require companies and organizations to adapt rapidly to changes, requirements, and market evolution trends, which are increasingly influenced by the integration of artificial intelligence. On the other hand, operating within a dynamic and highly competitive business environment, enterprises are compelled to perceive and analyze market signals and to act proactively, as swiftly and efficiently as possible, through an appropriate and comprehensive sustainable policy.

Sustainable marketing policy may be defined as an approach adopted by the modern enterprise, conceived from a marketing-oriented perspective and materialized in a coherent set of strategies and tactics through which the achievement of specific sustainability objectives is pursued.

A sustainable marketing strategy may take various forms, such as a market strategy, a sustainable product strategy, a pricing strategy, a sustainable distribution strategy, and others. The market strategy of economic organizations constitutes the core component of marketing policy, specifying the set of actions aimed at managing organizational activity with maximum efficiency. As highlighted by Kotler,

Kartajaya, and Setiawan (2021)[118], Marketing 5.0 emphasizes the integration of advanced technologies with human-centric values, redefining the way organizations create value in the digital and sustainable economy.

Figure 6.1. Conceptual Structure of Sustainable Marketing Policy

A sustainable market strategy defines the fundamental directions of the enterprise's attitude and behavior toward the market, imposing sustainability requirements alongside the objective of profitability, within the context of the dramatic intensification of competition on international markets. Marketing tactics represent the totality of concrete instruments through which the organization implements its marketing strategy. These tactics must be aligned with and follow the established strategic objectives. Chaffey and Ellis-Chadwick (2019)[119] underline that digital marketing represents a strategic framework that enables organizations to optimize customer engagement through integrated online communication channels.

We are living in an era of strategies, within a business environment more competitive than ever, in which allies are increasingly transformed into competitors, not only in the case of the United States, but also as a result of divergences among European economies, where the strongest survive and firms require a clear strategic vision. Strategy represents a balance between sustainability and efficiency, between specialization and simplicity, and between competition and alliances, all operating under the umbrella of effective leadership.

Any sustainable organizational market strategy comprises two essential components:

[118] Kotler, P., Kartajaya, H., & Setiawan, I. (2021). Marketing 5.0: Technology for Humanity. Wiley.
[119] Chaffey, D., & Ellis-Chadwick, F. (2019). Digital Marketing (7th ed.). Pearson.

- the definition or delimitation of the market in which the enterprise intends to operate;
- the development of a marketing mix focused on efficiency and sustainability.

The strategy adopted by an organization must ensure, through its practical implementation, an appropriate system of relationships between the organization and the market, capable of capitalizing as profitably as possible on the potential at its disposal. Consequently, strategy must take into account the general functions of marketing, the most significant stages in the life cycle of the organization, as well as the major objectives pursued.

A sustainable strategy[120] requires a clear articulation of what is fundamentally sought in a given market, the firm's purpose, and the manner in which the proposed objectives are to be achieved. Strategic management within economic organizations presupposes the availability of a broad range of options for responding to environmental conditions. These options take the form of programs that define the position and role of the organization within its operating environment, as well as the means and pathways that must be followed.

Within the sphere of expertise of strategic management in a sustainable organization, three essential elements can be identified, namely:

- the definition of the organization's field of activity;
- the establishment of objectives or performance indicators to be achieved in correlation with sustainability indicators;
- the development of sustainable growth strategies designed to create the most appropriate conditions for achieving these objectives.

By defining the **field of activity** of an economic agent, its economic positioning, mission, and the utility of the products manufactured or services provided are determined. Regardless of whether these products or services are intended for productive or non-productive consumption, firms seek to avoid numerous constraints by

[120] Peattie, K., & Belz, F. M. (2010). Sustainability marketing—An innovative conception of marketing. *Marketing Review St. Gallen*, 27(5), 8–15

adopting development strategies that generate the most favorable economic outcomes under conditions of market competition. Concretely, this also involves delimiting the market in which the organization will operate[121]

The second significant element considered by corporate management concerns **objectives**. Economic agents may set multiple objectives; however, the most important include: the volume of sales, which should reflect the material, financial, and human resources available to the organization; the level of profits to be achieved; and the market share held by the company's sales. This latter objective directly relates to the organization's competitive position in the market, such as that of a Leader, Co-Leader, Challenger, or Specialist.

Any objective is defined by three essential components: *the attribute*, which delineates the targeted area of action; *the indicator*, used to measure and assess the attribute; and the *target* level (goal), expressed through the value of the indicator set to be achieved. The system of objectives of an economic entity varies from one organization to another, depending on the field of activity, the structure of production and services, as well as market positioning.

Moreover, within the same organization, objectives may vary from one period to another under the influence of internal and external factors. In the managerial process of substantiating objectives, compliance with the criteria of realism, coherence, and sustainability is required, the latter being addressed in an integrated manner through its economic, social, and environmental dimensions. Accordingly, objectives must ensure economic performance and long-term financial viability, contribute to social responsibility and the development of human capital, and minimize environmental impact by facilitating efficient resource use and the protection of ecosystems. The appropriate integration of these objectives into the hierarchy of organizational programs and strategies constitutes an essential condition for achieving sustainable development.

[121] Kotler, P. (2011). Reinventing marketing to manage the environmental imperative. *Journal of Marketing*, 75(4), 132–135.

The market[122] objectives of organizations must be subordinated to their overall objectives; however, in comparison with the objectives of specific marketing activities, they occupy a higher hierarchical level. In formulating a market strategy, organizations are confronted with a multitude of objectives, some of which are mutually complementary, while others are mutually exclusive. This situation necessitates their grouping. A frequently used criterion is the nature of the firm's objectives, according to which objectives may be classified as economic or social. From a marketing perspective, under market economy conditions, corporate activity pursues both types of objectives; nevertheless, economic objectives remain predominant.

While objectives establish the performance levels that the organization seeks to achieve, strategy, as the third essential component of the management process, defines the direction and course of action required to realize the formulated forecasts. Market strategy ensures the alignment of the enterprise with its internal and external environment, substantiates the rationale for its existence, and guides organizational activity toward sustainable development by balancing economic performance with social responsibility and environmental protection.

A properly substantiated market strategy is one through which the organization identifies and selects market segments with the highest profitability potential and concentrates its marketing efforts on them, ensuring that products are available in locations where they are demanded and at price levels compatible with consumers' purchasing power. Through such a strategic orientation, firms are able to achieve their established objectives within a defined time horizon. In this context, the formulation of market strategy may be regarded as the most important activity within the marketing program, as it ensures the alignment between the organization's offer and the requirements of the competitive environment. Corporate efforts to achieve assumed objectives under conditions of efficiency and sustainability are reflected in a coherent set of elements that define the relationships

[122] Belz, F. M., & Peattie, K. (2012). *Sustainability Marketing: A Global Perspective*. Wiley.

between the products offered and current and potential markets. This framework is structured around four fundamental strategic components.

Table 6.1. Components of Market Strategy in the Context of Sustainable Development (EU)

	Strategic Component	Economic–Managerial Content	Alignment with EU Sustainability Strategies
1	Production Volume and Sales Markets	It focuses on determining the quantity of products to be produced and the markets in which they will be commercialized, based on existing and potential demand.	The efficient use of resources, the reduction of waste, and orientation toward the circular economy, in line with the European Green Deal.
2	Strategic Development Direction	It reflects the firm's orientation with regard to the current situation of its products and markets, as well as the options for sales growth and market expansion.	Supporting sustainable economic growth through innovation, digitalization, and adaptation to market requirements, in accordance with EU strategies for competitiveness and the green transition.
3	Product Competitiveness	It expresses the ability of products to deliver superior value to consumers and to secure a favorable position in the market relative to competitors.	The integration of economic, social, and environmental dimensions (ESG), compliance with quality standards, social responsibility, and environmental protection requirements established at the European level.
4	Organizational Synergy	It represents the coordinated use of internal resources (human, material, financial, and informational) in order to achieve a superior overall effect.	Strengthening organizational capacity to adapt to EU policies on sustainable development and the transition toward sustainable business models.

The formulation of market strategy involves continuous and complex processes of information gathering, analysis, and decision-

making, being influenced by both internal and external factors. Within this framework, enterprises must consider market forces and the European institutional environment, including current and potential users, competitors and their positioning, adopted distribution policies, as well as social, economic, legislative, and cultural factors. The integration of European requirements regarding sustainable development constitutes an essential condition for the formulation and implementation of a coherent, efficient, and long-term performance-oriented market strategy.

Firms primarily analyze internal factors that they are able to manage, focusing on the structure of their own resources and on the ways in which these resources are leveraged. The assessment of an organization's potential may be conducted using an analytical framework that includes: the establishment of the organization; its evolution since inception; the organization's field of activity; organizational structure and functioning; adaptability to the environment; general objectives; sales forces; the organization of the communication and promotion function; and the organization's collaborations with specialized marketing firms, where applicable.

Furthermore, a particularly important internal factor with a significant impact on the formulation of market strategy is the organizational life cycle, which comprises the following stages:

The launch (founding) phase, which involves two key objectives for the new organization:

- identifying user segments that will respond positively to its market strategy;
- developing a competitive offer with high utility for the identified user segments.

The development phase, during which the organization adopts a strategy that enables market expansion through both intensive and extensive growth.

The consolidation phase, characterized by the organization's pursuit of growth and the strengthening of its market share.

In the process of substantiating strategy[123], the internal and external factors influencing a firm's activity cannot be perfectly aligned; therefore, organizational adaptation to new and specific contexts requires a high degree of flexibility and adjustment capacity in the use of resources, which may assume different values and levels of importance across categories. When economic agents succeed in combining resources in an appropriate manner and the synergistic effect is significant, they occupy a favorable strategic position, insofar as external influences do not diminish the effectiveness of the actions undertaken.

In summary, the main elements underlying a firm's strategic options include the dynamics of market potential, market structure, market evolutions and transformations, the level of market requirements, and the intensity of competition.

2. Alternatives of market strategy

The specific characteristics of each market compel economic agents to adapt their strategic behavior to its requirements, depending on the level of synergy and their capacity to efficiently utilize available resources. In the current context, shaped by European Union policies on sustainable development, the green transition, and responsible competitiveness, firms' response options are multiple and conditioned both by the elements analyzed in the previous subchapter and by their combinations, integrated into strategic decision-making.

Confronted with a diversity of economic, social, and environmental factors, organizations define their behavior in relation to the main market challenges, aiming to align with sustainability requirements and European compliance standards. The most representative types of market strategies, related to firms' positioning according to the essential characteristics and dimensions of the market, in accordance with the strategic orientations of the European Union, are presented in Table 6.2.

The **firm's attitude toward market dynamics** reflects the manner in which it adapts its strategic options to the evolution of the market's

[123] Polonsky, M. J. (2011). Transformative green marketing: Impediments and opportunities. *Journal of Business Research*, 64(12), 1311–1319.

potential capacity, which may display tendencies of growth, stagnation, or decline. Depending on the level of available resources and the capacity to generate synergy, the organization may choose one of the following strategic alternatives: a growth strategy, a maintenance strategy, or a strategy of activity reduction.

The *growth strategy* is recommended for firms undergoing expansion, characterized by a high development potential and a significant synergistic capacity, as well as for those operating in dynamic markets, in accordance with the European Union's objectives regarding innovation, competitiveness, and sustainable growth.

The strategy of *maintaining the dimensions of market* activity proves appropriate in situations where the market is saturated or its potential is limited, being compatible with the principles of efficient resource utilization and economic stability promoted at the European level.

Table 6.2. Market Strategy Alternative

	THE FIRM'S POSITION WITH RESPECT TO:				
	1. Market Dynamics	**2. Market Structure**	**3. Market Changes**	**4. Market Requirements**	**5. Level of Competition**
STRATEGIES	a. Growth Strategy	a. Undifferentiated Strategy	a. Active Strategy	a. High-Requirements Oriented Strategy	a. Offensive Strategy
	b. Maintenance Strategy	b. Differentiated Strategy	b. Adaptive Strategy	b. Moderate Requirements Strategy	b. Defensive strategy: Maintaining Market Share(b1) Market Share Reduction(b2)
	c. Contraction Strategy	c. Concentrated Strategy	c. Passive Strategy	c. Low Requirements Strategy	

The *strategy of reducing market* activity represents an option for firms operating in declining markets or for those that reorient their production profile, which naturally implies a reduction in market share within certain segments.

Depending on the resources available and the constraints imposed by the economic, social, and regulatory environment, firms may decide whether or not to align with the transformations occurring in market capacity, while pursuing the integration of sustainable development principles and compliance with the European Union's strategic framework regarding the green transition and economic adaptability.

The positioning of a firm in relation to market structure constitutes an important criterion for the classification of market strategies. In situations where the market exhibits a high degree of segmentation, organizations may adopt different strategic behaviors in response to this structure. Strategic alternatives, also referred to as positioning options, can be grouped into undifferentiated, differentiated, and concentrated strategies.

The *undifferentiated strategy* involves addressing the market as a whole, without taking into consideration its distinct segments. This type of strategy is less compatible with the modern marketing concept and with the orientations of the European Union regarding adaptation to consumer requirements and the efficient use of resources. Nevertheless, the undifferentiated strategy may be applied by firms at the beginning of their activity, by economic agents holding monopoly positions, or by organizations operating in markets characterized by scarcity.

The *differentiated strategy* consists of producing and marketing distinct products at different price levels, using specific distribution and promotional policies for each market segment. This strategy is suitable for firms operating in weakly segmented markets, but it may also be applied in highly segmented markets, provided that organizations possess a solid economic capacity and a high potential for production diversification, in line with European requirements regarding innovation and sustainable competitiveness.

The *concentrated strategy* involves directing the firm's activities

toward a single market segment or a limited number of segments, with the objective of maximizing the utilization of the potential available to the organization. In the context of EU policies on smart specialization and the efficient use of resources, this strategy enables firms to strengthen their competitive position and respond more effectively to the specific requirements of consumers.

The firm's position in relation to changes occurring in the market constitutes an essential criterion in defining market strategies, as market conditions are subject to continuous transformations that impose different rhythms and directions of action on economic agents. Depending on their capacity for anticipation and the potential resources available, firms may adopt active, adaptive, or passive strategies.

The *active strategy* is characteristic of firms with a solid economic position, consistently concerned with production modernization, innovation, and sustainable growth. It involves the systematic analysis and anticipation of market developments, as well as deliberate intervention in influencing and directing consumer behavior. Through such an approach, organizations consolidate their interests in certain markets and align themselves with the European Union's objectives regarding competitiveness, the green transition, and digitalization.

The *adaptive strategy* consists of adjusting the firm's activities to market changes without seeking to directly influence them. In this case, organizations adapt their production structure or marketing forms in accordance with new economic, social, and environmental conditions, ensuring the maintenance of balance between economic performance and sustainability requirements promoted at the European level.

The *passive strategy* is characteristic of firms with limited economic potential or those lacking the resources necessary to conduct market research. Economic agents adopting this strategy limit themselves to minimal adjustments in their activities, implemented only after identifying changes in market conditions. Consequently, they display a reduced capacity to adapt to the dynamics of the competitive environment and to the requirements imposed by European Union policies.

The firm's response to market requirements constitutes a relevant criterion in defining market strategies, as it reflects the qualitative level at which economic agents aim to conduct their activities, in close correlation with the needs and expectations of users. Depending on the level of technical endowment, the degree of qualification of human resources, and managerial competence, firms may adopt one of the following strategic options: the high-requirements strategy, the moderate-requirements strategy, or the low-requirements strategy.

The ***high-requirements strategy*** involves satisfying market demands at a superior level, ensuring that the most refined expectations of consumers are met or even exceeded. Firms adopting this strategy benefit from a strengthened market reputation and seek to maintain a favorable image, while simultaneously aligning with European Union policies regarding quality, innovation, consumer protection, and sustainable development.

The ***moderate-requirements strategy*** is characteristic of economic agents with more limited potential that operate in heterogeneous markets marked by significant differences in consumer expectations. This approach enables firms to maintain a balance between costs, quality, and accessibility, being compatible with European objectives concerning economic inclusion and efficiency in resource utilization.

The ***low-requirements strategy*** does not result from a modern marketing vision and generally emerges in contexts characterized by scarcity, low competition, or significant constraints within the economic environment. Such a strategy is difficult to reconcile with current European Union requirements regarding sustainable competitiveness, responsibility toward consumers, and compliance with quality and environmental standards.

The firm's behavior in relation to the level of market competition represents an essential criterion in defining market strategy, as competition constitutes a fundamental characteristic of the market economy, manifesting itself with varying intensities depending on the number and strength of competitors, as well as on the relationship between demand and supply. Market strategy establishes the organization's attitude toward other market participants, the firm

being able to adopt either an offensive or a defensive orientation, in accordance with its competitive position and the objectives pursued.

The ***offensive strategy*** is characteristic of economic agents holding consolidated market positions or of those aiming to expand their sales volume and customer base. By adopting this strategy, the firm seeks to strengthen its competitive position by capitalizing on its competitive advantages and innovation capacity, in line with European Union policies concerning sustainable competitiveness, innovation, and long-term economic growth.

The ***defensive strategy*** is typical of enterprises with a medium or low level of synergy that occupy peripheral positions within the market structure. Depending on their strategic interests and market position, firms may opt either to maintain their market share or to reduce it. The ***market share maintenance strategy*** represents an appropriate solution in conditions of intense competition, when available resources do not allow for significant expansion, being compatible with the principles of efficiency and stability promoted at the European level. The strategic option of ***market share reduction*** becomes appropriate when the organization's interests require it or when the firm reconfigures its production profile in order to adapt to new economic, social, and environmental requirements.

It is important to emphasize that the strategic alternatives analyzed do not operate in isolation but constitute component elements of an integrated market strategy. A comprehensive strategy requires the coherent combination of several strategic options corresponding to different market dimensions.

Thus, a firm with a high level of recognition, strong synergy, and consolidated competitiveness may adopt a complex strategy of the type **1a–2b–3a–4a–5a**, while an organization with more limited resources and capabilities will correspond to a more prudent strategic combination, such as **1b–2c–3c–4b–5b**. Such an approach is consistent with the European Union's orientations regarding strategic adaptability, the efficient use of resources, and the sustainable development of enterprises.

Economic agents may adjust their market strategy from one period to another, either as a result of achieving the proposed objectives or in

situations where their attainment becomes impossible. The strategic options adopted are conditioned by the organizations' capacity to analyze and anticipate changes occurring in the structure and functioning of the market, as well as by their interest in innovation, production modernization, and adaptation to the requirements of sustainable development.

In this context, the selection of strategy depends decisively on the economic and organizational potential of the firm, as well as on the degree of knowledge regarding the factors with a major influence on the market, including those arising from the regulatory framework and the strategic orientations promoted at the level of the European Union.

The selection of an organizational market strategy alternative should follow the following steps:

- **identification of the market** in which the organization will operate:
  - market capacity;
  - market potential;
  - market volume;
  - user segments.
- **Analysis of competitors' market strategies:**
  - strengths;
  - weaknesses.
- **Assessment of the organization's strengths and weaknesses** in relation to its main competitors:
  - organizational synergy;
  - organizational image;
  - market share.
- **Study of market forecasts and conjunctural projections.**
- **Selection of target user segments** and identification of competitors that the organization must consider in the strategy selection process.
- **Substantiation and formulation of the market strategy.**
- **Implementation of the market strategy (effects):**
  - increase in market share;
  - increase in brand recognition.

Artificial intelligence strengthens the firm's ability to adopt active

and offensive market strategies, facilitating predictive analytics, market anticipation, and the development of highly personalized value propositions[124]. Artificial intelligence applications in university marketing illustrate the practical implementation of digital marketing[125] strategies, highlighting the role of predictive analytics and user-centered design in enhancing institutional visibility and stakeholder engagement. The use of AI-driven platforms, such as EyeQuant, reflects a methodological advancement in marketing research, enabling the simulation of user behavior and supporting data-driven improvements in digital communication strategies. The digital transformation identified in Moldova's marketing practices creates the necessary framework for the integration of artificial intelligence tools.[126] The evolution of marketing in the Republic of Moldova demonstrates a clear transition toward digitalization and sustainability, confirming that modern marketing functions as a catalyst for economic development, competitiveness, and integration into global markets. According to Ryan (2020), understanding digital marketing requires a comprehensive approach that combines technological tools with consumer behavior insights in order to effectively engage the digital generation[127]. Kingsnorth (2022) argues that an integrated digital marketing strategy is essential for aligning organizational objectives with rapidly evolving online environments and consumer expectations.[128]

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[124] Robu, E. (2025). *Strategic marketing transformation in the age of artificial intelligence: Tools, trends, and organizational adaptation*. EcoSoEn, 1, 38–48. https://doi.org/10.54481/ecosoen.2025.1.04

[125] Jomir, E., & Belostecinic, G. (2025). *Artificial intelligence in university marketing: Some realities and possible applications*. Economica, 131, 7–27. https://doi.org/10.53486/econ.2025.131.07

[126] Burbulea, R., & Moroi, E. (2026). *Evolution and current trends in marketing in the Republic of Moldova amid digitalization and economic sustainability*. https://doi.org/10.52326/csd2025.64

[127] Ryan, D. (2020). Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation (5th ed.). Kogan Page.

[128] Kingsnorth, S. (2022). Digital Marketing Strategy: An Integrated Approach to Online Marketing (3rd ed.)

Tourism marketing[129] strategies, particularly differentiation and concentration approaches, enable destinations to capitalize on their unique cultural and natural assets, thus reinforcing both competitiveness and sustainability. The tourism sector illustrates the practical relevance of sustainable marketing strategies, demonstrating how economic development can be harmonized with environmental protection and the preservation of local identity, thereby contributing to long-term territorial resilience.

Green marketing[130] adapted to family values represents a key behavioral dimension of sustainable marketing, highlighting the role of consumer awareness, education, and ethical alignment in promoting environmentally responsible consumption. he adaptation of marketing strategies to family values allows firms to adopt differentiated and concentrated approaches, targeting specific consumer segments characterized by higher environmental awareness and long-term orientation.

3. Marketing mix

The **marketing mix** represents an essential component of an organization's market strategy. Achieving the objectives established at the managerial level requires a coherent set of operational actions through which firms adapt their activities to the requirements and expectations of the market, in order to ensure the efficient utilization of available resources. In this process, organizations first assess the level of internal synergy, while the attainment of the expected results also requires an understanding of the complex relationships with the market environment. Although these elements cannot be fully controlled, they must be taken into consideration in the process of designing the action program.

The interaction between firms and the market is carried out through the products offered under specific conditions, through pricing policies established according to the relationship between supply and

[129] Bulican, A., & Turcov, E. (2025). *The contribution of tourism marketing strategies to economic development and the promotion of local identity*. Economica, 132, 22–36. https://doi.org/10.53486/econ.2025.132.22

[130] Buzdugan, A., & Nepotu, L. (2026). *Green marketing adapted to family values: Strategies for promoting well-being and adapting to current family trends*. 8–19.

demand, contractual clauses, and the seasonality of consumption, through distribution channels that ensure the movement of goods from producers to users, as well as through the entire set of promotional activities conducted by manufacturing, commercial, or specialized firms.

The mobilization of resources in different proportions and combinations aims to achieve high economic efficiency and the realization of the intended objectives. In this context, specialized research has led to the development of the **marketing mix** concept, which reflects the way in which an organization's resources are integrated in order to achieve the expected economic performance. Particular importance is attributed both to the expenditures involved and to the instruments used by firms in their relationship with the market. Thus, the marketing mix represents a synthesis of **product, price, promotion, and distribution policies**, considered as an integrated system applied within a specific time horizon.

Through the marketing mix, the firm defines its response options to the requirements of the external environment. The four fundamental variables, **product, price, promotion, and placement (distribution)**, are endogenous variables, largely controllable by organizations, and are used in interaction with the market. Each component generates a "sub-mix" or a specific policy that encompasses complex sets of decisions through which the firm responds to the conditions of the economic, social, and competitive environment. The complexity of the marketing mix results from the interdependence of its components, since a change in one variable leads to corresponding adjustments in the others. In this context, managers must identify the optimal solution that ensures the coherence and effectiveness of strategic decisions. The design of the marketing mix involves three main stages: the identification and selection of marketing variables, their optimal integration, and the evaluation of the efficiency of the adopted mix.

The selection of marketing variables is carried out in accordance with the market strategy and with the specific conditions of implementing the marketing mix. Although all four elements are present in any marketing strategy, their relative importance varies depending on the nature of the product and the particular

characteristics of the market. Among these components, the product occupies a central position, constituting the element around which the other policies are mobilized. The marketing mixes of manufacturing firms, centered on product policy, place particular emphasis on innovation, quality, and specialization, in line with the European Union's orientations regarding sustainable competitiveness, the circular economy, and the green transition. The marketing mix, viewed as a set of integrated decisions, represents the practical implementation of strategic options, taking into account product positioning and the general objectives of the organization.

The structure of the marketing mix includes: *product policy***,** which highlights intrinsic characteristics, product assortment, quality, brand, and design; pricing policy**,** which includes price levels, discounts, payment conditions, and their correlation with the product life cycle; *promotion policy***,** which encompasses advertising, public relations, sales promotion, and direct marketing; and *distribution policy*, which concerns distribution channels, logistics, warehouse networks, and the infrastructure used.

Product policy is based on information obtained from market research and aims to adapt the offer to the level and requirements of demand by developing products capable of satisfying consumer needs while ensuring the firm's profitability. Pricing policy focuses on establishing price levels that are accessible to both producers and buyers, ensuring a reasonable long-term profit and the possibility of purchase for users. Promotion and distribution policies complement the overall set of strategic decisions, contributing to the efficient utilization of the technical and human potential of organizations.

As an instrument of marketing strategy, the marketing mix does not have a rigid character but is subject to continuous adjustments in response to developments in the external environment. The quantitative and qualitative evaluation of the marketing mix aims to determine the extent to which the objectives of the marketing strategy are achieved. The quality of the modern marketing mix depends on the capacity of decision-makers to anticipate changes in the economic, social, and competitive environment, to integrate the principles of sustainable development, and to use internal resources efficiently in

order to adapt to the dynamics of demand and to the current and future behavior of competitors, in accordance with the policies and regulations of the European Union.

4. Marketing audit of market strategy

First and foremost, the strategic audit aims to verify the existence of a clearly defined market strategy that is coherently formulated and grounded in principles of sustainable development. If the organization possesses a market strategy, the audit analysis focuses on the following aspects:

a. the market strategy has been rigorously developed on the basis of relevant data and information, integrating economic, social, and environmental criteria;

b. the degree of clarity of the strategy ensures the coherence of managerial decisions and contributes to the achievement of long-term economic performance under conditions of sustainability;

c. the adopted strategy has been formalized and communicated to all departments of the organization, facilitating the consistent and responsible implementation of strategic decisions;

d. the selected strategic alternatives are aligned with the firm's general objectives and are evaluated from the perspective of strategic risks, including those associated with sustainability; for example, the adoption of a product differentiation strategy may generate risks such as:

- consumers abandoning certain features of the differentiated product in favor of standard products if the differentiation involves a price level incompatible with the perceived value;
- competitors' ability to imitate the elements of differentiation, thereby reducing the competitive advantage and the impact of the investments made;
- the extent to which the developed strategy has taken into account the behavior of customers, competitors, and suppliers, as well as the requirements regarding social responsibility and environmental protection.

In the absence of a clearly formulated market strategy oriented toward sustainable development, each department of the firm tends to act autonomously, according to its own objectives and motivations,

without integrating these actions into a unified and sustainable strategic vision.

The **"absence of strategy"** represents the highest organizational risk, as the firm becomes vulnerable both to external competitive pressures and to internal dysfunctions generated by the lack of coordination among its structures and by the misalignment of decisions with long-term economic, social, and environmental performance objectives.

Conclusions

Sustainable marketing strategies are increasingly dependent on the ability of organizations to develop and maintain customer loyalty, which represents not only a behavioral outcome but also a strategic asset ensuring resilience, stability, and long-term competitiveness.

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Chapter 7
Sustainable and Resilient Economic Development: Frameworks, Business Adaptation and the Role of Agriculture

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Abstract: *This study examines the interdependence between economic resilience and sustainable economic development in the context of contemporary global transformations. The research highlights that modern economies are increasingly shaped by complex challenges such as climate change, globalization, technological advancement, and recurrent economic crises, which require integrated and adaptive development models. Moving beyond traditional growth-oriented paradigms, the paper emphasizes the necessity of incorporating sustainability, social equity, and environmental considerations into economic decision-making processes.*

The concept of sustainable economic development is analyzed through the lens of the Triple Bottom Line framework, which integrates economic performance, social well-being, and environmental protection. In this context, the transition toward green growth, circular economy models, and the efficient use of resources is identified as a key pathway for achieving long-term economic stability. Furthermore, the study underlines the role of innovation, digital transformation, and sustainable finance mechanisms in supporting this transition and enhancing economic adaptability.

Economic resilience is explored as a fundamental attribute of modern economic systems, defined by the capacity to absorb shocks, adapt to structural changes, and recover from crises. The paper distinguishes between passive and active resilience, emphasizing the importance of adaptive and transformative capacities in ensuring long-term

sustainability. Particular attention is given to the role of businesses and public policies in fostering resilient and sustainable systems, highlighting the contribution of institutional frameworks, innovation strategies, and investment in human and physical capital.
Additionally, the research addresses the role of agriculture in sustainable development, emphasizing its dual function as both an economic sector and a key component of environmental systems. The analysis of European and U.S. agricultural policies illustrates the increasing integration of environmental objectives into economic governance through instruments aimed at promoting sustainable practices and resource efficiency.
The findings suggest that sustainability and resilience are complementary and mutually reinforcing concepts, forming the foundation of modern economic development strategies oriented toward long-term stability, competitiveness, and societal well-being.
Keywords: *Economic resilience, Sustainable economic development, Green growth, Circular economy, Sustainable finance, Agricultural sustainability, Environmental policy*

1. Introduction

Economic resilience represents a fundamental component of urban sustainability, as it contributes to maintaining stability and fostering economic growth in the face of external shocks, while also supporting social cohesion, inclusiveness, and environmental sustainability. Moreover, resilient economic systems enhance the capacity of cities to adapt to future challenges and structural transformations. This study extends the conventional understanding of economic resilience beyond the narrow perspective of crisis response, emphasizing the intrinsic resilience of regional economic systems. In this context, the research explores the structural, institutional, and socio-economic factors that influence the capacity of regions to maintain long-term economic stability and adaptability.

Economic resilience and sustainable finance represent two fundamental concepts in the context of sustainable economic and social development. Both play a crucial role in ensuring stable and balanced economic growth, supporting environmental protection, and promoting the efficient management of natural and financial resources. Moreover, the integration of resilient economic systems

with sustainable financial mechanisms contributes to strengthening long-term development strategies and enhancing the capacity of economies to respond to structural transformations and global challenges.

In recent decades, the global economy has been marked by profound transformations driven by climate change, accelerated globalization, the digital revolution, and the increasing economic interdependence among countries. In this context, the concept of sustainable and resilient economic development has become a central concern both for the academic community and for decision-makers involved in public policy and the business environment.

Numerous scholars emphasize that the traditional economic model, based exclusively on economic growth and profit maximization, is no longer sufficient to ensure the long-term stability of economies and the well-being of society. Thus, Stiglitz, Sen and Fitoussi (2009)[131] highlight that traditional indicators of economic performance, such as Gross Domestic Product (GDP), do not adequately reflect the social and ecological dimensions of development. Similarly, Costanza et al. (2014)[132] argue that the assessment of economic progress should also include dimensions such as natural capital, social capital, and human well-being.

The concept of sustainable development was internationally established through the report of the World Commission on Environment and Development, known as the Brundtland Report (WCED, 1987)[133], which defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition has become a fundamental reference for economic development policies and for the strategies of international

[131] Stiglitz, J. E., Sen, A., & Fitoussi, J. P. (2009). *Report by the Commission on the Measurement of Economic Performance and Social Progress*. Paris.
[132] Costanza, R., de Groot, R., Sutton, P., van der Ploeg, S., Anderson, S., Kubiszewski, I., Farber, S., & Turner, R. (2014). Changes in the global value of ecosystem services. *Global Environmental Change*, 26, 152–158.
[133] WCED (World Commission on Environment and Development). (1987). *Our Common Future*. Oxford: Oxford University Press.

organizations such as the United Nations (UN), the World Bank, and the Organisation for Economic Co-operation and Development (OECD)[134].

Subsequently, the concept of sustainable development was incorporated into the global agenda through the Sustainable Development Goals (SDGs) adopted by the United Nations in 2015, which aim to achieve a balance between economic development, social inclusion, and environmental protection (UN, 2015)[135]. According to Sachs (2015), these objectives reflect the need for a systemic transformation of economic and social models so that economic growth becomes compatible with the ecological limits of the planet.

Beyond the limitations of conventional economic indicators, the growing complexity of global economic systems requires new analytical approaches capable of integrating environmental sustainability, social equity, and institutional stability. In this regard, contemporary economic research increasingly emphasizes the need for integrated development models that combine economic efficiency with long-term ecological balance and social resilience.

The emergence of global environmental challenges, such as climate change, biodiversity loss, and resource depletion, has further reinforced the necessity of redefining the foundations of economic development. Traditional growth-oriented paradigms are progressively being replaced by approaches that emphasize circularity, resource efficiency, and systemic resilience. In this context, sustainable economic development is no longer understood merely as a policy objective but rather as a multidimensional framework guiding economic decision-making at local, national, and global levels.

At the same time, the increasing frequency of economic crises has highlighted the importance of resilience as a fundamental characteristic of modern economic systems. Financial shocks,

[134] OECD. (2011). *Towards Green Growth*. Paris: Organisation for Economic Co-operation and Development.

[135] UN (United Nations). (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development*. New York.

geopolitical tensions, supply chain disruptions, and pandemics have demonstrated that economies must not only pursue efficiency but also develop adaptive capacities capable of mitigating risks and responding effectively to unexpected disturbances. Consequently, resilience has become a key concept in economic governance, development planning, and corporate strategy.

Sustainable and resilient economic development has become a central objective of modern economic systems, particularly in the context of globalization, climate change, and rapid technological transformation. Contemporary economic theory increasingly emphasizes the need to balance economic growth with social welfare and environmental sustainability. Within this framework, welfare theory provides an important conceptual foundation, highlighting that economic and social life is characterized by continuous change and that individuals, institutions, and businesses must constantly adapt in order to maintain economic stability and well-being.

Welfare economics traditionally focuses on maximizing social welfare through efficient allocation of resources and improved living standards (Pigou, 1932; Samuelson & Nordhaus, 2010). However, modern interpretations of welfare theory incorporate broader dimensions such as sustainability, resilience, and long-term economic adaptability. These dimensions reflect the growing recognition that economic prosperity cannot be sustained without addressing environmental constraints, social inequalities, and systemic vulnerabilities.

In the context of sustainable and resilient economic development, businesses play a fundamental role as drivers of innovation, productivity, and economic transformation. Firms contribute to economic resilience by adopting adaptive strategies, investing in new technologies, and improving resource efficiency. In particular, the transition toward green and digital economies requires companies to integrate sustainable practices into their operational and strategic frameworks. Corporate sustainability initiatives, circular economy models, and responsible resource management are increasingly recognized as essential components of resilient business models capable of responding to global challenges.

At the same time, public policies represent a key mechanism for supporting sustainable and resilient economic systems. Governments and supranational institutions, particularly within the European Union, have developed a wide range of policy instruments designed to promote sustainable development and economic stability. Policies such as the European Green Deal, cohesion policy, and innovation strategies aim to foster environmentally responsible growth while strengthening economic competitiveness and social cohesion (European Commission, 2020[136]; OECD, 2019)[137].

Economic resilience is closely related to the capacity of economic systems to absorb shocks, adapt to structural changes, and continue functioning effectively in uncertain environments. Recent economic crises, including financial instability, global supply chain disruptions, and environmental challenges, have highlighted the importance of building resilient economic structures. These structures rely on diversified economic activities, strong institutional frameworks, and adaptive governance mechanisms that allow societies to respond effectively to both short-term disruptions and long-term structural transformations (Stiglitz, Sen & Fitoussi, 2009).

In addition, sustainable economic development requires the integration of environmental considerations into economic decision-making processes. The concept of sustainable finance has emerged as an essential component in this regard, directing financial resources toward environmentally and socially responsible investments. Sustainable finance mechanisms support investments in renewable energy, green infrastructure, sustainable agriculture, and technological innovation, thereby contributing to long-term economic resilience and environmental protection.

From a regional perspective, sustainable and resilient economic development also involves reducing disparities between regions and promoting balanced territorial growth. Within the European Union, cohesion policy and regional development programs aim to support

[136] European Commission. (2020). *The Common Agricultural Policy at a glance*. Brussels.

[137] OECD. (2019). *Innovation, Agricultural Productivity and Sustainability in Europe*. Paris: Organisation for Economic Co-operation and Development.

less developed regions by facilitating investments in infrastructure, innovation, education, and human capital development. These initiatives contribute to strengthening economic resilience by enhancing the adaptive capacity of regional economies and promoting economic and social convergence among member states.

From a policy perspective, the integration of sustainability and resilience requires coordinated actions across multiple levels of governance. Governments play a crucial role in designing regulatory frameworks, implementing environmental policies, and supporting innovation ecosystems that facilitate the transition toward sustainable economic models. At the same time, the private sector has become an essential actor in promoting sustainable business practices, technological innovation, and responsible resource management.Parallel to the development of the sustainability concept, contemporary economic literature has also incorporated the concept of economic resilience, which refers to the capacity of economic systems to absorb external shocks, adapt, and reconfigure themselves following major crises or disturbances. The concept of resilience originates in ecology and was introduced by Holling (1973)[138] to describe the ability of ecosystems to cope with changes while maintaining their core functions. Later, this concept was adopted and further developed in the fields of economics and management.

In economics, Martin and Sunley (2015)[139] define economic resilience as the ability of a regional or national economic system to resist, adapt, and recover from economic shocks. Similarly, Briguglio et al. (2009)[140] emphasize that economic resilience involves both the capacity to absorb shocks and the ability to structurally adjust and transform the economy.

Recent crises, such as the global financial crisis of 2008, the

[138] Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics*, 4, 1–23

[139] Martin, R. (2012). Regional economic resilience, hysteresis and recessionary shocks. *Journal of Economic Geography*, 12(1), 1–32

[140] Briguglio, L., Cordina, G., Farrugia, N., & Vella, S. (2009). Economic vulnerability and resilience: Concepts and measurements. *Oxford Development Studies*, 37(3), 229–247.

COVID-19 pandemic, and major disruptions in global supply chains, have highlighted the vulnerability of contemporary economic systems and the need to strengthen economic resilience. According to the World Bank (2021)[141], economies that have invested in human capital, infrastructure, and innovation have demonstrated a greater capacity to adapt and recover in the face of such crises.

In this context, recent research highlights that sustainability and resilience are complementary concepts. Thus, Folke et al. (2010)[142] argue that the long-term sustainability of socio-economic systems depends on their ability to adapt and evolve in response to change and uncertainty. Likewise, Walker and Salt (2012) emphasize that resilient systems are those capable of learning from disturbances and transforming crises into opportunities for innovation and development.

From the perspective of economic development, this complementarity between sustainability and resilience implies the need to integrate multidimensional strategies that include both effective public policies and sustainable and innovative business models. Therefore, modern economic development can no longer be conceived solely in terms of economic growth, but must also incorporate dimensions such as environmental protection, social equity, and the capacity to adapt to global changes.

2. The concept of sustainable economic development

Sustainable economic development represents a model of development that aims to achieve a balance between economic progress, environmental protection, and social well-being. In the specialized literature, this concept is frequently analyzed through the Triple Bottom Line model, introduced by Elkington (1997)[143], which proposes the evaluation of organizational and economic performance through three fundamental dimensions:

[141] World Bank. (2021). *World Development Report*. Washington, DC.

[142] Folke, C., Carpenter, S., Walker, B., Scheffer, M., Chapin, T., & Rockström, J. (2010). Resilience thinking: Integrating resilience, adaptability and transformability. *Ecology and Society*, 15(4)

[143] Elkington, J. (1997). *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*. Oxford: Capstone Publishing

- economic performance (profit),
- social impact (people),
- environmental impact (planet).

According to Elkington (1997), the long-term success of organizations depends on their capacity to create value simultaneously in all three of these dimensions. In this sense, sustainability is no longer perceived solely as a moral obligation or as a component of corporate social responsibility, but rather as a strategic element of economic competitiveness.

Furthermore, Daly (1996)[144] emphasizes that sustainable development implies the use of natural resources in a manner that does not exceed the regenerative capacity of ecosystems. This perspective is also supported by Meadows et al. (2004)[145], who highlight the limits of economic growth within a finite ecological system.

Within the contemporary economy, an important concept associated with sustainable development is green growth. According to the OECD (2011), green growth represents a model of economic development that promotes the efficient use of natural resources, the reduction of carbon emissions, and the development of clean technologies.

Green growth implies the decoupling of economic growth from excessive resource consumption and environmental degradation, a process known in the literature as decoupling. According to Jackson (2017), this process is essential for ensuring long-term economic sustainability. The transition toward sustainable economic development reflects a broader transformation of economic paradigms. Classical economic theories traditionally focused on maximizing production and consumption, assuming that natural resources were abundant and largely substitutable through technological progress. However, contemporary economic thought increasingly recognizes the ecological constraints that limit unlimited economic expansion.

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[144] Daly, H. E. (1996). *Beyond Growth: The Economics of Sustainable Development*. Boston: Beacon Press.

[145] Meadows, D., Randers, J., & Meadows, D. (2004). *Limits to Growth: The 30-Year Update*. White River Junction: Chelsea Green Publishing

Ecological economics has played a significant role in redefining the relationship between economic systems and natural ecosystems. According to this perspective, the economy is embedded within the biosphere, and economic activities must operate within the ecological boundaries of the planet. The concept of planetary boundaries has gained prominence in recent years, highlighting the risks associated with exceeding critical environmental thresholds such as climate stability, biodiversity integrity, and biogeochemical cycles.

Within this framework, sustainable economic development emphasizes the efficient use of resources, the preservation of ecosystem services, and the long-term stability of socio-economic systems. This approach requires the integration of environmental costs into economic decision-making processes and the promotion of economic models that reduce waste, pollution, and resource depletion.

One of the most influential approaches in this regard is the circular economy model. Unlike the traditional linear economic model based on "take–make–dispose," the circular economy seeks to maintain the value of products, materials, and resources for as long as possible within the economic system. By promoting recycling, reuse, and sustainable product design, circular economy strategies contribute to reducing environmental pressures while creating new economic opportunities.

Furthermore, sustainable development increasingly relies on innovation and technological transformation. Digital technologies, renewable energy systems, and smart resource management solutions have the potential to significantly improve economic efficiency while reducing environmental impacts. The integration of digital technologies with sustainability objectives is often referred to as the "twin transition," reflecting the simultaneous digital and green transformation of modern economies.

3. The relevance of economic resilience in sustainable development

The concept of economic resilience has become increasingly important in the analysis of contemporary economic systems.

According to Holling (1973)[146], resilience refers to the capacity of a system to absorb disturbances while maintaining its essential functions.

In economics, Martin (2012)[147] defines regional resilience as the ability of an economy to resist shocks, adapt, and recover after periods of crisis. Similarly, Briguglio et al. (2009)[148] argue that economic resilience depends on factors such as macroeconomic stability, institutional quality, and economic diversification.

Recent economic crises have demonstrated that globalized economies are exposed to major risks generated by the interdependence between financial markets, global supply chains, and climate change. According to Taleb (2012)[149], economic systems should become not only resilient but even "antifragile", meaning capable of improving and becoming stronger as a result of disturbances.

The literature identifies two main forms of resilience:

Passive resilience, which refers to the ability of a system to return to its initial state after a disturbance, and active resilience, which involves the capacity of a system to learn from crises and develop new economic development models (Walker & Salt, 2012)[150].

In this sense, resilience becomes an essential component of sustainability, as it enables economic systems to evolve in an environment characterized by uncertainty and continuous change.

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[146] Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics*, 4, 1–23.

[147] Martin, R. (2012). Regional economic resilience, hysteresis and recessionary shocks. *Journal of Economic Geography*, 12(1), 1–32.

[148] Briguglio, L., Cordina, G., Farrugia, N., & Vella, S. (2009). Economic vulnerability and resilience: Concepts and measurements. *Oxford Development Studies*, 37(3), 229–247.

[149] Taleb, N. N. (2012). *Antifragile: Things That Gain from Disorder*. New York: Random House.

[150] Walker, B., & Salt, D. (2012). *Resilience Practice: Building Capacity to Absorb Disturbance and Maintain Function*. Washington DC: Island Press.

4. Agriculture, environment and sustainable economic development

The relationship between agriculture and the natural environment has long been perceived as intrinsically harmonious, with agricultural activity traditionally viewed as an integral component of rural ecosystems. For centuries, agricultural practices were largely adapted to natural cycles and local environmental conditions, which contributed to maintaining ecological balance in rural areas. However, the evolution of agricultural systems during the last decades has significantly altered this relationship.

Technological progress, agricultural intensification, mechanization, and the increasing use of chemical inputs such as fertilizers and pesticides have generated complex environmental effects. Structural changes in land use, the expansion of monocultures, and the intensification of livestock production have contributed to soil degradation, biodiversity loss, and increased pressure on water resources (Tilman et al., 2002[151]; Pretty, 2008[152]). These developments have led to growing economic and political concerns regarding the environmental impacts of agriculture and the necessity of adopting public policies oriented toward sustainability.

From a modern economic perspective, many of these challenges can be addressed through microeconomic instruments and adaptive policy mechanisms capable of correcting environmental externalities and enhancing the ecological functions of agricultural systems. Environmental economics emphasizes the importance of policy tools such as subsidies for sustainable practices, environmental taxation, and regulatory frameworks aimed at internalizing environmental costs (Pearce & Turner, 1990[153]; Tietenberg & Lewis, 2018[154]).

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[151] Tilman, D., Cassman, K. G., Matson, P., Naylor, R., & Polasky, S. (2002). Agricultural sustainability and intensive production practices. Nature, 418, 671–677.
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[154] Tietenberg, T., & Lewis, L. (2018). *Environmental and Natural Resource Economics* (11th ed.). New York: Routledge.

In this context, the integration of environmental considerations into the European Union's **Common Agricultural Policy (CAP)** has become a central element of the broader strategy for sustainable development. As emphasized by the European Commission, agriculture must simultaneously ensure food production, environmental protection, and rural development (European Commission, 2020).

Romanian scholars have also highlighted the multidimensional role of agriculture in sustainable development. According to Otiman (2011)[155] and Zahiu et al. (2015)[156], agriculture contributes not only to food security and economic growth but also to landscape management, biodiversity conservation, and the preservation of rural cultural heritage.

Institutional concerns regarding environmental protection began to be formally integrated into European policies in the 1970s. These concerns were further consolidated through the **Single European Act (1987)** and the **Maastricht Treaty**, which established the principle that environmental protection requirements must be integrated into all European Community policies. Subsequently, the expansion of the European Parliament's competences and the introduction of the co-decision procedure strengthened the role of environmental policies within the European institutional framework.

European environmental policy is based on several fundamental principles that contribute to the development of a resilient and sustainable economic model:

- the **precautionary principle,**
- the **prevention principle,**
- the **principle of correcting environmental damage at source,**
- the **"polluter pays" principle.**

These principles are oriented toward achieving strategic objectives such as:

- preserving and improving environmental quality,

[155] Otiman, P. I. (2011). *Agricultura României la răscrucea secolelor*. București: Editura Academiei Române

[156] Zahiu, L., Dachin, A., & Alexandri, C. (2015). *Agricultural Economics and Rural Development*. Bucharest: ASE Publishing House.

- protecting human health,
- ensuring the responsible use of natural resources,
- promoting international cooperation in environmental protection.

Integrating these objectives into agricultural policies is essential for sustainable development strategies, as agriculture represents not only an economic sector but also a key factor in landscape management, biodiversity conservation, and the maintenance of rural ecosystem stability (OECD, 2019)[157].

At the same time, European agriculture operates within a complex and sometimes contradictory context. On the one hand, the European Union imposes high standards regarding environmental protection, animal welfare, and natural resource management, which inevitably increase production costs. On the other hand, the liberalization of international trade and the pressure exerted by global trade organizations encourage competitiveness based on lower production costs (Matthews, 2013)[158].

In this context, European agricultural policies must pursue several simultaneous objectives:

- enhancing the ecological functions of agriculture, including landscape management, biodiversity conservation, and soil protection,
- integrating environmental considerations into international trade negotiations,
- providing financial support for agro-environmental measures through specific policy instruments.

Through these mechanisms, agriculture becomes part of a broader economic model aimed at achieving both competitiveness and ecosystem resilience. Businesses play a fundamental role in the transition toward sustainable and resilient economic systems. As key drivers of economic activity, companies influence production processes, resource consumption patterns, and technological

[157] OECD. (2019). *Innovation, Agricultural Productivity and Sustainability in Europe*. Paris: Organisation for Economic Co-operation and Development.
[158] Matthews, A. (2013). Greening agricultural payments in the EU's Common Agricultural Policy. *Bio-based and Applied Economics*, 2(1), 1–27.

innovation. Consequently, the adoption of sustainable business practices has become an essential component of global sustainability strategies.

In recent decades, corporate sustainability has evolved from a peripheral concern into a central element of business strategy. Companies increasingly recognize that sustainable practices can enhance long-term competitiveness by improving resource efficiency, strengthening stakeholder relationships, and reducing exposure to environmental and regulatory risks. The relationship between agriculture and the natural environment has long been perceived as intrinsically harmonious, with agricultural activity traditionally viewed as an integral component of rural ecosystems. For centuries, agricultural practices were largely adapted to natural cycles and local environmental conditions, which contributed to maintaining ecological balance in rural areas. However, the evolution of agricultural systems during the last decades has significantly altered this relationship.

Technological progress, agricultural intensification, mechanization, and the increasing use of chemical inputs such as fertilizers and pesticides have generated complex environmental effects. Structural changes in land use, the expansion of monocultures, and the intensification of livestock production have contributed to soil degradation, biodiversity loss, and increased pressure on water resources (Tilman et al., 2002[159]; Pretty, 2008[160]). These developments have led to growing economic and political concerns regarding the environmental impacts of agriculture and the necessity of adopting public policies oriented toward sustainability.

In many regions of the world, agricultural intensification has increased productivity and contributed significantly to global food security. At the same time, however, the environmental costs associated with intensive agricultural systems have become increasingly evident. Soil erosion, nutrient depletion, water

[159] Tilman, D., Cassman, K. G., Matson, P., Naylor, R., & Polasky, S. (2002). Agricultural sustainability and intensive production practices. *Nature*, 418, 671–677.
[160] Pretty, J. (2008). Agricultural sustainability: Concepts, principles and evidence. *Philosophical Transactions of the Royal Society B*, 363, 447–465.

contamination caused by excessive fertilizer use, and greenhouse gas emissions from agricultural activities represent some of the most significant environmental challenges associated with modern agriculture (Foley et al., 2011)[161]. These impacts highlight the need for new approaches capable of reconciling agricultural productivity with environmental protection.

From an economic perspective, agriculture plays a dual role in sustainable development. On the one hand, it is a key sector for ensuring food security, generating employment, and supporting rural livelihoods. On the other hand, agriculture directly depends on natural resources such as soil, water, biodiversity, and climate stability. Consequently, the long-term sustainability of agricultural systems is closely linked to the sustainable management of these resources (Godfray et al., 2010)[162].

In recent years, the concept of sustainable agriculture has gained increasing attention in both scientific literature and public policy debates. Sustainable agriculture refers to farming systems that are capable of maintaining productivity while minimizing negative environmental impacts and preserving natural resources for future generations (Pretty, 2008)[163]. This approach emphasizes the integration of ecological principles into agricultural management practices, including soil conservation, efficient water use, crop diversification, and the reduction of chemical inputs.

Another important dimension of sustainable agricultural development is the concept of ecosystem services. Agricultural landscapes provide a wide range of ecosystem services, including

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[161] Foley, J. A., Ramankutty, N., Brauman, K. A., Cassidy, E. S., Gerber, J. S., Johnston, M., Mueller, N. D., O'Connell, C., Ray, D. K., West, P. C., Balzer, C., Bennett, E. M., Carpenter, S. R., Hill, J., Monfreda, C., Polasky, S., Rockström, J., Sheehan, J., Siebert, S., … Zaks, D. P. M. (2011). *Solutions for a cultivated planet.* Nature, 478, 337–342. https://doi.org/10.1038/nature10452

[162] Godfray, H. C. J., Beddington, J. R., Crute, I. R., Haddad, L., Lawrence, D., Muir, J. F., Pretty, J., Robinson, S., Thomas, S. M., & Toulmin, C. (2010). *Food security: The challenge of feeding 9 billion people*. Science, 327(5967), 812–818. https://doi.org/10.1126/science.1185383

[163] Pretty, J. (2008). Agricultural sustainability: Concepts, principles and evidence. *Philosophical Transactions of the Royal Society B*, 363, 447–465

pollination, nutrient cycling, water regulation, and carbon sequestration. These services are essential for maintaining agricultural productivity and environmental stability. However, intensive agricultural practices often disrupt these ecological processes, leading to long-term environmental degradation (Costanza et al., 2014)[164]. Recognizing the value of ecosystem services has therefore become an important element of modern environmental policy.

In the European context, the integration of environmental objectives into agricultural policy has been primarily achieved through the Common Agricultural Policy (CAP). Over the past decades, the CAP has undergone significant reforms aimed at promoting environmentally friendly farming practices and supporting rural development. Agri-environmental measures, cross-compliance requirements, and greening payments are among the most important instruments used to encourage farmers to adopt sustainable agricultural practices (European Commission, 2020).

5. Public policy instruments for environmental protection in agriculture

In order to implement sustainable development objectives, the European Union adopted the **Fifth Environmental Action Programme – "Towards Sustainability" (1993–2000)**. This program identified five economic sectors with priority environmental impacts: industry, energy, transport, tourism, and agriculture.

Analyses conducted by the European Commission revealed that while the traditional mechanisms of the Common Agricultural Policy successfully achieved several economic objectives, such as increasing agricultural productivity and stabilizing farm incomes, they also generated significant environmental side effects.

Among the most important environmental challenges identified were:

- excessive intensification of agricultural production,
- soil degradation and erosion,

[164] Costanza, R., de Groot, R., Sutton, P., van der Ploeg, S., Anderson, S., Kubiszewski, I., Farber, S., & Turner, R. (2014). Changes in the global value of ecosystem services. *Global Environmental Change*, 26, 152–158.

- loss of genetic diversity in crops and livestock,
- water pollution caused by nitrates and phosphates,
- degradation of wetlands and sensitive ecosystems.

To address these challenges, the European Union introduced a series of agro-environmental instruments designed to stimulate the adoption of sustainable farming practices. These policy instruments represent an important shift from product-oriented support toward environmental and rural development measures (Baldock et al., 2010)[165].

The most important measures include:

- promoting extensive and environmentally friendly farming systems,
- encouraging conversion to organic agriculture,
- protecting endangered local animal breeds,
- reducing the use of fertilizers and pesticides,
- converting arable land into permanent pastures.

A relevant example is the implementation of **agri-environmental contracts** in several European countries. Through these contractual arrangements, farmers receive financial incentives in exchange for adopting environmentally friendly agricultural practices. Such mechanisms allow policymakers to combine economic incentives with environmental protection objectives at the local level.

Additionally, European environmental policy includes measures aimed at reducing nitrate pollution in agricultural areas. These measures are implemented through the **Nitrates Directive**, which identifies vulnerable zones and requires farmers to adopt improved fertilization practices in order to protect groundwater and surface water resources (European Commission, 2018)[166].

In these programs, agricultural institutions, research centers, and professional organizations play a crucial role in providing technical advice and support to farmers. Agricultural extension services and

[165] Baldock, D., Dwyer, J., Lowe, P., Petersen, J., & Ward, N. (2010). *The Environmental Impact of the Common Agricultural Policy (CAP)*. Brussels: European Commission

[166] European Commission. (2018). *The Nitrates Directive: Implementation Report*. Brussels

advisory systems help farmers adopt innovative practices that reduce environmental impacts while maintaining economic viability.

Through these instruments, European agricultural policy has gradually evolved from a model focused exclusively on increasing agricultural production toward a **multifunctional agriculture model**, which simultaneously contributes to food security, environmental protection, and rural development (Van Huylenbroeck & Durand, 2003)[167].

6. United states agricultural policy and adaptation to the global economy

In the United States, agricultural policies are integrated within a complex legislative framework known as the **Farm Bill**, which is periodically adopted in order to regulate agricultural production, food policies, and rural development programs.

These policies pursue several strategic objectives:

- stabilizing farmers' incomes,
- ensuring national food security,
- protecting natural resources and the environment,
- promoting agricultural exports.

Over the past decades, U.S. agricultural policies have undergone significant reforms aimed at increasing market orientation and reducing direct government intervention in price formation mechanisms. One of the most important policy reforms was the adoption of the **Federal Agricultural Improvement and Reform Act (FAIR Act) of 1996**, which introduced a system of direct payments decoupled from production levels.

This reform marked a major shift in agricultural policy philosophy, allowing farmers to adapt their crop structures according to market conditions rather than policy incentives. Such flexibility contributed to improving the competitiveness and efficiency of U.S. agriculture (Gardner, 2002)[168].

[167] Van Huylenbroeck, G., & Durand, G. (2003). *Multifunctional Agriculture: A New Paradigm for European Agriculture and Rural Development*. Aldershot: Ashgate

[168] Gardner, B. L. (2002). *American Agriculture in the Twentieth Century: How It Flourished and What It Cost*. Cambridge, MA: Harvard University Press

At the same time, U.S. agricultural policy includes several programs aimed at conserving natural resources and improving environmental sustainability. Among the most important initiatives are:

- soil conservation programs,
- wetland restoration initiatives,
- water pollution reduction programs,
- biodiversity conservation policies.

These initiatives reflect an increasing integration of environmental objectives within agricultural policy frameworks. Programs such as the **Conservation Reserve Program (CRP)** and the **Environmental Quality Incentives Program (EQIP)** provide financial incentives for farmers to adopt environmentally responsible land management practices (USDA, 2021)[169].

7. Agriculture in the context of international trade

The globalization of agricultural markets has significantly increased the role of international institutions in regulating global trade. Following the Second World War, the international economic order was shaped by the **Bretton Woods agreements**, which led to the creation of major international economic institutions such as the **International Monetary Fund (IMF)** and the **World Bank**.

In the field of international trade, the principal regulatory framework was established through the **General Agreement on Tariffs and Trade (GATT)**, which aimed to liberalize international trade and reduce tariff barriers between countries.

Nevertheless, agriculture benefited from a special regime within the international trading system. Most countries considered it necessary to maintain support mechanisms for agriculture in order to ensure food security and economic stability in rural areas (Anderson, 2010).

Multilateral trade negotiations evolved through several stages, culminating in the **Uruguay Round (1986–1994)**, which led to the

[169] USDA (United States Department of Agriculture). (2021). *Conservation Programs and Environmental Policy in U.S. Agriculture*. Washington, DC

establishment of the **World Trade Organization (WTO)**. This reform introduced stricter rules regarding:

- agricultural subsidies,
- market access conditions,
- the reduction of trade barriers.

As a result of these transformations, agriculture has become a central sector in international trade negotiations, reflecting its strategic importance for global food security and economic development.

Conclusion

The analysis confirms that sustainable economic development and economic resilience are deeply interconnected and constitute fundamental pillars of modern economic systems. In the context of global transformations driven by climate change, digitalization, and increasing economic interdependence, traditional growth models focused solely on efficiency and profit maximization are no longer sufficient. Instead, contemporary development paradigms require the integration of economic performance with social equity, environmental protection, and adaptive capacity.

The study highlights that resilience enhances the ability of economic systems to absorb shocks, adapt to structural changes, and transform crises into opportunities for innovation and long-term growth. At the same time, sustainability provides the normative and strategic framework necessary to ensure that this transformation remains compatible with ecological limits and societal well-being. The complementarities between these two concepts underline the need for integrated approaches that combine efficient resource management, institutional stability, and technological innovation.

Businesses and public authorities play a decisive role in this process. While companies contribute through sustainable business models, innovation, and resource efficiency, public policies create the regulatory and institutional environment necessary for fostering resilience and sustainability. In particular, policy instruments such as green finance mechanisms, environmental regulations, and regional development strategies are essential for supporting the transition toward more resilient and sustainable economies.

Moreover, the analysis of agriculture and environmental policies demonstrates that sectoral integration is critical for achieving balanced development. Sustainable agricultural practices and environmentally oriented policy instruments contribute not only to food security and economic growth but also to ecosystem stability and long-term resilience.

In conclusion, sustainable and resilient economic development requires a systemic transformation of economic models, based on the integration of environmental, social, and economic dimensions, ensuring long-term stability, competitiveness, and improved quality of life.

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Chapter 8
Leadership as a Mechanism for Resilience in Sustainable Development Perspectives

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Abstract: *This study examines the role of leadership as a fundamental driver of sustainable development in the context of contemporary global challenges, including climate change, resource constraints, and socio-economic transformations. Moving beyond traditional perspectives, leadership is conceptualized as a complex process of influence and coordination through which organizations and societies integrate economic, social, and environmental objectives into their strategic frameworks. The paper highlights the evolution of leadership theories, from trait-based and behavioral approaches to modern interpretations that emphasize sustainability, adaptability, and systemic thinking.*
Particular attention is given to leadership as a mechanism for promoting sustainable values and practices within organizations, fostering a culture of responsibility, innovation, and long-term orientation. The research identifies key characteristics of sustainability-oriented leaders, such as ethical responsibility, systemic thinking, collaboration, and the capacity for innovation. These competencies enable leaders to address complex interdependencies and develop strategies that balance economic performance with social equity and environmental protection.

The study also explores the role of leadership in sustainable governance and policy-making, emphasizing the importance of participatory approaches, stakeholder engagement, and institutional coordination. Transformational, adaptive, and ethical leadership models are analyzed as essential frameworks for guiding organizational and societal change, particularly in contexts characterized by uncertainty and rapid transformation.

Furthermore, the paper highlights the interconnection between leadership, innovation, and sustainable transitions, demonstrating that effective leaders play a critical role in facilitating technological advancement, organizational learning, and systemic change. By promoting collaboration and developing a clear strategic vision, leaders contribute to building resilient and sustainable organizations capable of responding to global challenges.

The findings suggest that sustainable leadership represents a key mechanism for achieving long-term development, integrating multidimensional perspectives and fostering resilience, innovation, and societal well-being.

Keywords: *Sustainable leadership, Leadership and sustainability, Transformational leadership, Organizational resilience, Sustainable governance, Innovation and sustainability, Stakeholder engagement*

Introduction

Leadership is one of the fundamental concepts analyzed in social sciences and contemporary management, being considered a determining factor in guiding organizations and societies towards sustainable development. In the context of current global challenges climate change, pressure on natural resources, social inequalities, and economic transformations the role of leaders becomes essential for integrating sustainability principles into organizational strategies and public policies.

Leadership is recognized in the specialized literature as a determining factor in the orientation of organizations towards performance and sustainable development, being defined as a complex process of influencing, motivating and coordinating human resources in order to achieve common objectives (Avolio, Walumbwa & Weber,

2009[170]; Bryman, 2013[171]). In the current context, marked by accelerated economic and social transformations, leadership acquires a strategic dimension, being directly correlated with the capacity of organizations to adapt and innovate (Cortellazzo, Bruni & Zampieri, 2019)[172].

Leadership is no longer perceived merely as a tool for coordinating and influencing individuals, but as a complex mechanism through which values, visions, and strategies oriented toward the sustainable development of communities and organizations are promoted. In the literature, leadership is often defined as the process by which a person influences the behavior and actions of other individuals or groups in order to achieve common goals.

Studies highlight the fact that leadership style significantly influences employee motivation and performance (Alghazo & Meshal, 2016[173]; Asrar-ul-Haq & Kuchinke, 2016[174]), as well as the level of satisfaction and organizational involvement (Braun et al., 2013[175]; Burch & Guarana, 2014[176]). In particular, transformational leadership is considered an essential factor in generating organizational change and creating a culture based on trust and innovation (Bass, 1985; Bass

[170] Avolio, B. J., Walumbwa, F. O., & Weber, T. J. (2009). Leadership: Current theories, research, and future directions. Annual Review of Psychology, 60, 421–449. https://doi.org/10.1146/annurev.psych.60.110707.163621

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& Riggio[177], 2006; Dong et al., 2017[178]).

This influence is based not only on formal authority, but also on the leader's ability to inspire, motivate, and mobilize human and organizational resources to achieve a common vision. In the context of sustainability, this vision involves integrating economic, social, and environmental dimensions into the decision-making process so that the development of organizations and society is achieved in a balanced and responsible manner.

At the same time, ethical and responsible leadership is increasingly associated with sustainable development, contributing to strengthening relationships with stakeholders and promoting responsible organizational behavior (Brown, Treviño & Harrison, 2005[179]; Voegtlin, Patzer & Scherer, 2012[180]; Hu, Wang & Yang, 2019[181]). Recent research shows that leaders' personal values influence organizations' orientation towards sustainability and democratic behaviors (Nedelko & Potocan, 2021[182]), and employee involvement in decision-making processes contributes to increasing

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organizational performance (Bilge et al., 2020[183]; Haryanto et al., 2022[184]).

In a global context, leadership must integrate intercultural competences and multicultural orientations to respond to the diversity and complexity of the contemporary economic environment (Atiku, 2018[185]; Atiku & Fields, 2016[186]). Also, the role of leadership in times of change and uncertainty becomes crucial, contributing to maintaining organizational stability and service efficiency (Atiku, Kurana & Ganiyu, 2023[187]; Bangura, 2023[188]).

At the same time, the literature highlights the importance of developing leadership competencies and training programs, which contribute to increasing organizational performance and their adaptability (Klimoski & Amos, 2012[189]; Geerts, 2024[190191]). In this sense, leadership is considered a central element of organizational

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innovation and transformation (Shin & McClomb, 1998[192]), as well as a determining factor of employee well-being and organizational efficiency (Onesti, 2023).

In the context of institutional reforms and public sector modernization, behavioral leadership models are gaining increasing importance, contributing to the efficiency of decision-making processes and the implementation of public policies. Recent studies highlight the fact that the assessment and hierarchy of leadership styles, using advanced analytical methods, can support the improvement of organizational performance and reform processes (Janovac et al., 2023)[193].

Also, the development of evidence-based leadership skills is considered essential for increasing organizational efficiency and for training leaders capable of responding to contemporary challenges. In this sense, leadership training programs must be based on empirical research and validated good practices, to ensure their relevance and applicability in the organizational environment (Klimoski & Amos, 2012)[194].

Within international organizations, leadership and motivation are interdependent elements that influence organizational culture and employee performance. Effective leaders contribute to creating a positive organizational climate, based on involvement, responsibility and orientation towards common goals, thus facilitating the adaptation of organizations to the global competitive environment (Košičiárová,

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Kádeková & Štarchoň, 2021)[195].

At the same time, the specialized literature emphasizes the importance of values-based leadership, which emphasizes ethics, integrity and responsibility. This type of leadership contributes to strengthening employee commitment, increasing performance and developing sustainable organizations, capable of generating long-term value (Kuczmarski & Kuczmarski, 1995)[196].

1. The evolution of the concept of leadership in the context of sustainability

The concept of leadership has evolved significantly over time, shifting from traditional perspectives focused on the individual traits of leaders to more complex approaches that highlight the role of social and organizational context. Early leadership theories focused on the personal characteristics of leaders, attempting to identify the traits that set them apart from other group members. Later, researchers began to analyze the behavior of leaders and how it influences organizational performance.

In recent decades, the concept of leadership has been reinterpreted in the context of sustainable development. Contemporary leaders are seen as agents of change, responsible for guiding organizations toward sustainable development models.

This involves adopting strategies that reduce negative environmental impacts, promote social equity, and ensure long-term economic stability.

Leadership for sustainability thus involves an integrative approach that goes beyond the limits of traditional management. Leaders must understand the complexity of economic and social systems, anticipate future risks, and develop innovative solutions to global challenges. In this sense, leadership becomes a process of organizational and social transformation, geared towards creating sustainable value.

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Figure 8.1. The evolution of the concept of leadership in the context of sustainability

2. Leadership as a process of influence geared towards sustainability

A central element of leadership is the ability to influence the behavior of individuals and groups. In the context of sustainability, this influence manifests itself through the promotion of values and practices that support social responsibility and environmental protection. Sustainable leaders succeed in creating an organizational culture in which the principles of sustainable development become an integral part of everyday activities.

Through communication and personal example, leaders can encourage members of the organization to adopt behaviors that are responsible towards the environment and society. This influence is not

limited to within the organization, but also extends to partners, customers, and local communities, thus contributing to the promotion of sustainable development models on a larger scale.

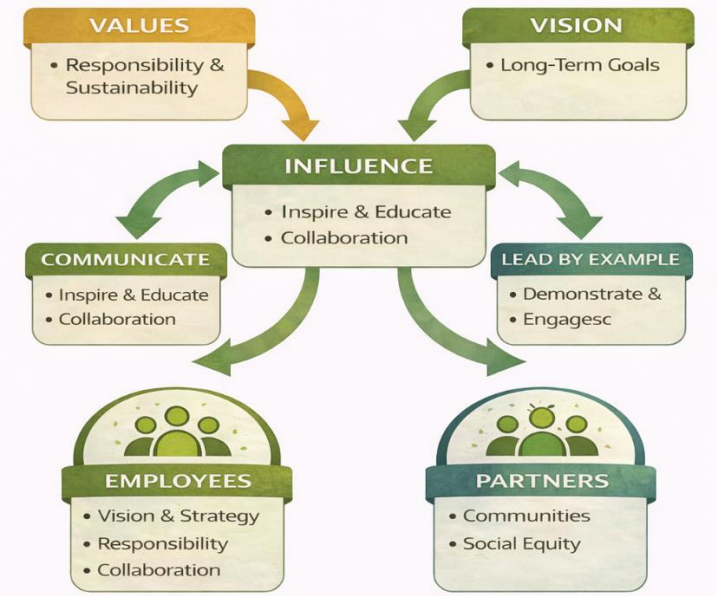

Figure 8.2. Leadership as a process of influence geared towards sustainability

Sustainable leadership also requires the ability to build a long-term vision. Leaders must identify strategic directions that enable organizations to adapt to economic and environmental changes while maintaining a balance between economic performance and social responsibility. This vision must be clearly communicated and inspire employees to actively contribute to the achievement of organizational goals.

3. Characteristics of sustainability-oriented leaders

Leaders who promote sustainability are distinguished by a number of specific characteristics and competencies. These include systemic thinking, ethical responsibility, innovation, and collaboration.

Systemic thinking enables leaders to understand the interdependencies between different components of economic, social, and environmental systems, facilitating the adoption of sustainable strategic decisions.

Ethical responsibility is another essential element of sustainable leadership. Leaders must act in accordance with moral principles and promote transparency and integrity within the organizations they lead. This approach helps to build trust between organizations and society, as well as create lasting relationships with stakeholders.

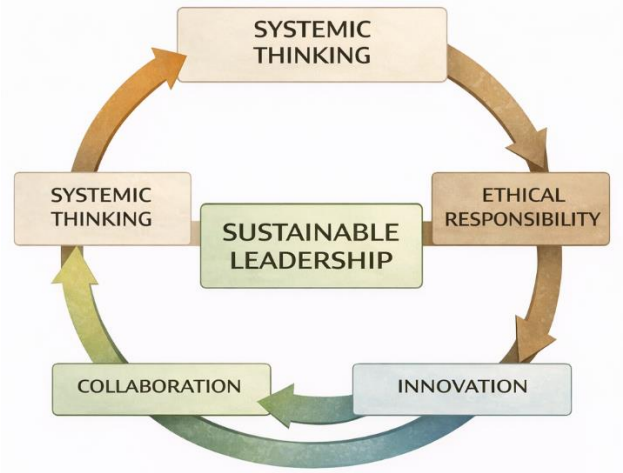

Figure 8.3. Characteristics of sustainability-oriented leaders

The capacity for innovation is also fundamental to sustainable leadership. Leaders must encourage the development of creative solutions to reduce environmental impact and improve social and economic performance. Innovation can contribute to the development of more efficient technologies, the optimization of organizational processes, and the creation of sustainable business models.

At the same time, collaboration is an important dimension of leadership for sustainability. Global issues such as climate change or environmental degradation cannot be solved by a single organization or institution.

Therefore, leaders must develop partnerships and cooperation networks between different social actors, including public institutions, private organizations, and civil society.

4. Leadership and sustainable governance

In modern governance, leadership plays an essential role in promoting policies and strategies geared towards sustainable development. Public sector leaders have a responsibility to formulate and implement policies that support environmental protection, sustainable economic development, and the reduction of social inequalities.

Figure 8.4. Leadership and sustainable governance

Sustainable governance involves making decisions that take into account the interests of future generations, as well as the balance between economic growth and environmental protection. In this context, leaders must develop mechanisms for cooperation between different institutions and levels of government, facilitating the implementation of sustainable development strategies.

Leadership in the public sector also involves the responsibility to engage citizens and local communities in the decision-making process. Public participation contributes to increasing the legitimacy of policies and identifying more effective solutions to societal problems. In this way, leaders become facilitators of dialogue and collaboration between different social groups.

5. Transformative leadership for sustainable development

A concept that is increasingly used in recent literature is that of transformational leadership. This type of leadership is characterized by the ability of leaders to generate profound changes within organizations and society. Transformational leaders inspire members of the organization to transcend individual interests and contribute to the achievement of collective goals with long-term impact.

In the context of sustainability, transformational leadership involves promoting values such as environmental responsibility, social equity, and intergenerational solidarity. Transformational leaders create an organizational culture focused on innovation and continuous learning, encouraging employees to actively participate in the process of change. This type of leadership also contributes to the development of a future-oriented mindset, in which decisions are evaluated not only in terms of immediate benefits, but also in terms of their impact on future generations. Through this approach, leadership becomes an essential factor in building a sustainable economy and society.

In this context, adaptive leadership becomes an essential component of sustainability-oriented organizational governance. Adaptive leadership requires leaders to respond quickly to changes in the external environment and adjust organizational strategies to new economic, social, and technological conditions. Leaders must develop organizational learning mechanisms and stimulate innovation to enable organizations to adapt to the challenges of an environment characterized by volatility and uncertainty.

In parallel with adaptive leadership, the literature highlights the role of ethical leadership in promoting sustainable development. Ethical leadership is based on values such as integrity, responsibility, and transparency in decision-making. These values are essential for

building trust between organizations and society, as well as for creating sustainable relationships with stakeholders. Particularly in the educational and institutional fields, research emphasizes that leadership practices must be analyzed in relation to the social and cultural context in which they occur, as values, norms, and the institutional environment influence how leaders make decisions and act.

Furthermore, sustainability-oriented leadership involves a high capacity for communication and social mobilization. Effective leaders are able to convey clear and consistent messages that inspire collaboration and collective involvement in achieving common goals. In times of crisis or major change, leaders' communication can have a significant impact on how society or organizations respond to these challenges.

Studies on political leadership show that leaders who manage to combine empathy, clarity of message, and decision-making authority can more effectively mobilize society in times of uncertainty or crisis.

Another important aspect of sustainable leadership is the ability to create and maintain a clear organizational vision. The vision represents the image of the future that the leader projects for the organization and which provides direction and meaning to collective activities. Effective leaders are able to transform this vision into a coherent set of strategies and actions, mobilizing the organization's resources to achieve the set goals.

In this sense, developing a strategic vision is one of the most important responsibilities of leaders, as the lack of a clear direction can lead to decreased organizational efficiency and difficulties in achieving change.

Leadership for sustainability also requires the ability to build collaborative relationships between different social and institutional actors. Global issues such as environmental degradation or social inequalities cannot be solved by a single organization or institution. Therefore, leaders must develop partnerships and cooperation networks between the public sector, the private sector, and civil society. This collaborative approach contributes to identifying innovative solutions and implementing sustainable policies on a large

scale. At the same time, sustainable leadership also involves developing human capital within organizations.

Leaders must create an organizational climate that encourages participation, continuous learning, and the development of employee skills. By promoting an organizational culture based on collaboration, responsibility, and innovation, leaders can help increase the capacity of organizations to respond to future challenges.

In the literature, sustainable leadership is often associated with the ability of leaders to guide organizations toward long-term goals, while integrating the economic, social, and environmental dimensions of development. In this sense, the concept of sustainable leadership goes beyond the traditional perspective of management focused exclusively on economic performance and promotes a systemic approach to organizational development.

Sustainable leaders are responsible not only for achieving immediate results, but also for creating organizational structures capable of generating sustainable value for society and the environment. From this perspective, sustainable leadership involves developing a long-term strategic vision, focused on balancing the interests of the organization and those of society.

Strategic decisions must take into account the impact on the environment, the social responsibility of organizations, and the involvement of stakeholders in the decision-making process. Thus, leaders are called upon to adopt an integrated approach to organizational governance, in which collaboration between the public sector, the private sector, and civil society becomes essential for achieving the transition to sustainability.

In the transition to sustainability, leadership plays a fundamental role in coordinating the actors involved and facilitating cooperation between different levels of governance. Sustainable transitions are complex processes involving interaction between numerous institutional and social actors, and leaders have a responsibility to create coordination and dialogue mechanisms that enable the development of collective solutions to global problems.

In this context, the concept of meta-governance highlights the role of political and institutional leaders in organizing and guiding the

governance networks involved in environmental and sustainable development policies.

Another central element of sustainable leadership is the ethical dimension of the leadership process. Ethical leadership involves adopting high moral standards and promoting responsible behavior within organizations. Studies show that ethical leadership contributes significantly to increased organizational performance because it positively influences employee behavior and their level of involvement in the organization's activities.

At the same time, the lack of an ethical organizational climate or the existence of negative perceptions of the organization's internal policies can diminish the manifestation of ethical leadership and affect employee performance.

In the context of economic globalization and increasing cultural diversity in organizations, sustainable leadership also involves the development of intercultural skills. Leaders must be able to manage multicultural teams and promote collaboration between people with different values, norms, and perspectives.

In this sense, cultural intelligence becomes an essential skill for effective leadership, as it facilitates communication and cooperation between members of the organization from diverse cultural backgrounds.

Leaders who demonstrate a high level of cultural intelligence are perceived as more effective and contribute to the creation of organizations that are more inclusive and adaptable to changes in the global environment. Sustainable leadership is also closely linked to the ability of leaders to manage situations of crisis and uncertainty. Economic, health, or climate crises test the ability of leaders to make quick and effective decisions in conditions of high uncertainty. Research shows that effective leaders in crisis situations exhibit a number of essential characteristics, such as strategic vision, courage, resilience, empathy, and the ability to inspire confidence among members of the organization.

These characteristics enable leaders to mobilize organizational resources and maintain institutional stability in times of major instability.

Sustainable leadership can therefore be understood as a complex process of influence and coordination that seeks to integrate the principles of sustainable development into organizational strategies and public policies.

Leaders who adopt this approach contribute to the development of resilient organizations capable of responding to the economic, social, and environmental challenges of contemporary society.

At the same time, sustainable leadership promotes the creation of cooperative relationships between different social and institutional actors, thus facilitating the implementation of effective sustainable development strategies.

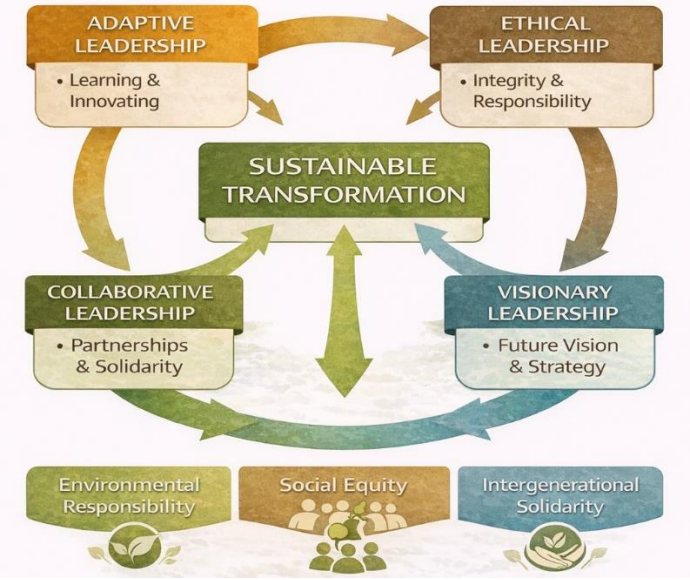

Figure 8.5. Transformative leadership for sustainable development

An important aspect of sustainable leadership is the relationship between leadership style and organizational performance. Studies show that the leadership style adopted by leaders directly influences

organizational culture, employee engagement, and the effectiveness of decision-making processes. In public institutions and complex organizations, leaders who adopt participatory or transformational styles succeed in creating an organizational climate conducive to innovation and cooperation. Thus, leadership becomes a determining factor in achieving organizational goals and providing efficient public services.

In the literature, transformational leadership is often associated with organizational change processes and the development of sustainable management systems. Transformational leaders are characterized by their ability to inspire and motivate members of the organization, formulate a clear strategic vision, and stimulate the professional development of employees.

They create an organizational environment based on trust, collaboration, and innovation, thus contributing to increased organizational performance and the consolidation of an organizational culture oriented towards sustainable development. At the same time, recent research highlights the fact that leadership has a significant impact on employee well-being and job satisfaction. The leadership styles adopted by leaders influence the level of engagement, motivation, and work-life balance of employees.

Organizations that promote responsible and ethical leadership create a healthy work environment that fosters professional development and retains valuable human capital. In this sense, leadership is a strategic tool for strengthening organizational sustainability, as employee well-being contributes to increased productivity and long-term organizational performance.

Another important element in the analysis of sustainable leadership is the process of developing leadership skills. Organizations are increasingly investing in leadership development programs, recognizing their role in ensuring the competitiveness and adaptability of organizations.

Studies show that effective leadership development programs contribute to increasing the professional skills of leaders, improving organizational performance, and strengthening innovation capacity.

However, the effectiveness of these programs depends on how the

knowledge and skills acquired are applied in organizational work.

Sustainable leadership is also closely linked to the promotion of participatory organizational structures, in which employees are actively involved in the decision-making process.

The concept of organizational democracy highlights the importance of employee participation in decision-making and the development of organizational strategies.

Active employee participation contributes to increased accountability, the development of a spirit of collaboration, and the strengthening of trust in the organization's leadership. In this context, organizations that adopt participatory leadership models are better prepared to face the challenges of the contemporary economic and social environment.

At the same time, the personal values of leaders play an important role in guiding their managerial behavior and promoting the principles of sustainable development.

Research shows that leaders who demonstrate collectivist and socially responsible values are more likely to adopt democratic and participatory behaviors within organizations. These behaviors contribute to the development of sustainable organizations characterized by social responsibility, transparency, and active stakeholder involvement.

6. Sustainable leadership models

In contemporary literature, sustainable leadership is approached through several theoretical models that highlight how leaders can contribute to the development of organizations in a responsible, balanced, and long-term oriented manner. These models focus on integrating economic, social, and environmental principles into organizational strategies, as well as promoting management practices that support sustainable development.

One of the most frequently analyzed models is transformational leadership, considered an essential factor in organizational change and innovation processes. Transformational leaders are characterized by their ability to inspire and motivate employees, create a clear vision of the future, and stimulate the professional development of the organization's members.

They promote creativity and initiative, contributing to the development of an organizational culture oriented towards progress and sustainability.

In complex organizational contexts, transformational leadership facilitates adaptation to changes in the economic and social environment, supporting the implementation of sustainable development strategies.

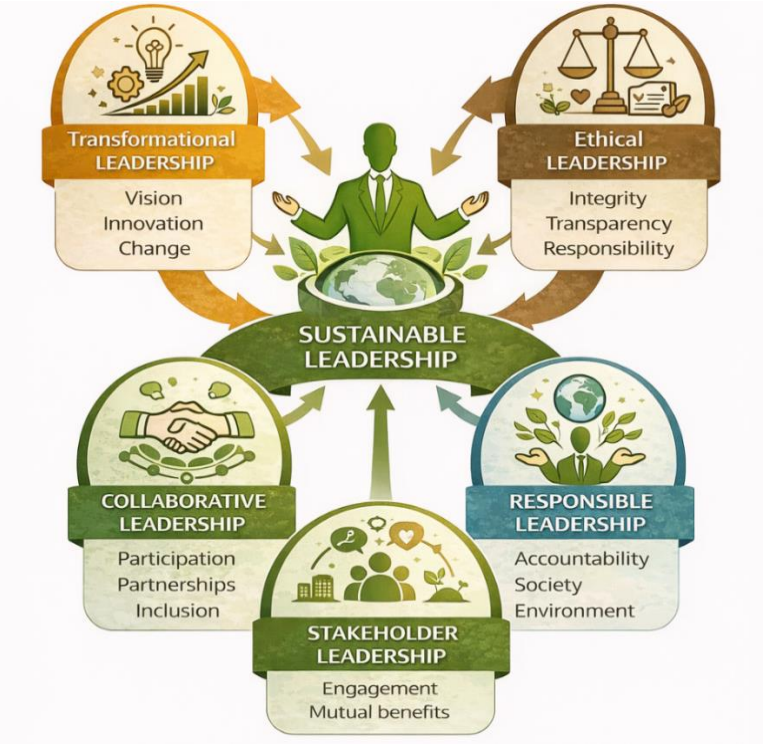

Figure 8.6. Sustainable leadership models

Another important model is ethical leadership, which emphasizes the moral responsibility of leaders and the promotion of values such as integrity, transparency, and social responsibility. Ethical leaders

create an organizational climate based on trust and mutual respect, contributing to the development of strong relationships between the organization and its stakeholders.

This leadership model is considered essential for strengthening organizational sustainability because it promotes responsible decision-making oriented toward the common interest.

Democratic or participatory leadership is also a relevant model for organizational sustainability. T

his type of leadership is based on involving employees in the decision-making process and promoting collaboration among members of the organization.

The active participation of employees in the development of organizational strategies contributes to increasing accountability and developing an organizational climate conducive to innovation.

Studies show that democratic leadership behavior contributes to the development of sustainable organizations and increased organizational performance.

In recent years, the literature has also highlighted the importance of responsible leadership and stakeholder-oriented leadership, which focuses on managing relationships between the organization and various interest groups. These models emphasize the need for leaders to consider the impact of organizational decisions on society and the environment, thereby contributing to the development of sustainable economic and social systems.

7. Dimensions of sustainable leadership

Sustainable leadership can be analyzed through several dimensions that reflect how leaders influence the development of organizations and their relationship with the external environment. In general, the literature identifies three main dimensions of sustainable leadership: the economic dimension, the social dimension, and the environmental dimension.

The economic dimension refers to the ability of leaders to ensure the long-term performance and competitiveness of the organization. This involves developing effective resource management strategies, promoting innovation, and creating sustainable competitive advantages.

Leaders who adopt a sustainable economic perspective seek not only to maximize short-term profits, but also to create lasting value for the organization and society.

Figure 8.7. Dimensions of sustainable leadership

The social dimension refers to leaders' responsibility towards employees, the community, and other stakeholders. This involves promoting fair working conditions, developing human capital, and strengthening collaborative relationships between the organization and the community in which it operates. Research shows that leaders who pay close attention to employee well-being contribute to increased job satisfaction and organizational performance.

The environmental dimension focuses on integrating environmental protection principles into organizational strategies and activities. Sustainable leaders promote the efficient use of natural resources, reduce negative environmental impacts, and develop environmentally responsible organizational practices. In addition to these fundamental dimensions, some studies highlight other

complementary dimensions of sustainable leadership, such as the ethical dimension, the cultural dimension, and the innovative dimension. These reflect the importance of organizational values, norms, and practices in promoting responsible and future-oriented management.

8. The link between leadership, innovation, and sustainable transitions

In the context of current economic and social transformations, leadership plays an essential role in facilitating innovation processes and promoting transitions to sustainable development models. Leaders have a responsibility to create the conditions necessary for the development of innovation and the implementation of solutions that respond to global challenges such as climate change, the digitization of the economy, and growing social inequalities.

Innovation is a key factor in the competitiveness of organizations and sustainable development. Leaders who promote an open and collaborative organizational climate stimulate employee creativity and facilitate the emergence of innovative ideas. By promoting innovation, organizations can develop technologies and practices that contribute to reducing environmental impact and using resources efficiently.

Leadership also plays an important role in coordinating the transition to more sustainable economic and social systems.

Sustainable transitions involve profound transformations of economic, institutional, and cultural structures, and leaders are responsible for guiding these processes and mobilizing the resources necessary for change.

In this regard, leaders must adopt a forward-looking strategic vision and promote collaboration between different social and economic actors. By developing cooperation networks and involving stakeholders in the decision-making process, leaders can contribute to the implementation of effective sustainable development policies and strategies.

Leadership skills development is also an essential factor for the success of these transitions. Organizations are increasingly investing in leadership development programs, recognizing the role of leaders in creating innovative and adaptable organizations.

Leadership training programs contribute to the development of strategic skills, improve decision-making capacity, and strengthen an organizational culture oriented towards innovation and sustainability.

Figure 8.8. The link between leadership, innovation, and sustainable transitions

Therefore, leadership, innovation, and sustainability are interdependent concepts that contribute to the development of resilient and competitive organizations. Leaders who promote innovation, social responsibility, and collaboration between different actors can facilitate the transition to more sustainable development models and contribute to a more balanced economic and social future.

Conclusion

The analysis demonstrates that leadership represents a fundamental mechanism for guiding organizations and societies toward sustainable and resilient development in an increasingly complex and uncertain global environment. Contemporary challenges, such as climate

change, digital transformation, resource constraints, and social inequalities, require a redefinition of leadership beyond traditional managerial functions, emphasizing its role in integrating economic, social, and environmental dimensions into strategic decision-making.

Sustainable leadership emerges as a multidimensional process that combines vision, ethical responsibility, innovation, and collaboration. Leaders are no longer solely responsible for achieving short-term performance, but for creating long-term value by fostering organizational cultures oriented toward responsibility, adaptability, and continuous learning. In this context, transformational, adaptive, and participatory leadership models play a decisive role in enabling organizations to respond effectively to change and uncertainty.

The findings highlight that effective leadership contributes to strengthening organizational resilience by enhancing the capacity to anticipate risks, absorb shocks, and transform crises into opportunities for development. At the same time, leadership facilitates the transition toward sustainable economic and social systems by promoting innovation, stakeholder engagement, and the efficient use of resources.

Furthermore, leadership plays a crucial role in governance processes, ensuring the coordination of multiple actors and the implementation of policies that balance economic growth with environmental protection and social well-being. The ability of leaders to build partnerships, mobilize stakeholders, and communicate a clear strategic vision is essential for achieving sustainable development objectives.

In conclusion, sustainable leadership is a key driver of modern development paradigms, contributing to the creation of resilient, inclusive, and competitive organizations. By integrating ethical values, innovation, and long-term strategic thinking, leaders can effectively guide the transition toward a sustainable future and ensure the well-being of both present and future generations.

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Chapter 9
Soil Sustainability: Concepts, Indicators and Quantification Approaches

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Abstract: *Soil is the invisible biological infrastructure of sustainability, a living and dynamic system that regulates the flows of water, energy and matter and conditions food security, climate stability and ecosystem balance. The study highlights that soil simultaneously intersects the three fundamental dimensions of sustainable development, ecological, economic and social, through its role in agricultural production, maintaining biodiversity, supporting rural communities and regulating climate processes. The analysis highlights that soil degradation, through erosion, compaction, loss of organic carbon, acidification, salinization and pollution, constitutes a major systemic risk for agricultural productivity and the stability of agri-food systems. The paper examines the relationship between soil and food security by expanding the perspective from "food security" to "soil security", showing that investing in soil health represents a strategic investment in the availability, stability and quality of food. A particular focus is placed on the role of soil organic carbon, soil biodiversity and soil hydrological functions in maintaining fertility, water retention, nutrient cycling and climate resilience. Circular economy principles applied to soil management, through organic matter recycling, crop rotation and reducing dependence on external inputs, are also analysed.*

Based on recent literature, the study proposes a conceptual and operational framework for assessing soil sustainability, based on physical, chemical and biological indicators, integrated into a synthetic sustainability index. The results suggest that protecting and restoring soil natural capital is an essential condition for sustainable agricultural

productivity, climate resilience and long-term sustainable economic development.
Soil is the invisible biological infrastructure of sustainability: a living system that regulates the flows of energy, matter and water, determining the ability of future generations to produce food and maintain climate balance. A link between soil and sustainability is, in essence, the link between life and its continuity. Soil is not just an inert support for plants, but a living, dynamic system, fundamental to the ecological and economic balance of society. The conceptual link between soil and sustainability starts from the three pillars of sustainability (ecological, economic and social), and soil is the only natural element that simultaneously intersects all three pillars as it produces food (economic), supports ecosystems (ecological) and ensures stability for rural communities (social).
Keywords: *soil health, food security, soil degradation, soil biodiversity, soil organic carbon, climate change, agricultural sustainability*

Soil – the basis of food security

Soil provides water, nutrients (N, P, K, microelements) and physical support for plants, and without healthy soil there is no sustainable agriculture. Soil degradation (through erosion processes, salinization, compaction, humus loss, etc.) reduces productivity and increases dependence on chemical inputs.

In Romania, erosion on slopes and loss of organic matter represent major risks for the sustainability of agricultural systems.

Soil is the basis of food security because it supports production through fertility, water and biological functions, ensures production stability through structural resilience and buffering capacity, influences product quality by cycling nutrients and filtering contaminants and, last but not least, is a natural capital vulnerable to degradation (erosion, decline in annual carbon stocks, compaction, pollution), degradation that can become irreversible in time horizons relevant to agricultural policies.

In a more applied logic, the "4/1000" initiative (annual increase in global soil carbon stocks) was discussed as an instrument with potential co-benefits for food security. The "4 per thousand, soils for food security and climate" initiative was launched at COP21 with the intention of increasing global soil organic matter stocks by 4 per 1000

(or 0.4%) per year, as a compensation for global greenhouse gas emissions from anthropogenic sources. Both the promises (improvement of soil functions) and the limitations (heterogeneity, caps, pedoclimatic conditioning, trade-offs) are highlighted.

Conceptual framing from "food security" to "soil security".

The "soil security" framework provides a bridge between pedology, agronomy and public policy, allowing the scientific argumentation that investment in soil health is investment in food security – not just in immediate production.

Within the recent scientific literature, *Pozza Liana E. and Field Damien J., 2020* propose the conceptualization of soil security as an essential element for food security, arguing that global soil degradation (accelerated by demographic growth and land pressures) reduces the continued capacity to produce quality food, fiber and water, requiring sustainable management practices in agriculture. Complementarily, *Evangelista Sandra J. et al., 2023* provides a methodological framework for assessing soil security through dimensions of capacity, condition, capital, connectivity and coding, laying the foundations for a systematic quantification that links soil characteristics to the stability of food production. In the same sense, *Brevik Eric C., et al., 2022* highlights the importance of education and connectivity between people and soil as a key factor in the sustainable use of agricultural land, and *Zhu Y.G., 2009* emphasizes the role of biological, chemical and physical functions of soil in determining both the quantity and quality of food.

Soil is a necessary condition for food security, which is described by dimensions such as availability, access, use and stability. Soil directly influences, through pedological and agroecological mechanisms, at least three of these, namely: availability, stability and, in an indirect way, use (through effects on nutritional quality and food safety).

Availability – depends on primary productivity, which varies according to chemical fertility (nutrient reserve and accessibility), physical properties (structure, porosity, water storage capacity) and biological properties (soil biota activity, nutrient cycling).

Production stability – depends on soil resilience to climate

variability (droughts, torrential rains), biotic pressure (diseases, pests) and anthropogenic shocks (excessive inputs, heavy traffic, monoculture).

Use – includes nutritional and safety aspects (contaminant mobility, micronutrients, nitrogen and phosphorus dynamics) and effects on food quality that are influenced by soil properties.

To operationalize the soil-food security link, the literature presents indicators that can be tracked in monitoring and management programs, and these refer to: organic matter and organic carbon content (content and, ideally, functional fractionation), aggregate stability and structural indicators, bulk density/porosity/infiltration (compaction), pH, cation exchange capacity, degree of base saturation, mineral N, available P, nutrient balances and biological indicators (respiration, microbial biomass, enzymes, functional diversity – where feasible). In addition, for "soil security" frameworks, the focus shifts from a fixed list of indicators to a logic of functions + threats + intrinsic capacity, to differentiate where interventions are effective and where protection/limitation measures are needed *(Pozza Liana E. and Field Damien J., 2020).*

Soil degradation as a systemic risk to food production

Soil degradation is treated in the literature not only as an "agronomic problem", but as a systemic risk to food security. In this regard, the difficulty of quantifying degradation globally (due to coarse or qualitative methodologies) and the fact that, without rigorous assessments, sustainable management interventions remain poorly targeted *(Bindraban Prem S., et al., 2012)* are important.

Soil degradation is commonly defined as any negative change in the physical, chemical or biological properties of the soil that reduces its capacity to provide ecosystem services, in particular the potential for agricultural production and crop productivity. Degradation occurs in multiple forms (erosion, compaction, loss of organic matter, salinization), and the combined effects inevitably lead to reductions in crop yields and an increase in the requirement for inputs to maintain productivity *(Pawelzik P., et al., 2013).*

In parallel, the analysis of agricultural intensification highlights that demographic pressure and management intensification have

increased yields in the short term, but have amplified degradation in many regions, reducing productive capacity in the long term *(Kopittke Peter M., et al., 2019).*

The main degradation processes with direct relevance to food security are:

✓ erosion (loss of topsoil and nutrients, silting, reduced water storage capacity);

✓ organic matter decline (decreased organic C, structural deterioration, reduced useful mineralization and buffering);

✓ compaction and structural degradation (decreased infiltration, anoxia, root restrictions);

✓ salinization/sodization (reduced osmotic potential, structural degradation);

✓ acidification (Al/Mn toxicity, reduced availability of some nutrients);

✓ pollution (metals, pesticides, microplastics, nitrates, etc., which have effects on food security).

An empirical study published in *2025 by Song Y. et al.* synthesized data from 488 observations from 32 independent studies on soil degradation in typical "chernozem" regions of northeastern China. The results showed that topsoil thinning was identified as the dominant form of degradation affecting crop yields. The average yield reduction was approximately -27% due to soil thinning (a loss of 5 cm of topsoil leads to significant yield reductions, often over 20%). The yield decline associated with nutrient depletion was assessed at around -20%, while soil structure degradation had a smaller impact, around -6%. These quantified values provide a reference ceiling for other agricultural regions with advanced soil degradation, highlighting that physical soil losses lead to dramatic decreases in agricultural production.

Another study published by *Yan Zhao. et al. in 2025* quantified the direct relationship between soil erosion, soil physicochemical indices and crop yields. For every 1 g kg^{-1} loss of soil organic carbon (SOC), corn yields decreased by 115.9 kg ha^{-1} and soybean yields by 28.5 kg ha^{-1}. An increase in erosion rate of 1000 t km^{-2} per year and a 1 cm reduction in topsoil thickness reduced corn yields by 170 kg ha^{-1} and

soybean yields by 40.0 kg ha^{-1}.

Recent literature even proposes integrative frameworks that connect biophysical and socio-economic dimensions (e.g. incentives, markets, policies), precisely to explain the persistence of degradation and the difficulty of transitioning to sustainable management *(Kopittke Peter M., et al., 2025).*

Soil degradation and quantifiable indicators

Soil degradation is a multifaceted process, with physical, chemical and biological implications, that simultaneously affects the productive, ecological and climatic functions of the pedosphere. Rigorous assessment of degradation requires the use of measurable, comparable and reproducible indicators, integrated into standardized monitoring systems specific to each type of degradation.

Physical degradation includes the process of erosion (hydro and/or wind) and soil compaction.

Hydro erosion remains the main mechanism of irreversible loss of the fertile soil layer. Average losses in European agricultural systems vary between 2–10 t/ha/year, but can exceed 20 t/ha/year under conditions of steep slopes and intensive work *(Panagos Panos et al., 2015, 2021).*

In Romania, especially in the hilly area of Moldova, the values can exceed the tolerance threshold of 6 t/ha/year, considered the limit above which natural fertility can no longer be compensated by pedogenesis.

Through erosion, there is practically a loss of natural capital and at the same time a vulnerability of production, so that erosion remains one of the clearest causal links between soil degradation and a decrease in production potential (loss of the A layer, rich in humus, export of nutrients, reduction of water storage capacity and increased variability in the response of crops to climate).

The indicators used to quantify this type of erosion are represented by the annual loss estimated by the RUSLE model (t/ha/year), the thickness of the A horizon (cm) and the content of organic matter in the superficial layer (%).

Soil compaction depends on the intrinsic characteristics of the soil and the external forces applied. The intensity of compaction is

influenced by the type of soil and its texture, humidity, the number of passes of agricultural machinery and their weight, the type of crop, the rotation and rotation used, etc. Thus, loamy-clay soils are susceptible to loss of porosity when subjected to repeated passes of machinery, and in addition, high humidity at the time of passing the machinery aggravates the compaction phenomenon. Crops with superficial rooting or monoculture predispose to maintaining high bulk density soil and can favor particle consolidation and porosity reduction. At the opposite pole, rotations with plants with taproots (alfalfa crop) reduce deep compaction.

Quantifiable indicators of soil compaction are represented by bulk density (g cm^{-3}), penetration resistance (MPa) and total porosity (%).

The values of bulk density and total porosity can differ greatly depending on the type of soil and its specific chemical properties, so they will be interpreted in correlation with other soil properties, especially its texture *(Table 9.1 and Table 9.2).* The same values of bulk density can be unfavorable on a clay soil, but totally favorable on a sandy soil *(Guş P. et al., 2003; Rusu T. et al., 2007).*

To calculate the results, the weight of the absolutely dry soil (M) expressed in grams is related to the total volume of the sample (Vt - total volume of the sample including the solid part + voids between the solid particles), expressed in g/cm3.

$$Da = \frac{M}{Vt}\, g / cm^3$$

Table 9.1. Classes bulk density values ranging

Name	Values (g cm^{-3}) for textured soils*					
	N	**NL**	**LN**	**L**	**LA**	**A**
Extremely small Very loose soil	< 1,28	< 1,21	< 1,18	< 1,13	< 1,05	< 0,94
Very small Moderately loose soil	1,28-1,40	1,21-1,34	1,181,31	1,13-1,25	1,05-1,18	0,94-1,07
Small Poorly loosened soil	1,41-1,53	1,35-1,47	1,32-1,45	1,26-1,39	1,19-1,31	1,08-1,20

Medium Weakly compacted soil	1,54-1,66	1,48-1,61	1,46-1,58	1,40-1,53	1,32-1,45	1,21-1,34
Large Moderately compacted soil	1,67-1,79	1,62-1,75	1,59-1,72	1,54-1,66	1,46-1,58	1,35-1,47
Very large Heavily compacted soil	> 1,79	> 1,75	> 1,72	> 1,66	> 1,58	> 1,47

* N – sandy; NL – sandy loam; LN – loamy loam; L – loamy; LA – loamy clay; A – clayey

(Florea N., 1987- I.C.P.A – Research Institute for Soil Science and Agrochemistry Bucharest, 3rd volume)

Table 9.2. Total porosity ranging

Name	Values (% v/v) for textured soils*					
	N	**NL**	**LN**	**L**	**LA**	**A**
Extremely high Very loose soil	> 53	> 55	> 56	> 58	> 61	> 65
Very high Moderately loose soil	49-53	51-55	52-56	54-58	57-61	61-65
Large Poorly loosened soil	44-48	46-50	47-51	49-53	52-56	56-60
Medium Weakly compacted soil	39-43	41-45	42-46	44-48	47-51	51-55
Small Moderately compacted soil	34-38	36-40	37-41	39-43	42-46	46-50
Very small Heavily compacted soil	< 34	< 36	< 37	< 39	< 42	< 46

* N – sandy; NL – sandy loam; LN – loamy loam; L – loamy; LA – loamy clay; A – clayey

(Florea N., 1987 - I.C.P.A, Research Institute for Soil Science and Agrochemistry Bucharest, 3rd volume)

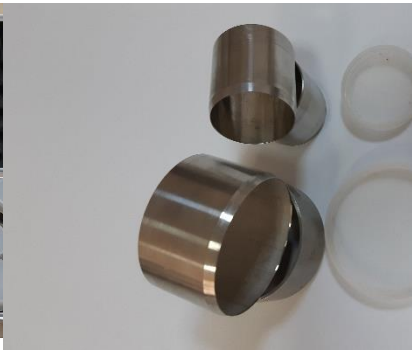
The bulk density was determined using soil samples in natural position, using metal cylinders of known volume. The most commonly used cylinders have walls of 0.8-1.0 mm thickness, diameter of 50 mm, height of 51 mm, sharp at the lower end and slightly frustoconical. The volume of these cylinders is 100 cm^3 *(Figure 9.1).*

The principle of the method consists in collecting soil samples in an unmodified position, using cylinders of known volume, relating the mass of the oven-dried soil to the total volume of the sample.

Stainless steel cylinders 200 cm3

Stainless steel cylinders 100 cm3

Metal box for 24 cylinders



Stainless steel cylinders

Figure 9.1. Cylinders used for collecting samples in natural settings, lids, metal ring, metal transport box, knife and hammer.

The determination of total porosity (TP) can be done by direct methods, using special devices called porosimeters. Much easier, with relatively accurate results, it can be determined using the relationship proposed by *Rusu T. et al., 2007, Canarache A., 1990*:

$$TP = \left(1 - \frac{BD}{D}\right) \times 100,$$

where:

TP – is the total porosity, in % of the soil volume;
BD – bulk density (g cm^{-3})
D – density, in g cm^{-3} (for most soils it has values of 2.65-2.68 g cm^{-3} for the arable layer and 2.7-2.72 g cm^{-3} for the sub-arable layer).

Soil compaction reduces physical fertility by increasing bulk density and mechanical strength, while reducing porosity, infiltration and water retention capacity. As a result, fertilizer use efficiency and crop productivity decrease, while excess water favors surface runoff, erosion and pollution risks. There is currently no single solution to prevent compaction, so an integrated set of measures is needed. These include minimum tillage or direct seeding, controlled machinery traffic, reducing the number of passes by combining operations, limiting grazing and animal load, maintaining a permanent plant cover and local loosening of compacted layers.

<u>*Chemical degradation*</u> includes *the loss of soil organic carbon (SOC), acidification* and *salinization*.

The decrease in soil organic carbon (SOC) simultaneously affects structural stability, cation exchange capacity and water retention. The loss of 1% of soil organic carbon can reduce water retention capacity by up to 2–3 mm per 10 cm soil layer *(Lal R., 2004).* Thresholds used to quantify this indicator are considered SOC less than 2% — high risk of structural degradation, and at a decrease of more than 0.1% SOC/year, accelerated degradation is manifested *(Lal R., 2004).*

Soil acidification becomes critical at pH values < 5.5, when phosphorus availability decreases drastically and aluminum becomes toxic to plants.

Quantifiable indicators used to determine soil acidification are pH (H_2O or KCl), degree of base saturation (%) and exchangeable Al^{3+} ($cmol^{(+)}\ kg^{-1}$).

Salinization is another cause of chemical soil degradation. The international threshold for salinized soils is EC > 4 dS/m (saturated extract). The soil salinization thresholds are: below 2 dS/m - non-salinity soil (no effect on most crops), between 2 - 4 dS/m - slightly salinity (affects only sensitive crops), between 4 - 8 dS/m - moderately salinity (visible reductions in yields), between 8 - 16 dS/m - strongly salinity (only tolerant plants produce acceptably), and above 16 dS/m - extremely salinity (significantly limited production). Over 20% of irrigated land globally is affected by secondary salinization *(Qadir M et al., 2014).* The quantifiable indicators used are represented by electrical conductivity (dS/m), SAR (Sodium Adsorption Ratio) and the Na^+/Ca^{2+} ratio.

Biological degradation refers to the reduction of microbial biomass, soil community diversity and enzymatic activity involved in the biogeochemical cycles of carbon (C), nitrogen (N), phosphorus (P) and sulfur (S). Soil microorganisms are responsible for the mineralization of organic matter, the formation of stable aggregates and the regulation of nutrient availability. The reduction of their activity leads to the slowing down of decomposition processes and the decrease of functional soil fertility.

As quantifiable indicators of this type of degradation we mention microbial biomass C (mg C/kg soil), dehydrogenase activity and basal respiration (mg CO_2/kg soil/day).

Microbial biomass C (mg C/kg soil) represents the active fraction of organic matter and is considered a sensitive indicator of management changes. Degraded soils frequently present reduced values of microbial C, associated with the loss of organic carbon and the disruption of the structure.

Dehydrogenase activity is frequently used as a global indicator of microbial activity, as it reflects intracellular respiratory processes. Enzyme activity decreases significantly in soils subjected to compaction, erosion or loss of organic matter. Dehydrogenase activity is frequently expressed in µg TPF/g soil/24h and is positively

correlated with organic carbon content.

Basal respiration (mg CO_2/kg soil/day) reflects the rate of microbial metabolism and the intensity of organic matter mineralization. Low values indicate reduced biological activity and may signal the presence of soil degradation.

Organic matter and soil organic carbon as a pivot for productivity and stability

In many agricultural systems, soil organic carbon (SOC) is considered an "umbrella" indicator of soil health and influences aggregation, cation exchange capacity, water adsorption, nutrient availability, biological habitat structure and stress resistance. From a global policy perspective, soil organic carbon is simultaneously correlated with productivity and climate stability, and its dynamics on a global scale have direct implications for land fertility *(Prăvălie Remus et al., 2021).*

Soil organic carbon is frequently used as an integrative indicator because it simultaneously reflects biomass inputs (residues, roots, organic amendments), stabilization processes (organo-mineral associations, aggregation), as well as losses (accelerated mineralization, erosion, leaching of organic compounds).

The amount of organic matter in the soil depends on the input of organic matter, its rate of decomposition, the rate at which existing organic matter in the soil is mineralized, soil texture, and climate. All four factors interact so that the amount of organic matter in the soil changes, often slowly, towards an equilibrium value specific to the soil type and the agricultural system practiced. For any cropping system, the equilibrium level of soil organic matter in a clay-textured soil will be higher than that in a sandy-textured soil, and for any soil type the value will be higher for perennial crops than for annual crops *(Edward Johnston A. et al., 2009).*

Organic matter plays an important role in the soil, influencing its formation and fertility (composition, humification, interactions with the mineral phase). Thus, we can say that organic matter can be presented on different functional axes, such as chemical, physical, hydrological and biological. *(Edward Johnston A. et al., 2009).* From a chemical point of view, it influences soil fertility (cation exchange

capacity - especially in soils with 2:1 clay and/or low active clay content -, complexation, soil buffering capacity and implicitly the availability of some microelements). From a physical point of view, it influences the structure and state of aggregation of the soil, as the soil microbiota, roots and organic matter are involved in stabilizing the soil structure, porosity, infiltration and at the same time reduces erosion and susceptibility to crust formation (especially in soils with a high dust content). From a hydrological point of view, organic matter increases the soil's capacity to retain water (through effects on structure and porosity, but also through colloidal properties), with a direct effect on the stability of production in dry years. From a biological point of view, organic matter is an energetic and structural substrate for soil microbiota, influencing N and P mineralization, disease control and the efficiency of symbioses.

At the level of agronomic mechanism, the link between soil organic matter, soil organic carbon and production stability under stress conditions (especially drought) is discussed through the role of organic matter as an indicator of "soil health" and a mediator of water retention and nutrient availability *(Swarnali Mahmood et al., 2023).*

The main functions that influence soil "health"

Soil health is defined as the continued ability of the soil to function as a vital living ecosystem that supports plants, animals and people. Healthy soil provides us with clean air and water, abundant crops and forests, productive pastures, diverse fauna and attractive landscapes. Soil does all this by performing essential functions, including:

- ✓ Function as a natural reservoir of water, air and nutrients. The regulation of the water, air, nutrient content in the soil is done according to the physical properties of the soil, so that water from precipitation, snowmelt, irrigation, etc. can drain to the surface or be "stored" in the soil profile. The nutrient cycle is also influenced (carbon, nitrogen, phosphorus and many other nutrients are stored, transformed and cycled in the soil).
- ✓ Function of regulating the composition of soil air - A continuous exchange of gases, especially oxygen and carbon dioxide, occurs between the soil atmosphere and the free atmosphere, determined by diffusion processes and influenced by temperature, humidity,

atmospheric pressure and biological activity. This gas exchange is essential for root respiration and for the metabolism of microorganisms, contributing to maintaining the biochemical balance of the edaphic ecosystem.

- ✓ Biodiversity conservation function. Sustaining plant and animal life. The diversity and productivity of living beings depend on the soil, which represents a complex habitat for a remarkable diversity of organisms (from bacteria and fungi to mesofauna and macrofauna) that ensures the conservation of floristic and faunal genetic resources.
- ✓ Ecological function (protection and filtration function). Filtration and buffering of potential pollutants. Minerals and microbiota in the soil are responsible for filtering, buffering, degrading, immobilizing and detoxifying organic and inorganic materials, including industrial and municipal by-products and atmospheric deposits.
- ✓ Vegetation support function - Through the processes of disaggregation and alteration of the parent material, the soil acquires a fragmented structure and adequate porosity, which allow the installation and development of the biotic component. This structuring facilitates the penetration of root systems, the mechanical anchoring of plants and their access to water and nutrients. The support function thus reflects the interaction between the physical properties of the soil and its capacity to support primary production.

There is no single universal practice for maintaining soil functions, but packages adapted to pedoclimatic and socio-economic conditions (trade-offs, costs, adoptability). Directions such as:

- ➢ Conservative agriculture / reduced tillage / permanent soil cover - resource-saving systems (including zero tillage in some contexts) can improve soil properties, support productivity and contribute to resilience.
- ➢ Integrated nutrient management and efficient fertilization - in addition to increasing yields, unbalanced or inefficient fertilization contributes to soil degradation and environmental risks (N/P losses, eutrophication, acidification).

- Restoring "soil health" as a strategy for climate resilience and productivity - a recent synthesis places "soil health" at the heart of resilience to climate extremes and discusses sets of practices (amendments, rotations, cover crops, beneficial microbes, precision agriculture), emphasizing adaptation to context *(Wogene Kabato et al., 2025).*
- Soil and water conservation practices in vulnerable systems - Even though much of the work is oriented towards semi-arid regions, it is relevant as a logic: Soil and water conservation can stabilize production and improve household food security in contexts where soil and water loss are major limiting factors.

Soil and biodiversity

A gram of fertile soil contains billions of bacteria, hundreds of meters of fungal hyphae, protozoa, nematodes, arthropods, etc., so that the soil is one of the most diverse ecosystems on the planet. The loss of soil biodiversity affects nutrient cycles, plant resistance to diseases and the stability of ecosystems.

Soil biodiversity constitutes the invisible biological infrastructure of food security. It supports pedogenetic functions, fertility, resilience and the quality of agricultural production. Integrating soil biodiversity into agricultural and environmental policies conditions the achievement of sustainability objectives. In a synthetic formulation, it can be stated that without functional edaphic biodiversity there can be no sustainable food security, and its protection must be treated as a strategic investment in the natural capital of the soil.

Conserving edaphic biodiversity involves reducing intensive work, maintaining soil cover with a vegetal carpet, crop rotation, constant supply of organic matter and, last but not least, limiting soil salinization and acidification.

In order to be able to measure and interpret the biological diversity and functionality of the soil, recent research has identified a set of quantifiable bio-indicators that reflect the state and ecosystem capacity of agricultural and natural soils. These indicators are important both for assessing soil health and for sustainable agricultural management decisions, and among them we list: microbial biomass, microbial respiration and basal respiration, microbial metabolic rate,

enzymatic activity, diversity indices and, last but not least, edaphic macrofauna and earthworm populations.

Microbial Biomass Carbon (MBC) - quantifies the amount of organic carbon present in soil microorganisms and represents an active fraction of soil organic matter. This measure is an early indicator of changes in the microbial community, as microorganisms respond rapidly to environmental or agricultural management changes *(Mikhail V. Semenov et al., 2005).* The authors show that MBC is one of the best microbiological indicators of soil health, providing information on the abundance and stability of microbial communities that process organic substances and release essential nutrients (e.g. N and P) for plants.

Microbial Respiration and *Basal Respiration* - reflect the metabolic activity of the microbial community, being measured as the flux of CO_2 released under standard laboratory conditions or in situ. Basal Respiration (RB) indicates the basic activity of microbes without the addition of substrate, being a sensitive indicator of the state of soil stress or disturbance. High RB values may reflect a disturbed soil or subjected to agroecosystem stresses, while moderate values are associated with functional and stable ecosystems *(Mikhail V. Semenov et al., 2005).*

Basal respiration is the rate of CO_2 release by soil microorganisms under natural or standardized conditions, without the addition of an external organic substrate. In other words, it is the "background" respiration of the soil, generated by the normal metabolic activity of the microbiota that uses: organic matter existing in the soil, intermediate decomposition products, root exudates (in vegetated soils). This respiration reflects the basic metabolic level of the microbial community.

The microbial metabolic coefficient - denoted qCO_2, is the ratio of basal respiration to microbial biomass, expressing the efficiency with which the microbial community uses the soil's energy resources. A high qCO_2 is often interpreted as a sign of a stressed soil, where microorganisms spend more energy for survival than for biomass growth. The qCO_2 indicator is useful in detecting changes caused by agricultural management, pollution or changes in the nutrient regime

(Anderson T.H. and Domsch K.H., 1993).

Enzyme activity (phosphatases, dehydrogenases, urease) - is considered a functional indicator of the microbial capacity to catalyze biogeochemical transformations. Higher levels are associated with efficient nutrient cycling and better management of organic matter *(Bhaduri Debarati et al., 2022).*

Diversity indices (including the Shannon index) - to assess the structural and functional diversity of soil communities, ecological indices such as the Shannon index or other measures of species richness and balance are used. These indices allow the quantification of taxonomic and functional variability of soil microbiota and organisms. These indices are important when assessing the relationships between community structure and the ecosystem capacity of the soil to provide services such as nutrient cycling, structural stability and resilience to disturbances.

Soil macrofauna and earthworm populations - serve as biological indicators of soil health because they influence microaggregate structure, aeration, carbon cycling, and organic matter mineralization. The abundance and diversity of these organisms are correlated with important soil properties, including water retention and nutrient regulation.

Quantifiable biological indicators provide a functional picture of soil biodiversity, complementing traditional chemical and physical indicators. Their integration into agricultural monitoring programs allows for early detection of soil biological degradation, assessment of the impact of agricultural practices on the soil ecosystem, and guidance of sustainable management decisions focused on maintaining ecosystem services.

Soil biodiversity: ecosystem services and the "pillars" of food security

Soil biodiversity represents the totality of organisms living in the soil – from microorganisms (bacteria, archaea, fungi) to mesofauna and macrofauna (nematodes, arthropods, earthworms) – and the functional interactions between them. Currently, soil is recognized as one of the most complex ecosystems on the planet, containing up to 10^9–10^{10} microbial cells per gram of soil and an exceptional genetic

diversity. Soil biota is responsible for processes without which agricultural production cannot be sustained. These processes are represented by mineralization, humification, aggregate formation, pathogen control, symbioses (mycorrhizae, rhizobia), etc.

Soil health cannot be reduced to chemical parameters (NPK, pH, etc.), so biological degradation (simplification of food webs, decrease in functional diversity) can lead to systemic vulnerabilities, such as: greater dependence on pesticides, more intensive fertilization and production instability.

The concept of "ecosystem services" applied to soil has been systematized in the specialized literature as an extension of the classical pedological functions. In the analysis published in Geoderma *(Estelle Dominati et al., 2010),* soil is considered natural capital, and biodiversity represents its active functional component.

The main ecosystem services provided by soil biodiversity include: regulation of biogeochemical cycles, carbon sequestration and climate regulation, structuring and stability of aggregates and last but not least biological control and soil suppressivity.

Regulation of biogeochemical cycles – is carried out by soil microorganisms, which control processes such as mineralization of organic matter, nitrification, denitrification and phosphorus mobilization. Enzymatic activities (dehydrogenases, phosphatases, urease) constitute sensitive indicators of soil quality *(Roberto Garcia-Ruiz et al., 2008).* Through these mechanisms, soil biodiversity ensures the availability of essential nutrients (N, P, S), directly contributing to agricultural productivity.

Carbon sequestration and climate regulation – is influenced by mycorrhizal fungi and bacterial communities by stabilizing carbon in soil aggregates. *Lal R., 2004*, in Geoderma, in the paper Soil carbon sequestration impacts on global climate change and food security, shows that appropriate soil management can transform agroecosystems into important carbon reservoirs, reducing the pressure on climate change and strengthening food security.

Aggregate structuring and stability – is also influenced by macrofauna (especially earthworms), which through their activity contribute to the formation of a stable, glomerular "zoogenic

structure", favoring water infiltration and soil aeration. This type of structure is formed by the passage of soil material through the digestive tract of earthworms, thus forming organo-mineral agglomerations, known as coprolites (biogenic neoformations). In soil, earthworms represent the largest component of animal biomass and are commonly referred to as "ecosystem engineers" *(Blouin M. et al. 2013).*

Biological control and soil suppressivity – are fundamental ecological strategies in modern and sustainable agriculture, aiming to manage soil pathogens (fungi, bacteria, nematodes) by using beneficial organisms and natural mechanisms, thus reducing the dependence on chemical pesticides. Microbial diversity contributes to the inhibition of pathogens through competition, antibiosis and induction of systemic resistance in plants.

Plant growth-promoting fungi (PGPFs) have emerged as effective biocontrol agents, capable of suppressing various soil pathogens while enhancing plant growth and resistance. For example, *Trichoderma sp.*, *Penicillium sp.*, *Aspergillus sp*., non-pathogenic *Fusarium sp.*, hypovirulent binucleate *Rhizoctonia* and sterile fungi, can significantly reduce diseases caused by fungi, oomycetes, bacteria and nematodes through mechanisms including antibiosis, hyperparasitism, competition and induction of systemic resistance. PGPF-based strategies represent a promising and sustainable alternative to chemical pesticides, with strong potential for integration into crop disease management under changing climate conditions *(Motaher Hossain Md. et al., 2025).*

PGPF works through both direct and indirect methods, acting in four main directions: it contributes to increasing nutrient availability, the production of phytohormones, induces systemic resistance and alleviates abiotic stress *(Motaher Hossain Md. and Farjana Sultana, 2020).* Thus, fungi secrete organic acids, siderophores (for iron capture) and enzymes that solubilize essential nutrients, such as phosphorus and potassium, making them accessible to the roots. They can also produce plant hormones such as auxins (indole-3-acetic acid - IAA), cytokinins and gibberellins, which stimulate root elongation and general plant development.

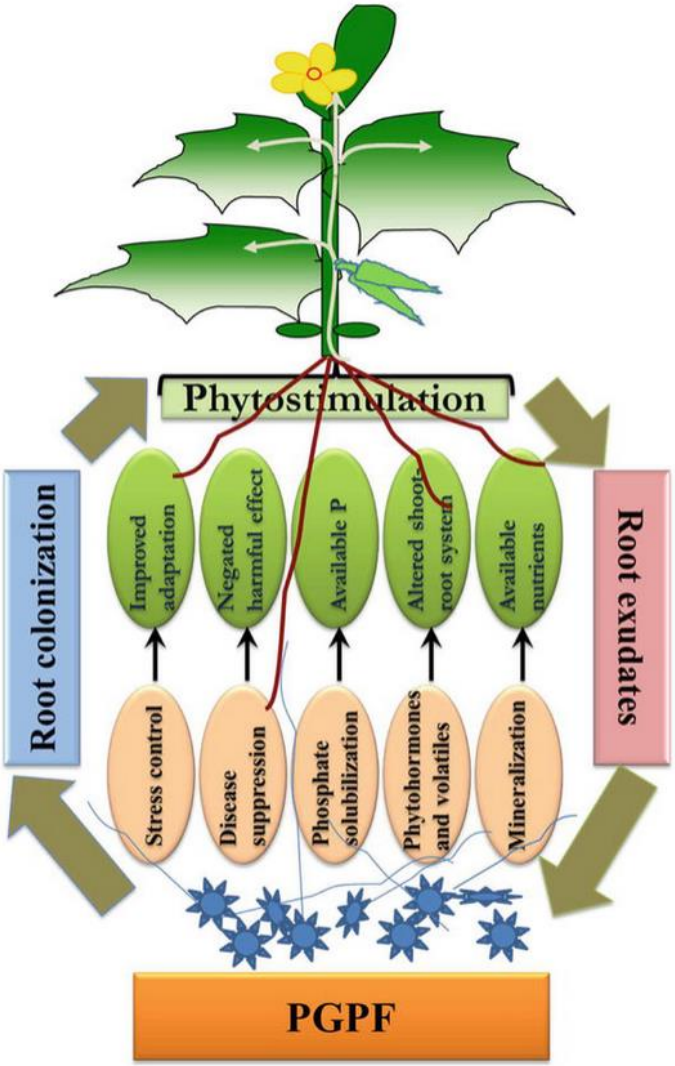


Figure 9.2. Beneficial interaction between plant and plant growth promoting fungi (PGPF)

(Motaher Hossain Md. și Farjana Sultana, 2020)

The induction of systemic resistance occurs following the triggering of plant defense mechanisms, allowing them to better protect themselves against diseases caused by soil pathogens (e.g. *Fusarium sp., Rhizoctonia sp.*). Abiotic stress alleviation refers to increasing plant resistance to drought, salinity and the presence of heavy metals *(Figure 9.2).*

According to the FAO definition, food security is based on four pillars, such as: availability, access, use and stability of agri-food systems. Soil biodiversity contributes directly or indirectly to each of these. By regulating fertility and maintaining productivity, soil biodiversity influences the level of agricultural production, and microbial diversity is a robust predictor of ecosystem multifunctionality, including the capacity to support primary production. Soil biodiversity degradation leads to decreased fertility and increased input costs (fertilizers, pesticides), economically affecting farmers' access to resources. Soil microbial composition influences the mineral content and phytonutrients of crops, and microbial symbioses increase nutrient use efficiency and can improve the nutritional value of crops. Resistance to climatic and biotic stress is closely linked to soil diversity. In the context of climate change, soils with high biodiversity have a greater capacity to adapt and self-regulate, while the loss of soil biodiversity compromises the long-term stability of agricultural systems.

Soil and climate change

Soil is one of the largest terrestrial carbon reservoirs. It contains more carbon than the atmosphere and vegetation combined, and through regenerative practices (conservation agriculture, green crops, minimum tillage), the soil can fix carbon (sequestration). Through degradation, it becomes a source of CO_2. Sustainability means transforming soil from an "emitter" to a "sink".

Climate change (extreme weather events, changing precipitation patterns and rising temperatures), combined with unsustainable soil management practices, can accelerate soil degradation, the loss of soil organic matter, reduce soil moisture retention, increase erosion, disrupt nutrient cycling and increase greenhouse gas emissions. Thus, it is estimated that a 1°C increase in temperature will increase pest

incidence by 10-25% and reduce yields of major crops by up to 7.4%. Improving soil health strengthens plant resistance, suppresses disease development and protects agroecosystems against the adverse effects of climate extremes *(Wogene Kabato et al., 2025).*

Soil is a central element of the global climate system, playing an essential role in carbon and nutrient cycles. Sustainable soil management can significantly contribute to limiting the negative effects of climate change, by sequestering carbon and reducing greenhouse gas emissions. At the same time, climate change can affect the stability of soil ecosystems, which requires the development of integrated soil management strategies, aimed at conserving soil resources and maintaining soil ecosystem functions.

Soil is one of the most important components of the global climate system, as it actively participates in the biogeochemical cycles of carbon, nitrogen and water. In the context of climate change, soils can function both as a source and as a sink of carbon, influencing the concentration of greenhouse gases in the atmosphere. The world's soils contain approximately 1500–2400 Pg of organic carbon, a much larger amount than that existing in the atmosphere or plant biomass. Therefore, even relatively small variations in soil carbon stocks can have significant effects on the global carbon balance *(Figure 9.3).*

Soil organic matter is the main carbon reservoir in terrestrial ecosystems. The stabilization of carbon in the soil structure depends on processes such as humification, the formation of stable aggregates and organo-mineral interactions. Increasing the organic carbon content in the soil simultaneously contributes to reducing the concentration of atmospheric CO_2, improving soil structure, increasing water retention capacity and increasing soil fertility. Therefore, sustainable soil management is an essential component of strategies to limit the negative effects of climate change.

Soils are involved in the cycles of several greenhouse gases, in particular carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4). Microbial processes such as soil respiration, nitrification and denitrification can generate significant greenhouse gas emissions, depending on conditions of moisture, temperature and nutrient availability.

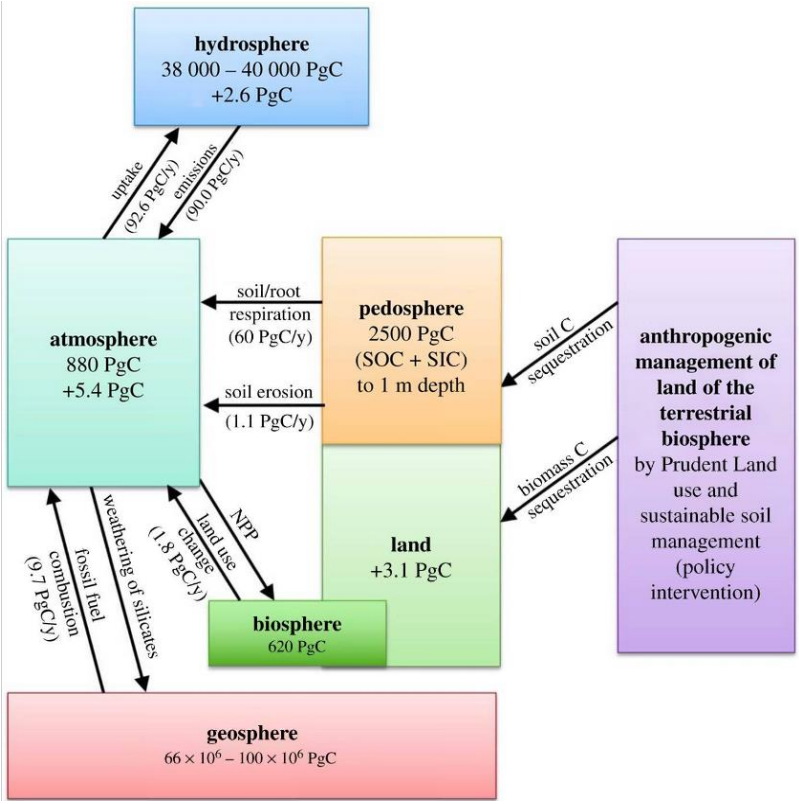


Figure 9.3. The role of soil and its management in moderating the global carbon cycle.

(Lal Rattan et al. 2021, - Friedlingstein P, et al. 2020, Lal R., 2018, 2004, 2001, NOAA. 2020, Jansson C. et al. 2010)

Climate change directly influences soil genetic processes and soil properties. Temperature increases and changes in precipitation patterns can affect the dynamics of organic matter, mineralization processes, soil water regimes and, implicitly, erosion intensity.

In recent years, the concept of *climate-smart soil management* has

become central to agricultural and environmental policies. Management practices that contribute to increasing organic carbon and reducing emissions include practicing conservative agriculture, crop rotation, introducing leguminous crops into rotation, using crop residues and reducing intensive soil tillage. By introducing these principles into the management of rational soil use, the agricultural sector will adapt to climate change, greenhouse gas emissions will be reduced and, implicitly, food security will increase.

Soil and water – functional interdependencies and implications for sustainability

Soil functions as a natural filter, water reservoir and runoff regulator, so that a soil rich in humus reduces the risk of floods, limits drought and improves groundwater quality.

In the context of increasingly frequent droughts, water retention capacity becomes a strategic element of sustainability.

The relationship between soil and water represents one of the fundamental pillars of the sustainability of terrestrial ecosystems and agri-food systems. Soil is not only a physical substrate for plants, but a porous, reactive and biologically active system, which controls the infiltration, storage, filtration and redistribution of water. In this sense, the hydrological function of the soil is inseparable from its physical structure, chemical composition and edaphic biodiversity *(Estelle Dominati et al., 2010).*

The capacity of the soil to retain water is determined by its texture, structure and organic matter content. Water is stored in capillary and non-capillary pores, and its availability to plants is conditioned by the distribution of pore sizes.

Soil structure degradation reduces water retention capacity and increases crop vulnerability to drought. Loss of organic matter leads to decreased aggregate stability and reduced functional porosity *(Lal R., 2009).* Aggregate stability also directly influences infiltration and reduced surface runoff, but through conservative practices (minimum tillage, crop rotation, soil cover) water infiltration can be improved and erosion is also reduced *(Bronick C.J. and Lal R., 2005).*

Soil serves as a filter and water protection barrier, acting as a biological and chemical filter, reducing the transport of pollutants to

groundwater. Adsorption, cation exchange and microbial degradation processes limit the mobility of heavy metals, pesticides and excess nutrients. Soil structure degradation and compaction increase nutrient runoff, contributing to eutrophication of surface waters (an excessive enrichment of surface waters with nutrients, especially nitrogen and phosphorus, which causes the proliferation of algae and cyanobacteria, followed by a decrease in dissolved oxygen and degradation of the aquatic ecosystem). Thus, soil health is a determining factor for the protection of water quality. A well-structured soil, rich in organic matter and biologically active, has a superior capacity to retain and transform potentially polluting compounds *(Ji Liu et al., 2020).*

Soil–water interaction in the context of climate change highlights the capacity of soil to buffer specific variations of extreme events, such as prolonged drought and torrential rainfall. Water management in rainfed agriculture must start from improving the hydrological function of the soil, not only from the irrigation infrastructure. Also, conserving water in the soil by increasing the organic carbon content is a central strategy for climate adaptation. Increasing the organic carbon content improves water retention capacity and structural stability, reducing the impact of drought on agricultural production *(Lal R., 2004).*

Erosion is one of the most severe forms of degradation of the soil–water interaction. Removal of the superficial (A) horizon reduces both fertility and water retention capacity. Moreover, the loss of topsoil affects both nutrient cycling and water use efficiency, leading to decreased long-term productivity *(Pimentel D., Burgess M., 2013).*

Soil–water interdependence directly influences the four pillars of food security, namely: availability (by maintaining stable agricultural production), access (by reducing the costs associated with degradation), utilization (by influencing nutritional quality) and stability (by resilience to climate variability).

To strengthen the functional relationship between soil and water in the context of agroecosystem sustainability, the specialized literature convergently highlights several fundamental strategic directions, among which we mention:

- ✓ Increasing the organic matter content - by applying organic amendments, maintaining plant residues and using green crops;
- ✓ Reducing the intensity of soil work - by adopting conservative systems (minimum tillage, no-till), in order to maintain structure and porosity;
- ✓ Diversifying crop rotation and introducing cover crops - to protect the soil surface and stimulate biological activity;
- ✓ Preventing and combating compaction - by managing agricultural traffic and controlled mechanical interventions where necessary;
- ✓ Applying integrated nutrient management - based on soil analysis and correlating fertilization doses with the real needs of crops.

The coherent implementation of these measures leads to improved infiltration, reduced erosion risk and increased water retention capacity, thus strengthening the resilience of the soil-plant system in the face of climate variability.

Soil and water form an integrated system, and the sustainability of one cannot be conceived without the functionality of the other. Soil degradation inevitably leads to the degradation of water resources, and sustainable water management must begin with the restoration and conservation of the natural capital represented by soil.

Soil and the Circular Economy

The circular economy is a development model that seeks to maximize the value of resources, reduce waste and reintegrate them into productive cycles. In the context of agroecosystems, soil is a central element of the circular cycles of nutrients and energy (it stores carbon, transforms and retains nutrients, provides physical support for plants and mediates water flows). Integrating circular economy concepts into soil management is important for a sustainable, resource-efficient and climate-resilient agricultural system.

The circular economy defines systems in which products, materials and resources are kept in use for as long as possible and waste is minimized through reuse, recycling and regeneration.

In agriculture, surplus organic matter becomes a resource for the soil, not a waste, nutrients from sludge and residues are reintegrated into the production cycle, nutrient losses through leaching and erosion are reduced, and agricultural practices are managed to maintain

internal nutrient cycles and minimize external inputs.

The circular economy in the context of soil involves efficient flows of carbon, nitrogen, phosphorus and other essential nutrients.

Carbon – is stored in the soil, which is the largest biologically active terrestrial reservoir. Stabilizing organic carbon in the soil reduces atmospheric CO_2 concentrations, improves soil structure and increases water retention capacity.

Nitrogen and phosphorus - are limiting nutrients, but also have potential for pollution when lost to water or air. A circular management of nitrogen and phosphorus involves recycling organic inputs (manure, compost), using nutrient-fixing/transforming microorganisms, and reducing losses through surface runoff and leaching. The agricultural literature highlights the role of microorganisms in transforming nitrogen and phosphorus into plant-usable forms and preventing losses through runoff *(Ji Liu et al., 2020).*

Soil-centered circular agricultural practices recommend reusing organic matter, composting and recycling residues from secondary production, and rigorously observing crop rotation and crop rotation.

Organic materials (vegetable residues, crop residues, compost) should be considered primary resources for improving soil fertility, so it is recommended to compost and recycle vegetable residues from secondary production and also integrate organic materials into the soil to increase the C-org content. This approach contributes to closing the carbon and nutrient cycle and reducing dependence on external chemical inputs.

Diversified rotation and the use of cover crops maintain active soil and functional nutrient system, protect the soil against erosion, improve and diversify biological activity and, last but not least, reduce losses through leaching. In this regard, studies have shown that in the case of technology that includes the use of cover crops, the apparent density of the soil was significantly reduced by 3.2% and the resistance to penetration by 11.8%. They also increased the water stability of structural aggregates by 15.9%, total porosity by 6.1% and water infiltration by 37.2%. No significant changes were observed for soil air permeability, saturated hydraulic conductivity, soil pH, electrical conductivity, and cation exchange capacity. The effects of

cover crops were influenced by climatic factors, management practices, and soil texture. Average annual temperature was positively correlated with reductions in bulk density and increases in soil water content, while average annual precipitation was positively correlated with changes in water infiltration and aggregate stability *(Fulai Yan and Emmanuel Arthus, 2025).*

Implementing circular economy principles in agriculture and soil management generates multiple benefits of an ecological, economic and social nature.

From an ecological point of view, the adoption of circular practices contributes to the reduction of greenhouse gas emissions, by increasing the storage of organic carbon in the soil and reducing the dependence on synthetic inputs with a high energy footprint. It also contributes to the improvement of the biological state of the soil, by stimulating microbial biodiversity and intensifying natural biogeochemical cycles and, last but not least, it limits the effect of erosion processes, due to the improvement of the structure and stability of aggregates, as well as the maintenance of an adequate plant cover.

From an economic perspective, the integration of internal nutrient and organic matter circuits determines the reduction of costs associated with external inputs (mineral fertilizers, amendments, correctives), the increase in the efficiency of resource use, by capitalizing on secondary flows (plant residues, organic waste) and the stabilization of production in the long term, as a result of the improvement of functional fertility and water retention capacity.

At a societal level, these practices support strengthening the resilience of rural communities by reducing vulnerability to climate and economic shocks, improving food security by maintaining soil productivity and reducing soil degradation, and limiting water pollution risks by reducing nutrient runoff

The conceptual basis of soil sustainability assessment

Soil sustainability assessment is one of the most important directions of modern pedology, because soil simultaneously performs ecological, economic and social functions. In the scientific literature, the concept of soil quality is frequently used as an integrative indicator

of sustainability, being defined as the capacity of soil to function within ecosystems to support biological productivity, maintain environmental quality and promote plant and animal health *(Jeffrey E. Herrick, 2000).*

Numerous recent studies highlight the fact that soil sustainability assessment is carried out through multiple indicators, grouped into three main categories, namely: physical, chemical and biological indicators.

This approach reflects the multifunctional nature of soil and its role in maintaining agricultural productivity, biodiversity and ecosystem services *(Elsadig Omer et al., 2026).*

Several studies recommend the use of synthetic indices (Soil Quality Index – SQI) to integrate multiple indicators into a single sustainability score. Such methods allow for the comparison of agricultural systems and the monitoring of soil degradation or improvement over time, according to the methodology proposed by *Veljko Perovic et al. 2025, Wendyam Arsene Flavien Damiba et al., 2024, Priya Bhattacharya et al., 2020.*

A robust quantification model can be built in three stages, namely: indicator selection, indicator normalization and calculation of the sustainability index.

Indicator selection - it will be taken into account that they must reflect the main functions of the soil, so that they can be grouped into physical, chemical and biological indicators.

Physical indicators describe the soil's ability to regulate water and air flows, essential for the functioning of agricultural ecosystems, and they include: bulk density (g cm^{-3}), total porosity (%), aggregate stability (%), saturated hydraulic conductivity (Ks) and usable water capacity (AWC).

Chemical indicators determine soil fertility and its capacity to support plant production and include: soil reaction (pH), soil organic carbon (SOC), cation exchange capacity (CEC), degree of base saturation (V%), total nitrogen (N) and available phosphorus (P).

Biological indicators are important because they reflect the functioning of biogeochemical processes and nutrient cycles in the soil and refer to microbial biomass (Cmic), dehydrogenase activity, soil

respiration and microbiological diversity.

Normalization of indicators – involves integrating them into a single index, so that the values will be transformed into a standardized scale between 0 and 1. The frequently used method is Indicators of the type "higher = better" or Indicators of the type "lower = better" and is calculated according to the relationships proposed by *Wendyam Arsene Flavien Damiba et al., 2024.*

$$Si = \frac{Xi - X\ \min}{X\ \max - X\ \min}$$

$$Si = \frac{X\ \max - Xi}{X\ \max - X\ \min}$$

where: *Si* = indicator score;

Xi = observed value;

Xmin, *Xmax* = reference range limits.

Calculating the soil sustainability index involves achieving a weighted average of the indicators using the relationship:

$$SSI = \sum_{i=1}^{n} w_i S_i$$

where: ***SSI*** = Soil Sustainability Index;

$\boldsymbol{S_i}$ = indicator score;

$\boldsymbol{w_i}$ = weighting coefficient;

n = number of indicators.

An important principle of the assessment is the balance between physical, chemical and biological indicators. Some conceptual frameworks recommend that each category should represent at least 20% of the total indicators, in order to reflect the holistic nature of soil functioning, so that the proposed structure of the sustainability index gives a weight of 30% to physical properties, 40% to chemical properties and 30% to biological properties.

The interpretation of the proposed sustainability index would place a highly sustainable soil at SSI values lower than 0.8, a moderately

sustainable soil at SSI between 0.6 and 0.8, a soil at risk of degradation at SSI between 0.4 and 0.6, and a degraded soil at SSI less than 0.4.

Such an Index (SSI) allows for the comparative assessment of different soil management systems and the identification of agricultural practices that contribute to the improvement of soil ecosystem functions. The use of synthetic indices has several advantages, including: integrating multiple indicators into a comparable value, rapid identification of soil degradation, monitoring the effects of agricultural practices and, last but not least, supporting sustainable land management policies.

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