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HR EXCELLENCE IN RESEARCH

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Section 1:
**ECONOMY AND INTERNATIONAL ECONOMIC
RELATIONS**

PROMOTING SUSTAINABLE DEVELOPMENT: FUTURE PROSPECTS FOR MINIMUM WAGE IN EUROPE BY 2024

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Abstract: *The long path of global development, largely driven by the desire to increase profits and minimize suffering, has had serious consequences for the environment, social structure and even spiritual well-being. The end of the 20th and the beginning of the 21st centuries were marked by various and persistent crises, including environmental degradation, global climate change, and social and gender inequalities, which forced the state, organizations and individuals to change their approaches. This conflict has triggered changes related to sustainable development. Therefore, as a measure, the European Union has proposed a directive aimed at establishing an adequate minimum wage in all 27 member states. However, the directive allows for flexibility, which means that the level and conditions of the minimum wage will not be standardized across the EU. Despite these initiatives, inflation, which rose sharply in 2022, has undermined the real value of the minimum wage in many EU countries. The Organisation for Economic Co-operation and Development (OECD) has called for regular reviews to protect low-income workers. The objectives of the EU directive include several ideas, including establishing a framework to ensure an adequate minimum wage, the role of collective bargaining in wage setting, and improving workers' access to the enforcement of their minimum wage rights. However, determining an adequate minimum wage is a complex task. The directive aims to allow Member States to use key international or national indicators when setting minimum wages, with the ratio of minimum wage to average wage providing as a principal indicator of the condition of minimum wage employees. According to the OECD, in 2022, the minimum wage was less than 50% of the average wage in ten EU countries. This article focuses on identifying these problems and proposing solutions to overcome them.*

Key words: *Minimum Wage, Sustainable, Progress, Development*

JEL: E24, J3, O11

1. Introduction

In recent years, there have been many discussions on sustainability. Much of the discussion on this topic has focused on conceptual frameworks, transition strategies, social models and other specific components, thus ignoring potential implementation problems. This paper aims to analyze the adequacy of the minimum wage, according to the guidelines of the Directive. Member States can adapt the international guidelines determined, as 60% of the average platforms or 50% of the average platforms, or they can stagnate national guidelines. One of them shows that in large European countries there is a minimum work plateau and with these guidelines almost nothing.

Wages are an important or rather basic element of working conditions and are also a point that helps to improve or avoid collective labor conflicts. The International Organization of Municipalities (IOM) is in charge of promoting political support that encourages the distribution of income, namely the beneficiaries of progress and wage increases that help all profit-making organizations to take care of protection. The IOM offers insurance services and basic proposals to address different aspects of the Wage Legislation, including minimum wages in the public sector, external wages, the gender pay gap, payments from the wage protection system, prevention and wage decisions.

2. Basic content.

In 2020, the European Commission introduced a proposal addressing the adequacy of minimum wages across EU member states. The proposal was motivated by concerns over inadequate incomes and significant gaps in minimum wage coverage. The directive's primary goal is to ensure that minimum wages are sufficient, whether established through collective agreements or by law.

Directive (EU) 2022/2041 was adopted by the European Parliament and the Council in October 2022, with a deadline of autumn 2024 for all member countries. The main purpose of the directive is to establish standards that will ensure the adequacy of the minimum wage, regardless of whether it is determined by law or by collective bargaining (depending on each state). Implementation will take place according to two different types of approaches. The first, will apply in 21 states, where the minimum wage is set by law or mandatory provisions, which implies more complex obligations. Another approach, with fewer obligations, applies to states where wages are mainly determined by collective bargaining, such as: Austria, Cyprus, Denmark, Finland, Italy and Sweden.

The difference in obligations aims to respect the autonomy of the social partners in setting the minimum wage, if they have exclusive competences. Member States must therefore set clear and stable criteria to ensure that the minimum wage remains adequate and is regularly updated.

The Directive defines four key components that Member States must take into account: the purchasing power of the statutory minimum wage, the general distribution of wages, the rate of wage growth and national productivity levels in the long term. This allows Member States to adapt the mechanism to different specific circumstances and to act with decisions to implement the Directive. Regarding Article 5 of the Directive, Member States must use reference values to assess the adequacy of the minimum wage. These include 60% of the average gross wage and 50% of the average gross wage or specific national reference values. The Directive aims to ensure full coverage of minimum wage standards. Article 6 obliges Member States to ensure that any differentiated statutory minimum rates for certain groups of workers or deductions that reduce wages below the statutory minimum comply with the principles of non-discrimination and proportionality.

Article 10 establishes a monitoring mechanism to monitor the coverage and adequacy of the minimum wage. EU Member States are required to collect and report annually to the European Commission data on various aspects, including the statutory minimum wage, the coverage of collective bargaining and the wage levels for employees not covered by these mechanisms. The monitoring serves both as a self-assessment tool for the Member States and as a basis for the EU institutions to review and subsequently issue recommendations in the context of the European Semester.

Finally, Article 11 focuses on ensuring that individual rights are respected. Member States are required to provide access to all applicable effective dispute resolution mechanisms and to protect workers against harassment when they exercise their rights under the proposed Directive. In addition,

they are required to apply effective, proportionate and dissuasive penalties for breaches of national legislation relating to the Directive.

The suspension of regulation during recent economic crises has largely exposed the shortcomings of the current mechanism. The core aspects of the EU Directive therefore include:

1. Setting clear criteria for the minimum wage;
2. A clear link between the minimum wage and the level of poverty;
3. Continued promotion of state support for collective bargaining on wage-setting issues.

The Directive also stipulates that states that apply social protection policies, such as minimum incomes guaranteed by collective agreements, are not obliged to adopt the new European rules on minimum wages, on one condition. That their current standards are more favourable than those set in the new directive.

The minimum wage is a basic tool in the fight against poverty and plays a key role in promoting sustainable development. 2024 is expected to be a difficult year, which will take a turn for the better with clear efforts to improve living and working conditions in EU Member States, as the Brussels Minimum Wage Directive is due to enter into force by 15 November. Currently, the global development agenda has identified priority areas for the collective efforts of the international community. These areas were identified by 2015 and include the creation of a post-crisis financial framework, the formulation of new global goals – the Sustainable Development Goals (SDGs) – and the renewal of climate change commitments, such as those in the Paris Agreement. The COVID-19 pandemic has also required further adaptations, stimulating developments to address new challenges. In addition, the global economic landscape has changed, changing the conditions that affect and constrain the ability to achieve the goals.

Today's macro economy is very different from the favourable conditions of the early 21st century: despite low interest rates, global economic growth has slowed down, and the challenges related to global governance and the prioritization of resources for development assistance have become more pressing. Delays in addressing global challenges have further worsened the situation, increasing future resource needs, especially financial.

In response to the challenges arising from recent crises, the EU Directive was adopted as a solution to create a framework to ensure an adequate statutory minimum wage, improve workers' access to it and facilitate collective bargaining on wage setting. However, one of the challenges that the directive creates is that it significantly changes the rules for determining the income of millions of Europeans. The directive requires each EU member state to establish clear criteria for setting the minimum wage. Relevant indicators include national purchasing power, the cost of living, the level and distribution of wages, the rate of wage growth, labour productivity, the poverty threshold and the average nominal wage.

The minimum wage in the EU varies greatly, currently ranging from €477 per month in Bulgaria to €2,571 per month in Luxembourg. Countries such as Luxembourg, Ireland, the Netherlands and Germany have a minimum wage of over €2,000, while France has a minimum wage of around €1,767 and Spain has a minimum wage of around €1,323. It is particularly worrying that the real minimum wage has fallen in most EU Member States due to high inflation since 2022, thus particularly affecting countries where a large share of workers earn a basic minimum. The challenges facing each EU Member State following the implementation of the Directive will include creating a framework to

ensure an adequate legal minimum wage, facilitating collective bargaining on wage setting and increasing workers' access to their minimum wage rights.

The main research method used on this topic was an in-depth analysis of official documents, regulations and directives issued by the European Parliament, the European Commission and the Council, as well as other relevant official publications in the field. In addition, the study included a review and identification of previous studies, reports and scientific articles that examined issues related to the minimum wage, collective bargaining and the consequences of wage policies. An important element of the study was the use of official statistical data, which became the basis for an efficient assessment of the level of the minimum wage in each EU Member State and for the analysis of their trends over time.

The minimum wage values in Europe each year between 2018 and 2024 fluctuated as follows:

- **Belgium:** The minimum wage increased moderately between 2018 and 2021, with significant accelerations in 2022 and 2023, followed by a more moderate increase in 2024.
- **Bulgaria:** The minimum wage increases steadily each year, but at different rates. The increase accelerated in recent years, especially in 2023 and 2024.
- **Germany:** The minimum wage increased steadily over the period under review, but with small fluctuations over the years.
- **Estonia:** The minimum wage increased steadily until 2023 and then increased significantly in 2024.
- **Spain:** The minimum wage increased steadily in the first three years, but remained the same in 2021 and 2022, followed by moderate increases in 2023 and 2024.
- **Romania:** The minimum wage continues to increase every year, but with different growth rates. The fluctuations have been more pronounced in recent years, especially in 2023 and 2024.

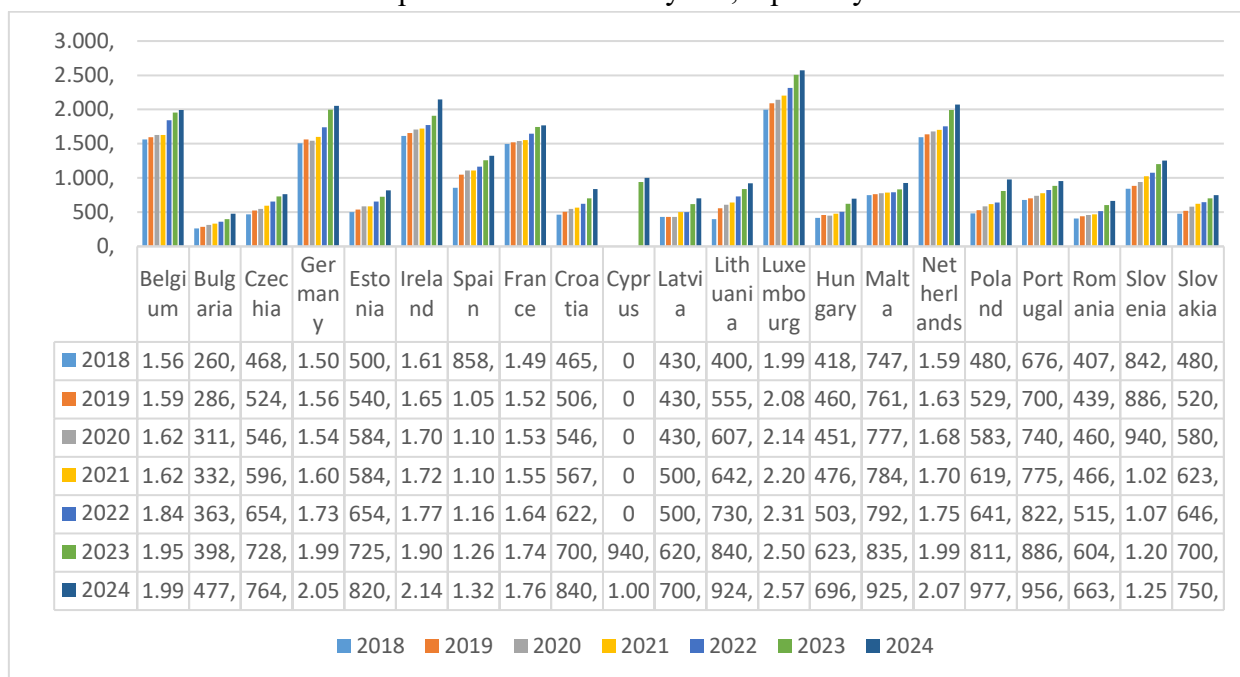


Figure 1. The Dynamics of Monthly Minimum Wage in Euros Across Member States

Source: Own processing based on Eurostat data

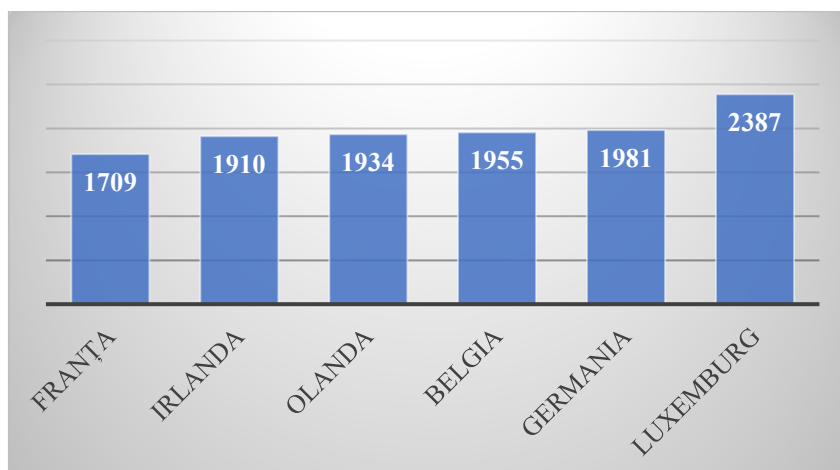


Figure 2. Minimum wage (euro) group – I

Source: Own processing based on Eurostat data

The latest EU statistics, published in 2023, illustrate how national minimum wages in the EU range from €399 (around \$440) per month in Bulgaria to €2,387 in Luxembourg, and how member states can be classified into three categories: □

- Group 1 - (Luxembourg, Germany, Belgium, the Netherlands, Ireland and France) with a national MINIMUM wage exceeding €1,500 per month.
- Group 2 (Slovenia and Spain) with national minimum wages above €1,000 but below €1,500 per month.
- Group 3 - below €1,000 per month. This group includes Cyprus, Portugal, Malta, Lithuania, Greece, Poland, Estonia, the Czech Republic, Slovakia, Croatia, Latvia, Romania, Venice and Bulgaria.

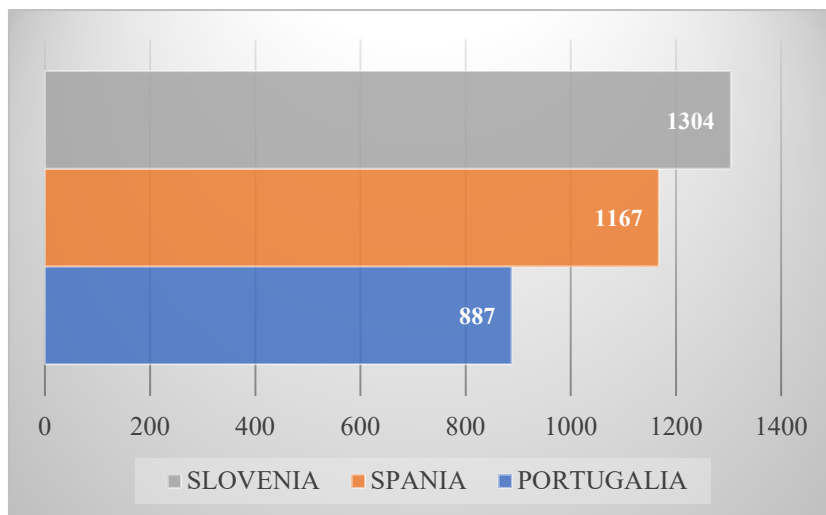


Figure 3. Minimum wage (euro) group – I

Source: Own processing based on Eurostat data

Even though Romania has had the highest average annual growth rate in the EU over the past 10 years (14.4%), its national minimum wage of €606 remains one of the lowest in the EU. According to an analysis by the European Trade Union Confederation (ETUC), based on Eurostat data, the lowest paid workers in Europe have seen their wages fall by up to 19% this year, marking the biggest

drop in real minimum wages this century. Although the statutory minimum wage rose by an average of 7.6% last year in all 21 EU countries with a minimum wage, inflation in the same countries rose by an average of 12.4%. This has led to an average fall in the real value of the statutory minimum wage of 4.8%, leaving millions of workers struggling to cover basic costs such as food, rent and energy.

This is only the second time since 2000 that real minimum wage growth has fallen below zero, and the current cut is much larger - at the height of austerity in 2012, real minimum wage growth was -0.7%. The most drastic decreases in real minimum wages were recorded last summer in Latvia (-19%), the Czech Republic and Estonia (-10%) and Slovakia (-8%). These changes have significantly worsened working conditions for minimum wage earners in Europe, many of whom were already struggling to make ends meet. Even before the cost of living crisis began, almost one in ten workers in the EU27 was at risk of poverty, and 7 in 10 minimum wage earners reported difficulties in meeting basic needs.

3. Conclusions.

The Minimum Wage Directive is a significant step forward, first and foremost, in promoting EU policy on public disclosure of EU policies. The Minimum Wage Guidelines are an important step towards the European triple pillar of social rights, in particular in terms of strengthening the understanding. While this is fine, it establishes important governance frameworks, strengthens the role of social partners and, more generally, defines the essential role that social entities should play in a fair and functioning European social economy. of the market.

From a policy point of view, the amendments to the Directive are based on strong empirical evidence, which previously recognised the adjustment of minimum wages to economic factors as a key issue in the labour market. In addition, the Directive emphasises the importance of timely and regular reductions in the minimum wage and adds a positive influence on the importance of spouses in the wage setting process. In addition to regulating minimum wages, the Directive is also notable for its broad wage targeting, as it affects social units, placing them at the heart of the wage economy, and the reform of low wages in Europe.

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STRUCTURAL CHANGES IN THE FOREIGN TRADE OF THE REPUBLIC OF MOLDOVA DURING THE PRE-ACCESSION STAGE TO THE EUROPEAN UNION

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This article explores in detail the structural changes in the foreign trade of the Republic of Moldova in the context of the pre-accession process to the European Union, with a focus on the period 2014-2023. The study focuses on three essential dimensions: the evolution of exports, imports, and the trade balance; an analysis of the geographical structure of Moldova's trade relations; and a detailed assessment of the export and import structure by product categories. The data used for the research comes from official sources, including the National Bureau of Statistics of the Republic of Moldova, various international organizations, as well as globally recognized databases.

One of the main findings of the study is the significant reorientation of Moldova's foreign trade toward the European Union market, a trend amplified by the signing of the Deep and Comprehensive Free Trade Agreement (DCFTA). This reorientation has contributed to an increase in the volume of exports to EU countries, while also strengthening trade relations with traditional partners in Europe. However, the export structure remains relatively undiversified both geographically and in terms of product variety. Exports continue to be dominated by agricultural products and raw materials with low added value, which limits Moldova's competitiveness in international markets.

Although significant progress has been made towards diversifying the products exported, these advances are moderate, and major challenges remain. The study highlights the importance of investments in technology, increasing product competitiveness through value addition, and improving trade infrastructure. These measures are essential to ensuring sustainable economic development and enhancing Moldova's presence in global markets. In conclusion, the research emphasizes that while European integration has opened up significant opportunities, deeper structural transformation is needed to foster long-term diversification and competitiveness.

Keywords: Foreign Trade, Trade Relations, Export Performance, Competitiveness

JEL Classification: F10, F15, F43

Introduction

The pre-accession of the Republic of Moldova to the European Union marked an important moment in the evolution of its external trade relations. Starting in 2014, with the signing of the Deep and Comprehensive Free Trade Agreement (DCFTA) [3], Moldova began a gradual process of integration into the European market, which has led to significant transformations in the structure of exports and imports [1]. This period was marked by a reorientation of trade flows towards the European Union, influenced by both economic and political factors, as well as Moldova's aspirations to align with the economic and trade standards of the Union [4].

Pre-accession was not only an opportunity but also a test of economic resilience. The structural changes in foreign trade reflect Moldova's efforts to reposition its economy in the context of globalization and to overcome the challenges that come with European integration. This period can be seen as a moment of transition, during which Moldova gradually reconfigured its external trade relations, preparing for eventual full membership in the European Union.

This article explores the major transformations in the foreign trade of the Republic of Moldova during the pre-accession period, offering a detailed analysis of the evolution of trade structures and how these have influenced the country's economic position in the international market.

The aim of this analysis is to provide a deep understanding of how European integration has influenced trade directions, the structure of exports and imports, as well as Moldova's international economic relations. In this regard, the research seeks to assess the impact of the European integration process on the national economy and highlight the adjustments in external trade relations, particularly in the context of the DCFTA Agreement [7].

The research objective is to conduct a detailed examination of the structural changes in the foreign trade of the Republic of Moldova during the pre-accession period to the European Union (2014-2023), with a focus on the dynamics of trade volumes and structure. The analysis will include an assessment of the evolution of exports and imports, identification of changes in the geographical structure of trading partners, and a comparison of the main categories of trade goods between 2014 and 2023 [2]. The research aims to identify the key factors driving these changes and propose strategies for adapting Moldova's economy in the context of European integration, as well as measures to improve competitiveness in international markets [10].

Research Methods Applied

The research methods applied are based on a combination of quantitative and qualitative approaches. Firstly, statistical data collection was carried out using official sources, such as the National Bureau of Statistics of the Republic of Moldova, the UN Comtrade Database, and specialized platforms like the Observatory of Economic Complexity (OEC). These data provided detailed information on the evolution of Moldova's exports and imports, both geographically and by product.

To analyze the changes in Moldova's foreign trade between 2014 and 2023, a comparative method was used, in which data from these years were compared to highlight major shifts in structure and trade directions.

Additionally, the research was grounded in a review of specialized literature, consulting academic works and economic reports addressing topics such as international trade and economic transition. Relevant sources include the studies of authors Van den Hoven and Petrescu, which provided a solid theoretical framework for analyzing structural changes in Moldova's foreign trade.

These methods offer a comprehensive overview of the transformations in Moldova's foreign trade and serve as a foundation for formulating strategic recommendations.

Results and Discussions

1. The Evolution of Moldova's Foreign Trade (2014-2023)

During the 2014-2023 period, Moldova's foreign trade experienced gradual growth, with a widening imbalance between exports and imports. The total export values remained lower compared to imports, leading to a persistent trade deficit (Figure 1).

Analyzing the available data, we observe that over the studied period, Moldova recorded a progressive increase in both imports and exports. Imports rose from 5.3 million to 8.6 million, while exports increased from 2.3 million to 4.0 million. However, the trade balance deficit widened consistently, starting from -1.9 million in 2015 and reaching -4.8 million in 2023 [2].

This faster growth in imports compared to exports highlights a significant dependence on foreign products, which negatively impacts the balance of foreign trade, especially the current account of the

balance of payments. On the other hand, although exports grew, the growth rate was not sufficient to offset the trade deficit. This situation reflects structural challenges within the economy and the need for a more effective strategy for diversification and increasing the complexity of exported products [8].

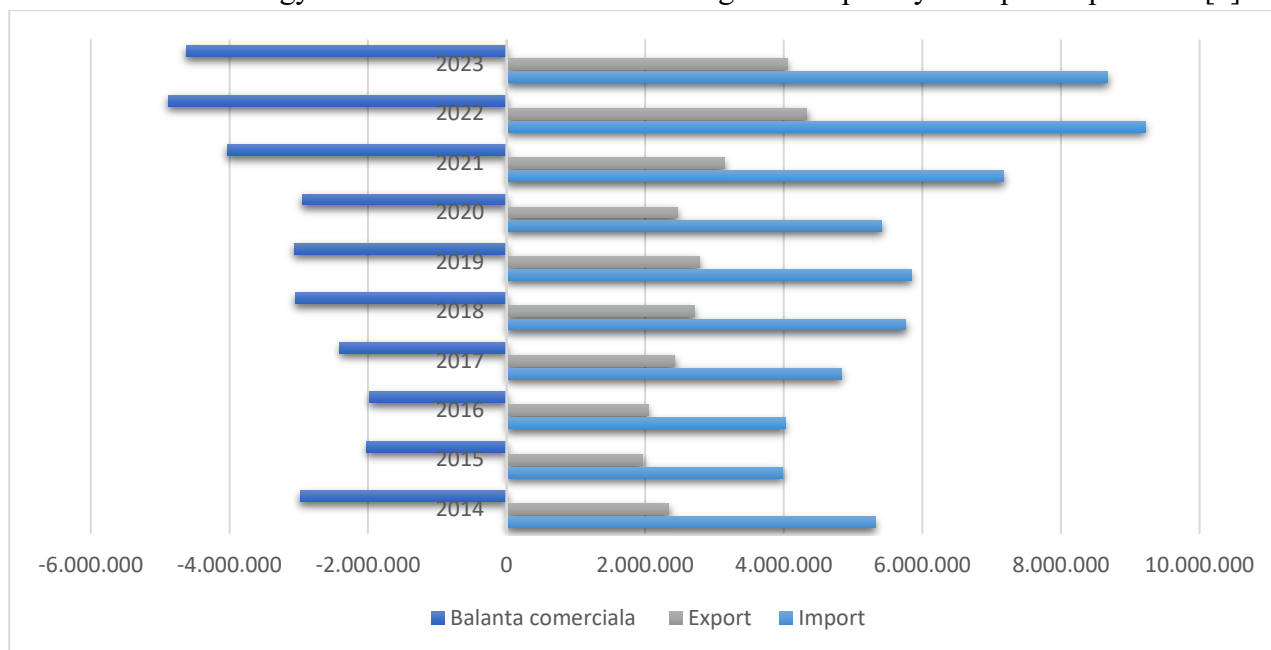


Figure 1. Dynamics of Moldova’s Foreign Trade (US\$, thousands), 2014-2023

Source: Prepared by the Author based on data from the National Bureau of Statistics [2]

Analyzing Moldova's reexports, we observe a significant adjustment in the context of rising imports and exports in recent years. Reexports have become an important element in the country’s foreign trade structure, reflecting both the dynamics of international trade flows and Moldova’s level of integration into global supply chains (Figure 2). These adjustments highlight Moldova's strategic role as a transit hub for certain products.

An analysis of reexport volumes between 2019 and 2023 reveals a fluctuating trend. During this period, Moldova saw a decline between 2019 and 2020, followed by a significant increase, especially in 2022, when reexports reached USD 1.366 million. This sharp rise can be explained by conjunctural factors, notably the effects of the war, which caused major disruptions in regional supply chains and shifts in trade flows. Moldova became an important transit hub for goods bound for Ukraine, particularly due to the blockage of certain ports and traditional trade routes. As a result, the share of reexports to Ukraine surged from just 4.1% in 2019 to a peak of 42.9% in 2022, a remarkable phenomenon.

In comparison to other markets, the share of reexports to Romania, Italy, and other traditional partners decreased, reflecting a temporary shift in Moldova’s trade priorities. Notably, Romania's share dropped from 30.8% in 2020 to 16.9% in 2022, indicating that Moldova diversified its reexport destinations and adapted to rapidly changing market conditions [9].

Overall, this trend illustrates not only Moldova's flexibility in regional trade but also how geopolitical shocks can influence trade flows and reexport directions. It remains to be seen whether this trend will persist or adjust as the region stabilizes and traditional trade routes are restored.

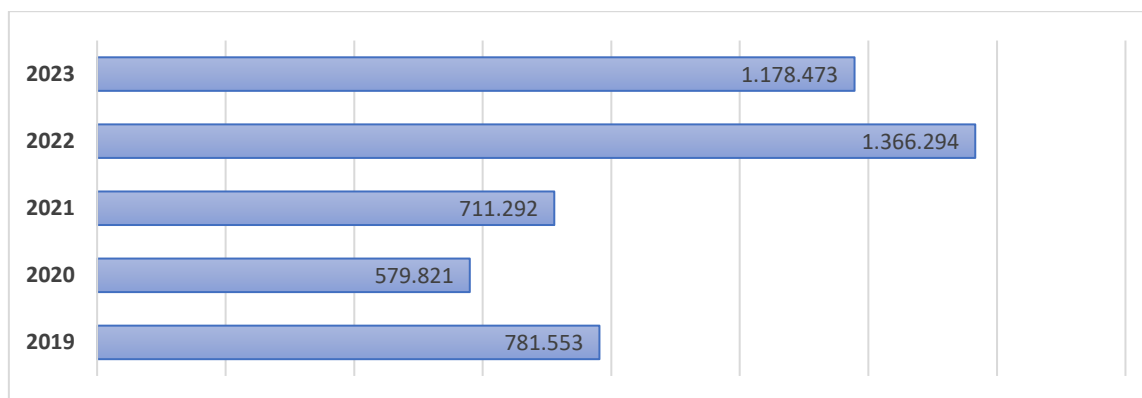


Figure 2. Dynamics of Moldova’s Reexports (US\$, thousands), 2019-2023

Source: Prepared by the Author based on data from Trade Map [9]

In the context of high import volumes and the trade balance deficit, reexports represent an important component that can bring additional revenue and mitigate the negative impact of the deficit. However, reexports do not directly contribute to the development of domestic production, which underscores the need to support local production and direct exports in order to boost Moldova’s long-term competitiveness.

2. Geographic Structure of Foreign Trade (2014-2023)

In the period 2014-2023, the analysis of the geographical structure of the Republic of Moldova's exports finds a plurivalent dynamic, signaled both by significant changes in the direction of the country's foreign partnerships and trade in long-term trends.

The main driver of the intensification of Moldovan exports in the analyzed period was the economic integration with the European Union [5]. The easy access of Moldovan products to the European market was activated by the Deep and Comprehensive Free Trade Agreement (DCFTA), which increased the favorable conditions for them. Exports to the EU have therefore grown steadily, peaking at USD 2.64 billion in 2023, compared to USD 1.24 billion in 2014 (Figure 3). This positive development reinforces the importance of deepening trade relations with the EU and indicates a growing presence of the Moldovan economy on the European market.

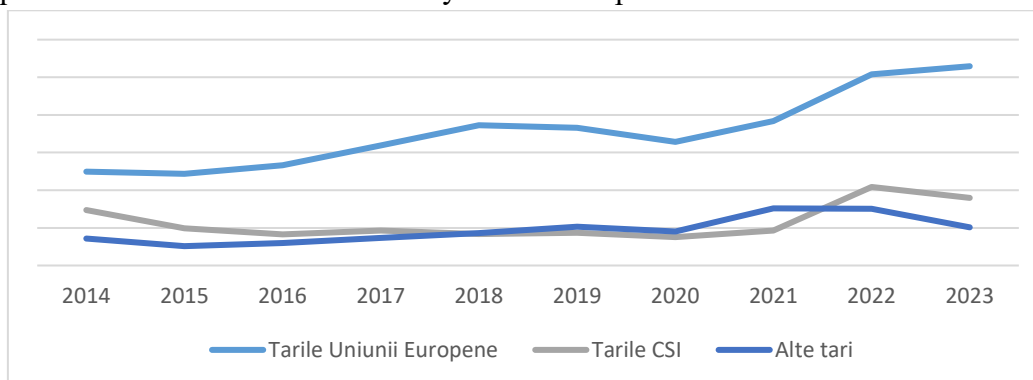


Figure 3. Foreign Trade by Country Groups, 2014-2023

Source: Prepared by the Author based on data from the National Bureau of Statistics [3]

In contrast to the positive growth trend of exports to EU countries, exports to CIS countries have diminished significantly between 2014 and 2016, from USD 735.6 million in 2014 to USD 414.2

million in 2016 [2]. This decline reflects political and economic tensions in trade relations with Russia, affected by embargoes and economic fluctuations. Although there was a slight recovery in 2017 and 2018, exports to the CIS remained below 2014 levels. However, in 2022, a significant increase in exports to CIS countries was observed, reaching over USD 1 billion. This may be attributed to temporary geopolitical factors, such as the reorientation of certain trade flows in the context of the Ukraine crisis. This paradoxical evolution highlights the complexity of economic relations between Moldova and the CIS, as well as the impact of external events on trade flows.

Republic of Moldova has made efforts to diversify its foreign trading partners, in parallel with strengthening relations with the EU. Consequently, **exports** to other markets have seen a steady increase, from USD 357.9 million in 2014 to USD 758.8 million in 2021, including markets such as the Middle East, Africa and Asia. Even so, despite the effort, this ramification was marked by suggestive fluctuations, in 2023 exports fell to USD 504.9 million, suggesting an instability in Moldova's ability to maintain permanent trade relations in these markets [9].

An examination of Moldova's main trade partnerships reveals significant fluctuations reflecting economic and geopolitical changes in the region. An example would be Romania, being a territorially neighboring country, has steadily grown in significance, reaching from 19% in 2014 to 35% in 2023, thus strengthening its title as Moldova's main trading partner. This leap reflects the economic integration into the European Union as well as the geographical and cultural proximity between the two countries (Figure 4).

In antithesis, the Russian Federation, which was an important trading partner for the Republic of Moldova, had a share of 18% in 2014, suffering a drastic decline, reaching only 4% in 2023.

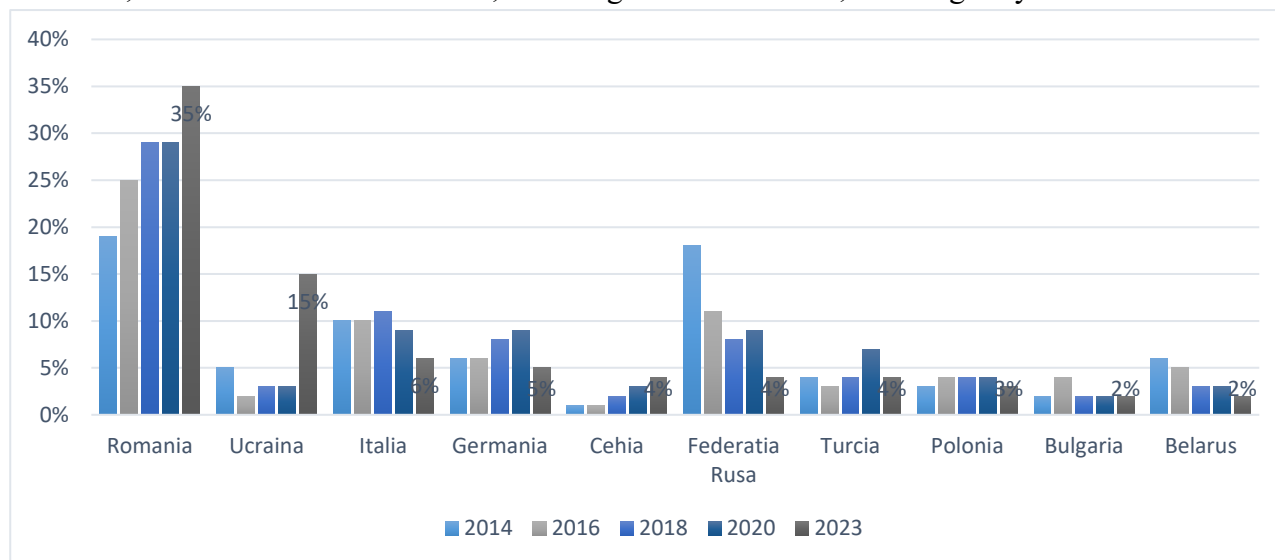


Figure 4. Foreign Trade with Key Partner Countries, 2014-2023

Source: Prepared by the Author based on data from the National Bureau of Statistics [2]

In the same downward trend, Italy and Germany, strategic partners of Moldova, have registered a slight reduction in the share of Moldova's trade in recent years. A moderate increase was observed in the case of the Czech Republic, specifying the branching of trading partners within the European Union, while a stable value of 3-4% was maintained by Poland and Bulgaria, suggesting a constant trade cooperation, but without major developments. Turkey maintained its presence on the Moldovan market, oscillating between 3% and 10%, reflecting a dynamic trade collaboration.

Overall, the Republic of Moldova has succeeded in strengthening its trade ties with the European Union, which has become the country’s most important trading partner. Additionally, diversification into other markets has been a strategic goal, though these markets remain less stable compared to the European market, despite growth in previous years.

Moldova’s **imports** between 2014 and 2023 have shown the consolidation of trade relations with Romania, China, and Turkey. Romania has become the main import partner, reaching a peak of USD 1.65 billion in 2022, supported by geographic proximity and economic ties. At the same time, imports from China have grown steadily, surpassing USD 1 billion in 2023, reflecting the global influence of this economy on Moldova (Figure 5).

Conversely, imports from the Russian Federation decreased significantly, from USD 717 million in 2014 to USD 322 million in 2023, due to geopolitical tensions and economic sanctions. In contrast, imports from Turkey and Ukraine have increased, with Turkey reaching USD 741 million in 2023 and Ukraine surpassing USD 1 billion, influenced by the regional crisis and the reorientation of trade flows.

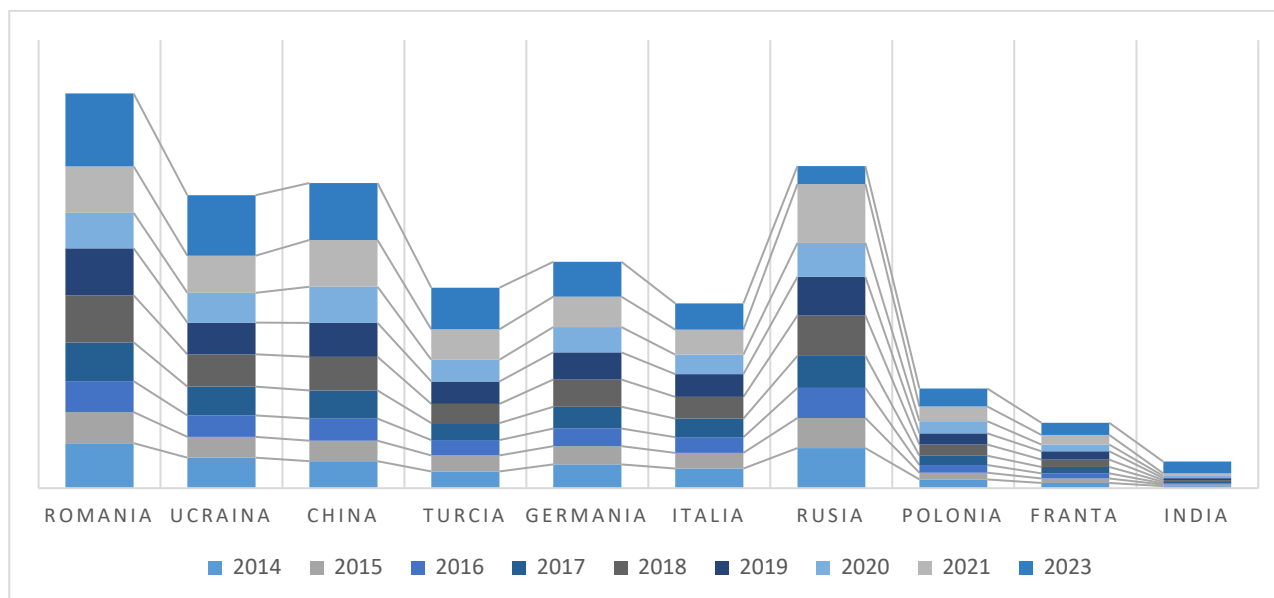


Figure 5. Imports by Main Countries of Origin, 2014-2023

Source: Prepared by the Author based on data from the National Bureau of Statistics [11]

Thus, Moldova’s import structure reflects the strengthening of trade relations with Romania, China, and Turkey, alongside a reduction in economic relations with the Russian Federation, highlighting the impact of regional geopolitical and economic shifts.

3. Structure of Exports and Imports by Product, Comparison Between 2014-2023

Between 2014 and 2023, Moldova’s **exports** have significantly evolved in terms of both value and structure. In 2014, exports were predominantly comprised of agricultural products and low-value-added raw materials. However, by 2023, exports of higher value-added goods, such as electrical equipment and processed agri-food products, increased, indicating a diversification in the export structure (Figure 6).

Moldova’s **exports** grew from approximately USD 2.3 billion in 2014 to over USD 4 billion in 2023. This reflects a gradual expansion of the country's export capacity, although fluctuations were

observed in 2016 and 2020. Nevertheless, these structural changes mark significant shifts in Moldova's export composition.

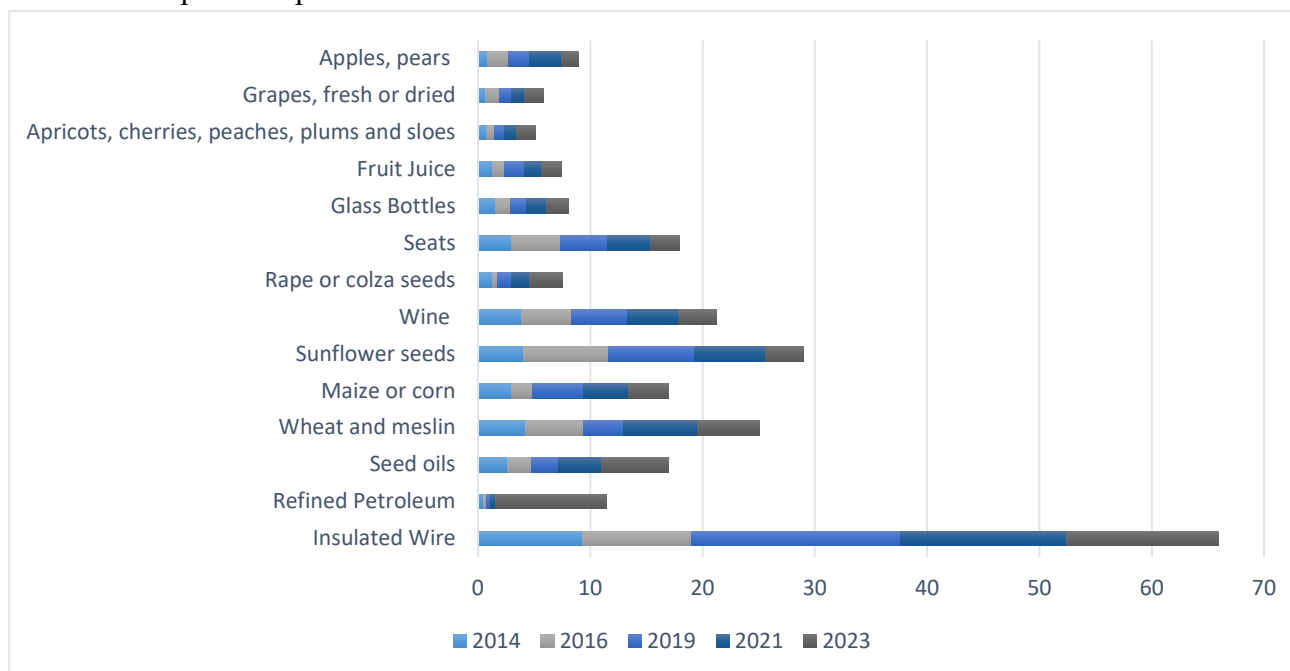


Figure 6. Share of Main Product Groups in Export Value, % (2014-2023)

Source: Prepared by the Author based on data from ComTrade Statistics and OEC [4][6]

Due to the war in Ukraine and the energy crisis, the rapid expansion of exports of petroleum products of USD 559.4 million in 2022, compared to USD 13.660 million in 2021, confirms the change in the structure of exports due to a conjuncture situation, and not to an organic development because Moldova is not a producer of oil and energy resources, being at most a transit hub. Thus, this situation can be considered a temporary adaptation to the increased demand of energy transit, rather than an improvement in Moldova's production capacity of this sector.

Important changes have also been recorded by agricultural exports, which have been and remain one of the essential pillars of Moldovan trade. Wheat and corn saw major increases, especially in 2023 (wheat at USD 223.7 million, corn at USD 144 million), as a result of the grain crisis in Ukraine and the redirections of trade flows. In the same upward trend are sunflower seeds and vegetable oils with a clear increase, thus contributing to the development of the agricultural sector and to the intensification of demand for these products as a result of the trade blockades in Ukraine.

A traditional export product, Moldovan wine, can be characterized by a relatively constant trend, without major structural transformations. This product saw a slight increase in 2023 (USD 137.4 million), however, there is a satiety of traditional markets for this product and the demand in foreign markets did not register a considerable increase.

In turn, the industrial sector managed to register several predispositions for improvement. In this sector, insulated cables had a considerable increase, reaching the value of USD 547.9 million in 2023, which denotes an increasingly solid integration of Moldova into industrial supply chains. At the same time, an industrial diversification of Moldova can be highlighted, there are products with significant increases in export value, among them can be mentioned electrical transformers and other industrial equipment (transformers increased from 3.8 million dollars in 2014 to 46.9 million dollars in 2023).

In contrast to the industrial sector, **exports** of natural leather footwear and raw sugar recorded major declines, the value of exports was reduced to less than half of the export levels in 2014. This may reflect difficulties in maintaining competitiveness on international markets for these traditional Moldovan products. Even the garment sector, especially men's and women's suits, recorded a decrease in the first part of the analyzed period, with a modest recovery in recent years, which would suggest an adjustment to the requirements of the European market demands.

Moldova has undergone significant transformation in **export** structure between 2014 and 2023. Although agriculture remains an important sector, the country has placed an increasing emphasis on industrialization and integration into global supply chains, particularly those within the European Union [9]. Recent geopolitical events, such as the conflict from Ukraine and the energy crisis, have generated temporary changes such as increased oil transit. Even so, these do not represent durable transformations on the long terms for the Moldovan economy. To conclude, Moldova is in a phase of economic transformation marked making an effort by trying the diversification of its industrial base and reducing the dependence on traditional sectors. Although this advancement is positive, it remains vulnerable to external fluctuations in particularly those caused by geopolitical factors.

Examining the **import** structure of the Republic of Moldova over the same period (2014-2023), it is evident that the country's economy is primarily oriented towards imports of energy products, technological equipment, and consumer goods. This reflects the dependence on external resources for basic consumption needs and infrastructure (Figure 7).

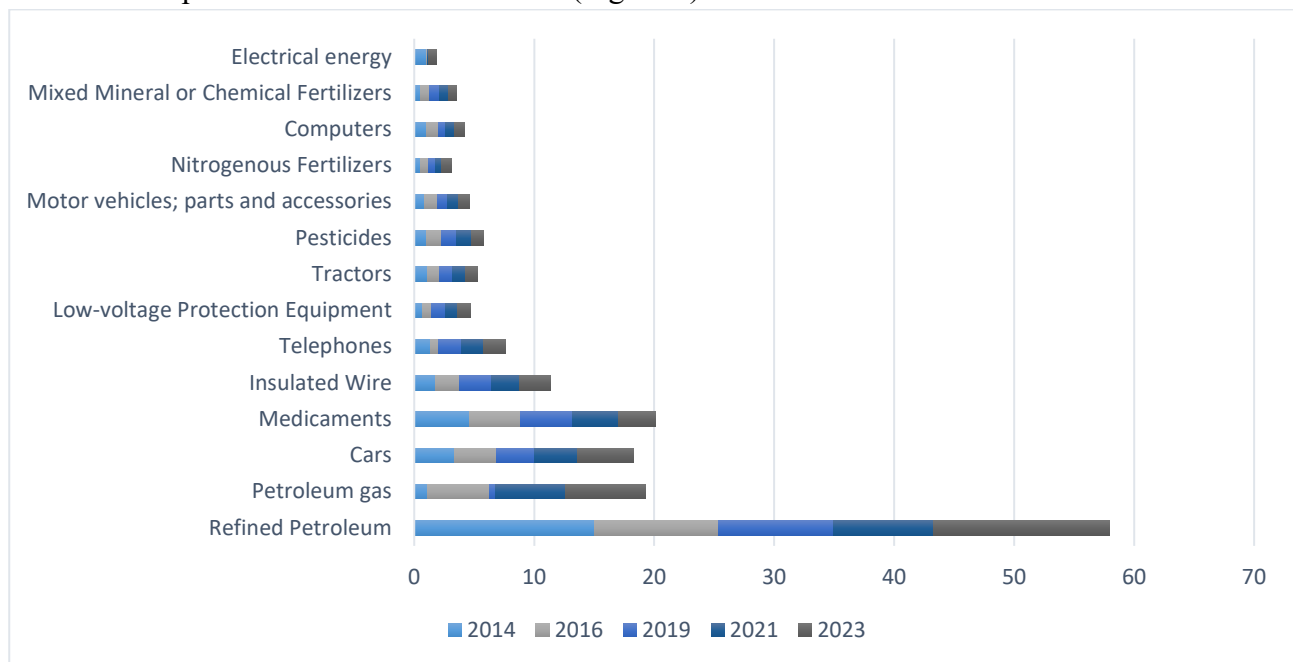


Figure 7. Share of Main Product Groups in Import Value, % (2014-2023)

Source: Prepared by the Author based on data from ComTrade Statistics and OEC [4][6]

Moldova's **imports** have highlighted a significant dependence on external energy resources, particularly refined oil and natural gas. The increase in refined oil imports, which accounted for 14.69% of the total in 2023, reflects both regional instability and changes in supply chains, underscoring Moldova's role as an energy transit hub and its vulnerability to external factors.

At the same time, imports of automobiles and electronic equipment, such as insulated wires and mobile phones, have shown consistent growth. Automobile imports increased from 3.36% of total

imports in 2014 to 4.64% in 2023, while mobile phones similarly rose (from 1.33% in 2014 to 1.87% in 2023). These data indicate an increased domestic demand for durable consumer goods, reflecting an improvement in living standards and a trend towards modernization and digitalization of daily life[6].

Conversely, imports of pesticides and fertilizers have remained relatively stable, reflecting a constant need for resources in agriculture, a crucial sector for Moldova's economy. Although the percentage has not fluctuated significantly, this stability indicates ongoing dependence on imports of products that support agricultural productivity.

In conclusion, the structure of Moldova's imports focuses on the consumption of energy goods and technological equipment. The economy remains dependent on external resources to support energy infrastructure and technological needs. Additionally, durable consumer goods, such as automobiles and electronic equipment, highlight a growing interest in modernizing and digitalizing daily life. At the same time, there is a constant concern for supporting local agriculture sector, this aspect is highlighted by the imports of agricultural and chemical products.

The trade of this country is affected by a considerable trade deficit that is the legacy of an underdeveloped economy and a dependence on specific imports that are not produced in the country. Such factors restrict Moldova's economy, as it is necessary to diversify the economy and establish industries that can develop enough added value to reduce this gap and be competitive internationally [1].

Conclusions and Recommendations

Following the above analysis we can draw the following conclusions, the period 2014-2023 marked the progress of the Republic of Moldova towards economic modernization and more importantly there is a growing trend of integration into the European Union market. In addition, there is also a weighted diversification of the export structure, while remaining focused on low value-added goods, especially those in the agricultural sector. At the same time, Moldova is exposed to trade shocks, given its dependence on imports of technological goods and energy. This makes Moldova's economy sensitive to external vulnerabilities, which reduces the country's competitiveness on the world market. Increasing the degree of structural diversification of exports has the potential to transform Moldova's economy while ensuring sustainable economic growth. This can be achieved by economically upgrading production in sectors such as processing and technology, but also by supporting higher value-added agriculture. In this regard, investing in research and development, seeking strategic partnerships with foreign investors and promoting innovations will be key factors in the long term. Strengthening Moldova's competitiveness requires a systemic approach to Moldova's policies and the gradual implementation of measures to stimulate and diversify exports, such as accelerating the pace of industrial development and digitalization processes, upgrading transport and logistics infrastructure to promote foreign business, and the new trade partnership are seen as capable of improving its global competitiveness. Greater engagement in regional and global supply chains will provide new opportunities for growth. At the same time, investments in renewable energy will reduce dependence on imports and ensure sustainable economic growth.

In the long term, Moldova should maintain the trend of supporting the transformation from exports of raw materials to processed agricultural goods. Greater attention should be paid to compliance with international standards in the production of goods and the introduction of modern agricultural

technologies to increase the added value of exports. Only in this way can Moldova become a stronger competitor on international markets, thus guaranteeing sustainable economic growth.

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THE LABOR MARKET OF THE REPUBLIC OF MOLDOVA IN THE CONTEXT OF INTRA-EUROPEAN LABOR MOBILITY

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Abstract: *The demographic decline, particularly the shortage of skilled labor, represents the most severe issue facing the Republic of Moldova, obstructing long-term economic growth, placing additional pressure on public finances, and undermining the existence of the state. The economy cannot grow without skilled labor and/or productivity increases, and public finances are unsustainable when the dependency ratio rises rapidly (calculated based on the number of pensioners relative to the number of contributors), while states cannot exist without citizens.*

The consistently negative net migration is largely responsible for the country's depopulation, resulting in two major interconnected imbalances within the labor market of the Republic of Moldova - labor shortages and wage inflexibility - which hinder the activation of internal depreciation mechanisms in the context of negative demand shocks and obstruct long-term economic growth. This study investigates labor dynamics in Moldova and the associated imbalances in the labor market through the lens of intra-European worker mobility, proposing a series of policies and measures that could mitigate the repercussions of the existing imbalances.

Key words: *European Integration, Labor Economics, Labor Policy, Labor Mobility, Macroeconomic Imbalances.*

JEL: *E0, E6, J2, J3, J6.*

Introduction

Capital and labor flows associated with the process of European integration are crucial for the long-term economic growth of the Republic of Moldova. The political association and economic integration outlined in the EU-Moldova Association Agreement are accompanied by net inflows of private capital from Western European economies into the Moldovan economy, while labor flows in the opposite direction, reducing unemployment and supporting consumption through remittances.

Although this development paradigm facilitates reindustrialization and stimulates economic growth in Moldova, it also fosters a series of chronic structural imbalances (such as the shortage of skilled labor, current account deficits, and budget deficits) that may obstruct socio-economic convergence with EU member states. Consequently, this situation necessitates adjustment policies grounded in comprehensive research.

International labor mobility has historically been a peripheral topic within mainstream economic thought, often studied separately from international capital flows. This separation has led to insufficient and contradictory assumptions, making it difficult to comprehend a complex socio-economic reality. The theoretical constraints not only complicate empirical research related to international labor mobility but also obscure understanding in the context of human civilization's evolution, given that global migration has significantly shaped the planet's population by Homo

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sapiens, while international labor mobility has accompanied the development of the capitalist system since the "long sixteenth century."²

Economic debates regarding international labor migration have, at least in the initial phase, been dominated by neoclassical economic theory, which focuses on the fundamental causes that drive individuals to migrate internationally. Neoclassical economics primarily emphasizes wage differentials and working conditions between countries, generally framing migration as an individual decision aimed at income maximization. In contrast, the "new economics of migration" addresses the existing conditions on different related markets, and treats migration as a household decision aimed at minimizing risks and alleviating constraints. The dual labor market theory and world-systems theory, by contrast, seek explanations at the macro level. Thus, the dual labor market theory connects migration to the structural demands of modern industrial economies, while world-systems theory, developed by Immanuel Wallerstein, interprets migration as a natural consequence of economic globalization (Massey, et al, 1993).

The development of international integration projects in the post-war period has reinvigorated theoretical debates regarding the international mobility of factors of production, especially after the Optimum currency area (OCA) theory, initially developed by Robert Mundell, established international labor mobility as a necessity within integration projects - serving as the primary mechanism for balancing asymmetric shocks within monetary unions (Mundell, 1961). Starting from an asymmetric demand shock - here there is a reduction in demand for products from one country in favor of products from another country within a monetary union - Mundell and other proponents of OCA theories argue that there are two mechanisms for the automatic balancing of these shocks (both related to labor markets), namely:

- *Wage flexibility* - which allows for the activation of internal depreciation mechanisms, thereby increasing the competitiveness of products from the country that experienced the negative demand shock.

- *Labor mobility* - which enables unemployed individuals from the country that experienced the negative asymmetric shock to find employment in the country that experienced the positive asymmetric shock (De Grauwe, 2009).

Therefore, traditional theories of optimal currency areas start from the premise that, in the absence of monetary policy tools that states can utilize through central banks, a monetary union between two or more countries is optimal/feasible only if at least one of the aforementioned conditions is satisfied: sufficient wage flexibility and sufficient labor mobility. Beyond the criticisms directed at Mundell's article and traditional OCA theories - particularly the skepticism regarding the chances of a successful monetary union in Europe - the theses related to wage flexibility and labor mobility have become important not only for monetary unions but for all regional or even global integration projects, especially as the capacity of monetary policy tools - exchange rate changes - to absorb asymmetric demand shocks becomes increasingly limited and often exacerbates long-term imbalances rather than providing sustainable stabilization mechanisms.

The development paradigm of the Republic of Moldova, including the existing imbalances in the labor market, must be understood through the lens of the European integration project and the theoretical framework upon which European integration is built. The prospects of the labor market

² The concept of the "long 16th century" was introduced by Fernand Braudel to describe an artistic expression of the first stage of development of the capitalist world economy, referring to the period from 1452 to 1630.

and the long-term economic growth of the Republic of Moldova are largely determined by European integration and related processes, while public policies and corresponding interventions must be designed and implemented based on complex research and empirical studies.

Intra-European Labor Mobility: Regulation and Dynamics

The Treaty establishing the European Economic Community (EEC), signed on March 25, 1957, which brought together six countries (Belgium, Germany, France, Italy, Luxembourg, and the Netherlands), created a common market based on the four freedoms: „ free movement of goods; free movement of persons/workers; free movement of services; free movement of capital”. (European Parliament, 2024).

Thus, the free movement of persons/workers is one of the fundamental freedoms of European construction as stipulated in the EEC, demonstrating that the architects of European integration understood the importance of the circulation of production factors (not just goods and services) for the creation of a common market and the reconstruction of Europe.

The Treaty on the Functioning of the European Union (TFEU) includes the free movement of persons/workers within the single market³. Thus, Article 20 of the TFEU establishes EU citizenship, including the related rights and obligations, among which is the "right to free movement and residence within the territories of the Member States." (TFEU, 2009) Furthermore, Article 21 of the TFEU states that "Every citizen of the Union has the right to move and reside freely within the territory of the Member States, subject to the limitations and conditions provided for in the Treaties and the provisions adopted for their implementation." (TFEU, 2009).

Thus, in accordance with art. 45 of the TFEU the free movement of workers includes *inter alia* the right to:

- accept genuine job offers;
- move freely for this purpose within the territories of the Member States;
- reside in a Member State to engage in paid employment in accordance with the laws and administrative provisions regulating employment in that state (TFEU, 2009).

EU secondary legislation establishes more detailed rules to regulate free movement through Directive 2004/38/EC, which codifies previous legislation that addressed distinct categories of EU citizens, and Regulation (EU) No. 492/2011, which contains detailed provisions concerning the free movement of workers, including regulations on employment, equal treatment, and the rights of workers' families. Also, the Directive 2014/54/EU establishes provisions that facilitate the application and uniform enforcement of the rights granted by Article 45 of the TFEU and Articles 1-10 of Regulation (EU) No. 492/2011.

The free movement of persons is part of the Agreement on the creation of the European Economic Area (EEA), as well as the Agreement on the free movement of persons signed with the Swiss Federation. Therefore, the aforementioned secondary legislation is relevant for the EEA, while the movement of Ukrainian citizens has been facilitated after Russia's invasion of Ukraine through a series of Directives and temporary mechanisms (European Commission, 2023).

³ The Treaty establishing the European Union, signed in Maastricht on February 7, 1992, brought a new impetus to European integration, including the free movement of persons within the common market, while subsequent amendments to the treaties reinforced these rights at the EU level.

Beyond the regulatory framework, labor mobility within the common market has been cyclical and moderate, at least until the successive enlargements of the European Union in Eastern Europe. Additionally, intra-European labor mobility, along with immigration flows from outside the EU, highlights the importance of wage disparities and economic structures in stimulating migration. Thus, although the EEC introduced free movement of labor among the six founding states, the number of foreign workers from other EEC countries was limited during the period from 1958 to 1973. There were no significant development differences among the founding states, including minimal wage differences, while labor markets went through critical periods in post-war Europe. Only Italian workers, predominantly from the less developed southern regions, migrated north in the first decade of European integration, primarily to France and Switzerland; however, their numbers decreased as Italy closed the development gap with the rest of the EEC countries (Molle, 2009).

The successive enlargements of the EEC and EU intensified development and wage disparities within the Union, which led to an initial increase in migration flows from the south and later from the east of the continent (Molle, 2009). The COVID-19 pandemic significantly disrupted intra-European labor flows in 2020, but by 2021, international labor mobility gradually recovered from the dynamics lost in the previous year. According to data from the Annual Report on Intra-European Labor Mobility, the stock of working-age migrants (20-64 years) from other Member States stood at approximately 10 million across the EU. The structure of mobility by the nationality of migrants has remained the same over the past half-decade, with Romanians being the largest group (27%), followed by Poles (12%) and Italians (10%) (European Commission, 2023).

The emigration of non-EU workers is more substantial than that of workers from Member States. From the early decades of integration, Member States have strengthened their recruitment efforts outside the EU to provide their growing economies with the necessary workforce, including by establishing recruitment offices in Mediterranean countries (Molle, 2009). The signing of the Association Agreements with the states of the Western Balkans and Eastern Europe, together with the flows of refugees coming via different routes from the Mediterranean, against the background of the labor shortage in the Western European economies, have boosted the emigration of non-EU citizens, who at the end of 2021, there were about 17 million people (European Commission, 2023). The fact that non-EU citizens constitute almost double the number of EU citizens who migrate/work in another member state, equally represent arguments for the hypothesis of international wage differences that determine international labor mobility, as well as for the hypotheses formulated by dual labor market theory and/or international systems, implicitly the structure of the capitalist world economy and the demand for labor in developed capitalist economies.

The imbalances and prospects of the labor market in the Republic of Moldova

The Republic of Moldova is one of the countries of origin of migrants in the EU, a fact that accentuated a deep demographic crisis. The UN report on the global population for 2023 states that the Republic of Moldova experienced one of the fastest population declines in the world - from about 4.5 million at the beginning of the 1990s, to about 3.4 million in 2023 - , while further declines are projected for the coming decades (UN, 2023). Similar findings are also expressed in domestic empirical studies, while the demographic projections made for the period 2019-2040, show that the decreasing population trends will continue in the following decades:

- pessimistic scenario – decrease by 34.5%, up to 1754.6 thousand;

- moderate scenario - a decrease of 28.2%, down to 1,924.9 thousand,
- optimistic scenario - a decrease of 21.5%, down to 2,094.5 thousand (Gagauz, et. al, 2021).

Additionally, domestic empirical studies indicate that emigration is responsible for 90% of the population reduction in the Republic of Moldova (Gagauz, et. al, 2023). According to provisional data published by the National Bureau of Statistics (NBS), the number of residents as of January 1, 2023, was 2,512.8 thousand people.

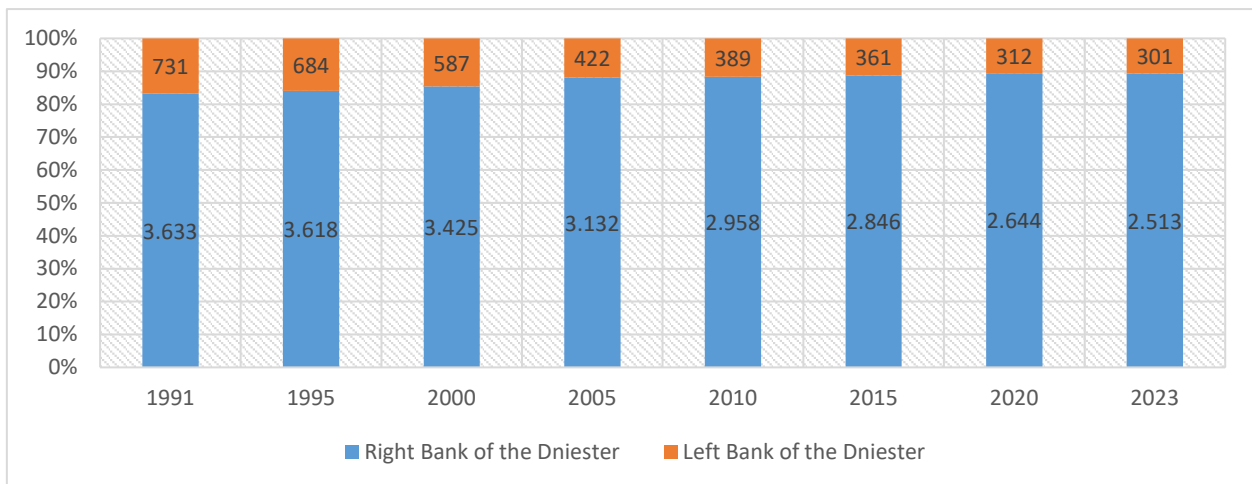


Figure 1. Population of the Republic of Moldova with usual residence.

Source: adapted by the author based on data from the National Bureau of Statistics (NBS) and the Statistics Department of Tiraspol.

Furthermore, the latest data from the National Bureau of Statistics (NBS) confirms that migration is primarily responsible for the country's depopulation, as the net migration of the population with usual residence has shown a declining trend in recent years, recording a negative value (-45.4 thousand people) in 2021 (Figure 2).

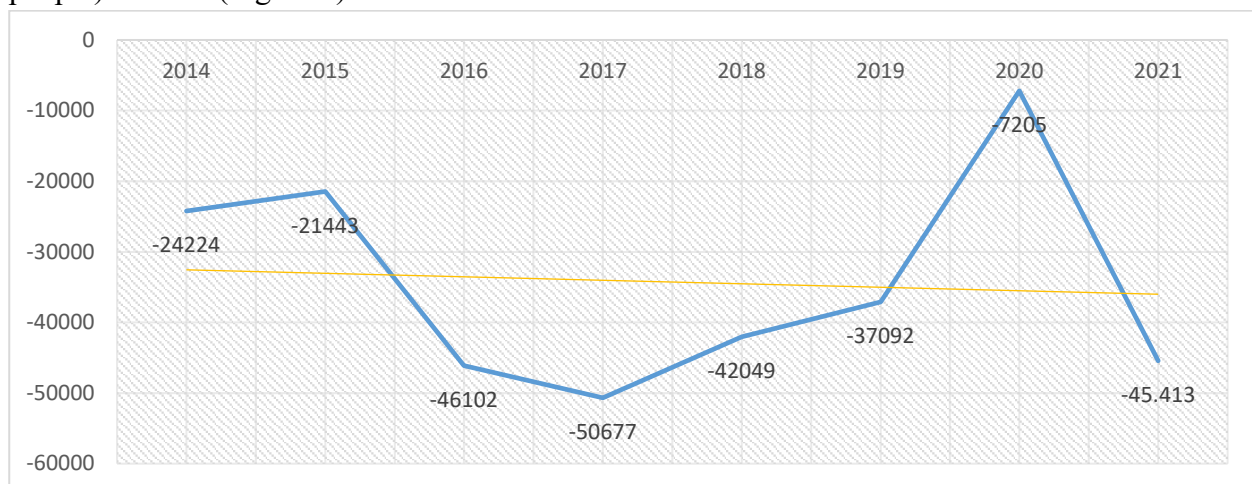


Figure 2. Net migration of the population with usual residence in the Republic of Moldova.

Source: adapted by the author based on data from the National Bureau of Statistics (NBS).

There are no exact data on the total number of Moldovan emigrants, but the trend of net migration of the population with usual residence over the last decade and the depopulation it generates are quite telling. Moreover, the demographic crisis that the Republic of Moldova is going through has deep

social, economic and political connotations, implicitly dramatic repercussions on the local labor market.

Consequently, net migration has become part of the development paradigm of the Republic of Moldova, expressed in three major dimensions:

- largely addressed negative demand shocks by reducing the unemployment rate, which has hovered between 3-5% over the past decade, and the unemployment insurance burden;
- personal remittances received by residents of the Republic of Moldova were comparable to exports and largely supported private consumption, respectively economic growth;
- Moldovan migrants have acquired entrepreneurial/managerial skills and qualifications, providential for the sustainable growth of the Republic of Moldova.

Migration theories and economic growth theories have often developed independently and separately, which is why the former were mainly concerned with the causes of international labor mobility (less concerned with the effects), while the latter mainly considered internal mobility /intersectoral labor (less international labor migration)⁴. The extrapolation of the neoclassical models of growth, however, allows us to find that labor emigration (L), i.e. the reduction in supply will reduce global production or Gross Domestic Product (GDP), although it may initially lead to an increase in GDP per capita inhabitant. Also, the theory of endogenous growth starts from the premise that the exodus of human capital (skilled labor) has a positive impact on the growth of host economies and a negative impact on the growth of home economies (World Bank, 2009).

Growing empirical studies on emerging and/or developing European economies find negative repercussions on labor markets, economic growth and convergence or on public finances.

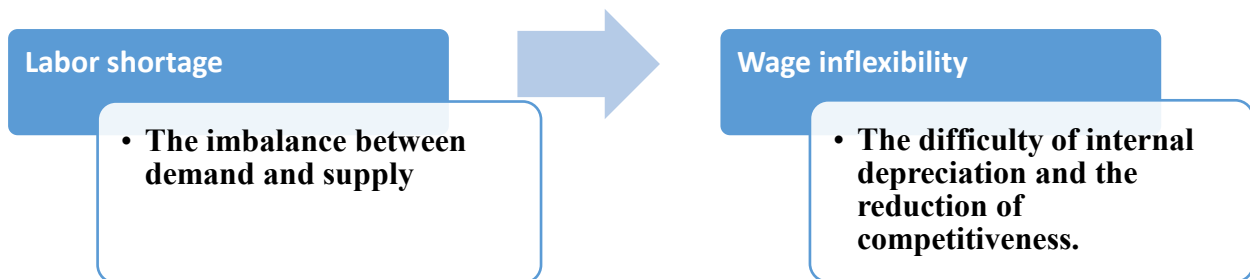
Following a series of studies concerning the Eastern European periphery that examine the impact of emigration through remittances or brain drain (Leon-Ledesma, Piracha, 2004; Ienciu N., Ienciu I., 2015), more studies are being developed that investigate the labor market and the macroeconomic effects of migration (Atoyan, et.al, 2016; Barrel, et.al, 2010).

The study conducted by the International Monetary Fund (IMF) in 2016 is by far the most explicit. IMF economists model the repercussions of emigration, including: a reduction in the labor supply (by 10-20%) and the exacerbation of the skilled labor shortage (brain drain); a decrease in the willingness to work, generated by remittances; a decline in competitiveness due to the increase in the unit cost of labor and the appreciation of national currencies thanks to remittances; pressure on public finances; and a reduction in potential economic growth and convergence with Western European countries in the EU (Atoyan, et.al, 2016). The pressures on growth are quite significant. IMF estimates indicate that migration reduced annual growth rates by 0.6-0.9 percentage points in some Southeast European countries between 1999 and 2014. Simulations suggest that net migration will continue until 2030, further reducing GDP and GDP per capita in all countries in the region (Atoyan, et.al, 2016).

Currently, there are no empirical studies modeling the relationship between net migration over the three decades of independence and GDP growth or decline. Remittances significantly fueled the economic recovery in 2021 and prevented a dramatic drop in private consumption and GDP in 2022-2023, amounting to about \$2 billion, of which 49.2% came from the EU-27 (BNM, 2023). However, the consistently negative net migration has contributed to significant imbalances in the labor market and the economy.

⁴ Starting from the hypothesis that, at the international level, labor is less mobile than capital, neoclassical economics has not given due attention to the relationship between international labor mobility and macroeconomic performance.

Moldova entered a recession in the third quarter of 2022 and has experienced negative GDP growth for four consecutive quarters, followed by a slow recovery in Q4 2023 and into 2024. This is not only due to overlapping crises (the war in Ukraine and logistical issues, the energy crisis, and inflation) and institutional imperfections but also due to two major imbalances that have emerged in the labor market:



Labor Shortage (Skilled Workers). According to the "Labor Market Forecast Report for 2023" from the perspective of employers, prepared by the National Agency for Employment (ANOFM), the labor shortage was felt by employers in 2022, with the majority being from the private sector (65%). In this context, 18% of employers (+2% compared to 2021) reported a lack of permanent labor, while approximately 10,000 vacant positions could not be filled throughout 2022 (Figure 3). Additionally, the labor shortage is not limited to the actual absence of workers in the market, but is also reflected in increased employee turnover and more frequent departures of staff (ANOFM, 2023).

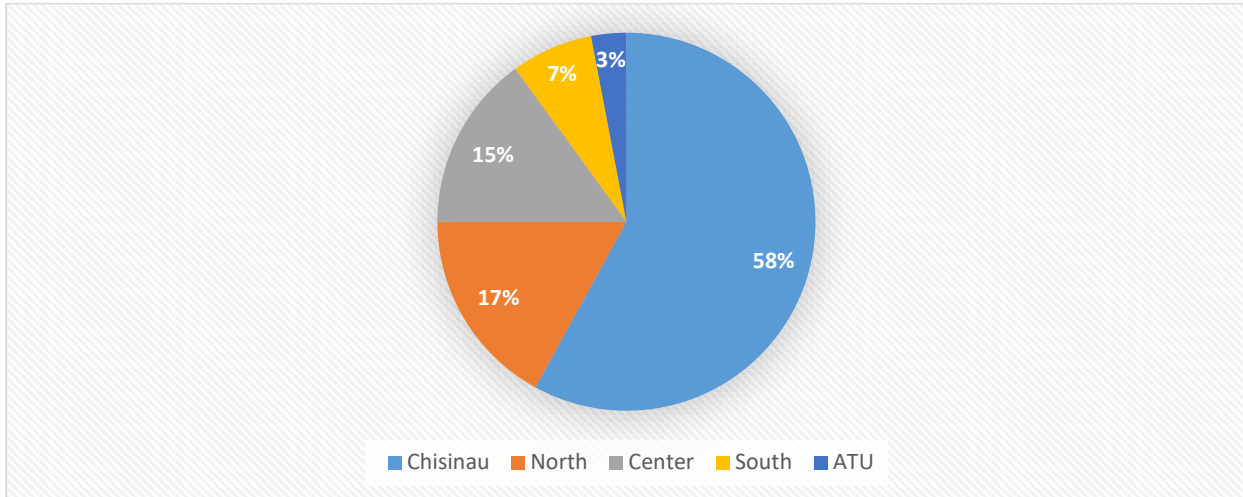


Figure 3. Territorial distribution of vacant positions for which there was a labor shortage, 2022.

Source: ANOFM (2023). "Labor Market Forecast Report for 2023 from the Perspective of Employers," p. 13.

The territorial distribution of the labor shortage is largely proportional to the distribution of economic activity in Moldova. Thus, 58% of employers reporting a labor shortage in 2022 are from Chisinau, while 17% are from the North Development Region, 15% from the Central Development Region, and the southern regions account for the smallest share (10%).

Notable reasons for the labor shortage from the employers' perspective, as mentioned in the ANOFM Report for 2024, include: lack of qualified staff with experience; a low number of applicants; and the inability to offer adequate salaries, among others (Figure 4).

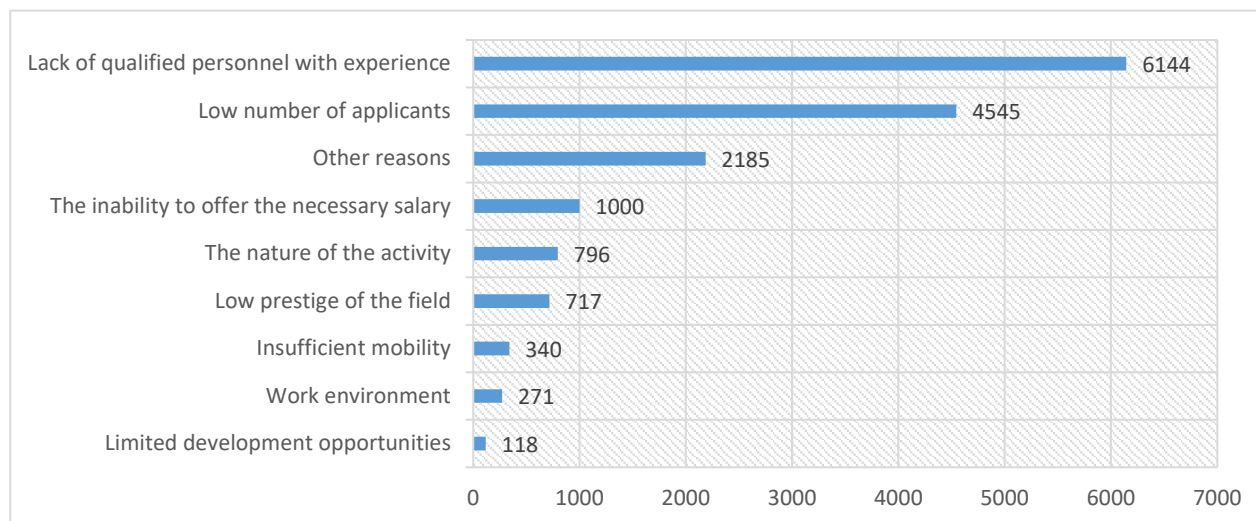


Figure 4. Reasons for the Labor Shortage

Source: ANOFM (2024). Labor Market Forecast for 2024 from the Employers' Perspective, p. 14.

Additionally, economic agents in the Republic of Moldova are forecasting a significant shortage of specialists in the public sector and in the real economy (primarily in the light industry/clothing, Transport, Trade, etc.) for 2024 (ANOFM, 2024).

Wage Inflexibility. This imbalance is largely driven by the labor shortage in the Republic of Moldova, which prevents the activation of the internal depreciation mechanism. Although intended as one of the key mechanisms for adjustment to asymmetric shocks within the theory of OCA, Joseph Stiglitz identifies some of the reasons why domestic depreciation does not work (referring to the Eurozone crisis): wages may not fall; the decrease in wages does not automatically imply a decrease in export goods, at least not by enough; falling prices may not lead to an increase in exports, at least not enough to balance the balance of payments (Stiglitz, 2016).

What has not been mentioned either in Stiglitz's writings or within the theories of optimal currency areas is that the mechanisms of adjustment to negative demand shocks – wage flexibility and labor mobility – are contradictory mechanisms within an integrationist project. Respectively, the negative net migration of the labor force solves the problem of unemployment, but does not allow the internal depreciation and the increase of competitiveness, since the low unemployment and the shortage of the labor force, as in the case of the Republic of Moldova, cannot lead to a decrease in real wages. The absorption of the unemployed by demand in the European market ensures better real wage rigidity in the context of demand shocks than strong unions or government interventions.

The identification of these contradictory mechanisms, implicitly the inflexibility of wages, does not in any way represent a call for "wage flexibility" in the Republic of Moldova in the context of negative demand shocks, especially since the workers in the Republic of Moldova are some of the lowest paid in Europe. The identification of pre-booked mechanisms represents a fundamental economic reality that does not allow for automatic adjustment through internal depreciation, proof that the negative demand shocks experienced by the Moldovan economy have become constant in recent decades, while external imbalances - the trade/current account balance deficit - are increasing.

Along these lines, the set of measures recommended by the IMF for all Southeast European economies facing similar challenges due to massive population outflows is, broadly speaking, applicable to the Republic of Moldova as well. Additionally, taking into account some specific characteristics of Moldova and its labor market, the necessary interventions can be designed along four major dimensions:



Therefore, the necessary interventions represent a phased and complex process that involves improving governance and modernizing state institutions, including strengthening the capacities of the National Agency for Employment (ANOFM) and the State Labor Inspectorate (ISM). Additionally, the interventions entail policies and tools aimed at qualitatively transforming labor demand by stimulating industrial sectors with potential for innovation and growth that can offer competitive wages. Increasing participation and reintegration requires that policies and measures focus on three main categories of citizens of the Republic of Moldova: citizens currently in the country, including women, youth, and individuals aged 55 and older; citizens who have emigrated abroad; and citizens from the left bank of the Dniester. Ultimately, the initiative entails a gradual and controlled liberalization of the labor market for foreign workers, taking into account the dynamics of the labor market and ensuring state security.

Conclusions and Recommendations

- The theoretical framework regarding the international mobility of factors of production, articulated over the last century, including international labor mobility, represents a fragmented set of assumptions that have largely developed in isolation from one another. Neoclassical economics opens the theoretical debate on the causes of international migration by focusing on wage and working condition differences between countries. Subsequently, the "new economics of migration" and dual labor market theory focus on conditions across various markets, linking migration to the structural requirements of modern industrial economies or considering it a natural reality of globalization.

- The theory of optimum currency areas, alongside integrationist theories, has formed the theoretical framework for the process of European integration, considering international labor mobility a necessity within integrationist projects - serving as the main mechanism for balancing asymmetric shocks within monetary unions. In this context, the effort to create a common/internal market includes the free movement of people - one of the fundamental freedoms of European construction, as stipulated in the Treaty on the Functioning of the European Union (TFEU).

- Labor mobility within the common market has been cyclical and moderate, at least until the successive expansions of the European Union into Eastern Europe. Additionally, intra-European labor mobility (approximately 10 million people), along with immigration flows from outside the EU (about 17 million people), highlights the importance of wage differences and economic structures in stimulating migration.

- Net migration driven by wage differences and demand in European markets has largely mitigated negative demand shocks and reduced the unemployment rate in the Republic of Moldova, which has fluctuated between 3-5% over the last decade. At the same time, the consistently negative net migration has significantly contributed to the demographic crisis facing the Republic of Moldova.

- The Republic of Moldova has experienced one of the fastest population declines in the world, according to the UN Global Population Report, while data from the National Bureau of Statistics indicates that the resident population reached approximately 2.5 million as of January 1, 2023. Furthermore, the persistently negative net migration has significantly contracted the domestic labor market and led to the lowest employment rate in Europe, which reached 40.5% in 2022.

- Personal remittances received by residents of the Republic of Moldova largely fuel consumption and economic growth, preventing a dramatic decline in private consumption and GDP in 2022. However, the consistently negative net migration equally exacerbates two major imbalances in the domestic labor market - labor shortages and wage inflexibility - which hinder long-term growth.

Recommendations: Policies and actions aimed at improving the labor market situation, mitigating existing imbalances, and enabling sustainable economic growth in the Republic of Moldova must be designed in a complex and coherent manner. Without being an exhaustive set of measures, they should include the following:

- Development of a theoretical framework and domestic empirical studies on international labor mobility, which would allow for thematic/sectoral modeling and systematically update public policy recommendations to address labor market imbalances and ensure sustainable economic growth.

- Improvement of governance and modernization of state institutions responsible (directly or indirectly) for the labor market in the Republic of Moldova, along with the implementation of relevant horizontal and sectoral policies, including reforms in the social security sector, modernization of the education system, and optimization of employment measures.

- Implementation of sectoral policies and measures on both the demand and supply sides of labor, including:

- Qualitative transformation of labor demand: stimulating the development of industrial sectors with potential for innovation and growth that can offer competitive wages.

- Increasing the participation rate of Moldovan citizens in the labor market, specifically: enhancing the participation rates of women, youth, and residents aged 55 and older; strengthening mechanisms for the return of emigrants, including measures to facilitate reintegration; and developing mechanisms for the reintegration of workers from the left bank of the Dniester.

- Establishing mechanisms for gradual, limited, and organized liberalization of the labor market for foreign workers.

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INTERNATIONAL TRADE AND FDI: TRENDS, CHALLENGES, CONTROVERSIES

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Abstract: *International trade and FDI are marked by new trends and challenges at the international level, and by a complex and constantly changing economic landscape. Factors such as sustainable development and the green economy, digitization and technology, geopolitical factors and innovative research methodologies significantly influence trade and investment. In the context of globalization, the growth of international trade, influenced by the increase in the share of services and electronic commerce and the decrease in FDI flows and the economic instability generated by the deglobalization of production, geopolitical tensions and fracturing along geopolitical lines and global value chains, are just some of the global trends and challenges in trade and investment, the overall landscape being much more complex.*

Key words: *trade, FDI, global value chains, world economy*

JEL: F1, F6, O1

1. Introduction

International trade in goods and services and foreign direct investment (FDI) flows are fundamental drivers of global economic interactions, which, in response to emerging challenges, are in continuous evolution. The traditional frameworks that once governed these interactions are being challenged and enhanced by trends and challenges. Technological advances, geopolitical shifts, sustainable development goals and changes in consumer behavior have reshaped the patterns and flows of cross-border trade and investment, with the international trade and investment landscape undergoing significant transformation.

At the center of these developments lies a fundamental reevaluation of how nations engage in trade and attract foreign investments. Traditional measures, such as tariffs and quotas, are now complemented by considerations of digital economies, sustainable practices, and regional integration efforts. Furthermore, the dynamics of FDI have evolved beyond simple capital inflows, encompassing knowledge transfers, innovation ecosystems, and strategic alliances that redefine global economic competitiveness.

The main goal of this work is to delve into the fundamental trends shaping global economic integration, as well as analyze the fundamentals components of the world economy: trade and investment, along with their evolution, trends, and future prospects for sustainable economic development and global cooperation in the 21st century.

2. Basic content

In a constantly changing world, trade and investment, which are the main engines of growth and catalysts of productivity, competitiveness and the integration of the world's economies into the global economic system, are influenced by new trends and challenges, generated by the phenomenon of globalization, which seeks to create a global system where people, goods, capital, etc., are freed from the geographical context.

An analysis of global macroeconomic indicators – GDP and trade – shows a continued upward trend; If until 1980 the growth was a slow one, after - with the intensification of the fragmentation of production processes and the development of global value chains, as well as the expansion of transnational corporations, international trade registered rapid growth rates of approximately 10% annually between 1980 and 2000 and an annual increase of 20% between 2000 and 2008. Following the major economic crisis of 2008, international trade experienced a sharp decline, followed by steady growth until 2014—when global political and economic events (the outbreak of the war between Ukraine and Russia, operations in the Gaza Strip, the escalation of conflicts between Iraq and Syria, the collapse of oil prices, etc.) caused a new decline. The COVID-19 pandemic was the “generator” of the collapse of trade operations in 2019-2020, due to the “closure” of borders and a drastic reduction in trade exchanges, particularly with China. However, after 2020, international trade experienced the fastest and broadest growth to date—resulting from the surge in online activity and the rise of e-commerce, which, since 2022, has held over 20% of the retail sales market. (World Trade Report, 2024)

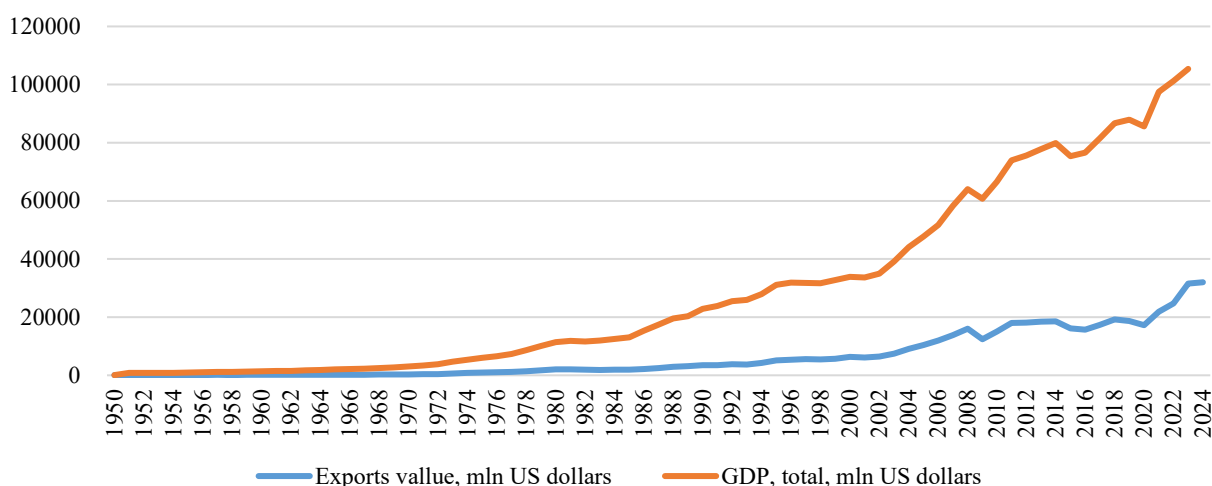


Figure 1: Evolution of trade and GDP

Source: developed by the author based on World Bank (GDP) and UNCTAD (Export) data.

From the graph above, it is evident that international trade has seen a continuous rise over the years, so that from 1950 to 2000, the value of exports increased more than 100 times – from 63 MLN to 6390 MLN; From 2000 to the present, the value of exports has increased more than 5 times, in 2023 the trade value being 32 TRLN US dollars.

Another evident point is that *the global economy is supported by the entire network of global value chains* (UNCTAD, 2013), and economic growth and development can occur only within a complex ecosystem based on economic development models focused on market liberalization, participation in global value chains, and a high degree of productivity. The latter are catalysts of economic development, where economic growth and competitiveness are interdependent, supporting the overall viability of an economy.

The current dollar value of global merchandise trade (measured by the average of exports and imports) decreased by 5% in 2023, reaching \$24.01 trillion. The decline in exports was driven by the Russian Federation, whose exports fell by 28%, as well as by Asian economies oriented toward

production, including China (-5%), Japan (-4%), and South Korea (-8%). Other major economies recorded smaller declines or even modest increases, including the United States (-2%), Germany (+1%), and Mexico (+3%). Overall, the European Union's exports to the rest of the world grew by 2%, while intra-EU trade decreased by 1%, leaving total exports unchanged in U.S. dollars. Meanwhile, imports of goods fell in most economies, partly due to declining prices for commodities such as natural gas, which saw an average price drop of 63% in 2023. All major economies recorded a decrease, except for a few large energy exporters, including the United States (+7%), the United Arab Emirates (+7%), the Russian Federation (+10%), and Saudi Arabia (+11%).

In the figures below, the overall evolution of international trade in goods and services can be seen, as well as the level of participation of the main actors in international trade:

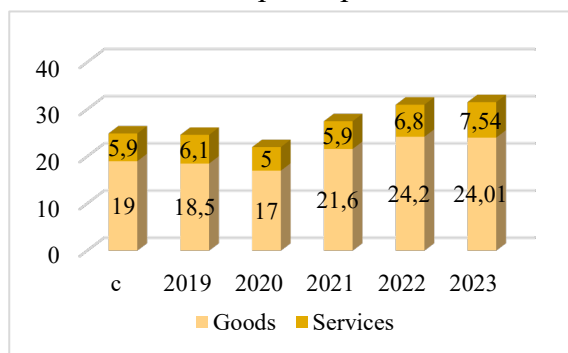


Figure 2: Global market for goods and services, in trln US dollars

Source: WTO. World Trade Statistical Review, 2023.

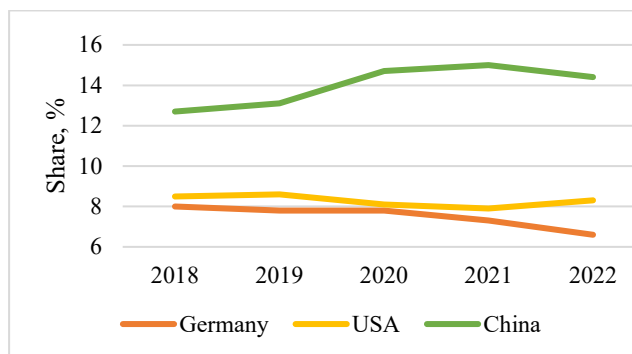


Figure 3: Top exporters of goods

Source: WTO. World Trade Statistical Review, 2023.

According to the *World Trade Statistical Review 2023* of the WTO, the top ten economies participating in international trade represent almost 50% of global trade: China (14.4%), USA (8.3%), Germany (6.6%), Netherlands (3.9%), Japan (3%), Republic of Korea (2.7%), Italy (2.6%), Belgium (2.5%), France (2.5%) and Hong Kong (2.4%). The first three of these, or the major economies participating in international trade flows, China, the US and Germany, control almost 30% of trade flows.

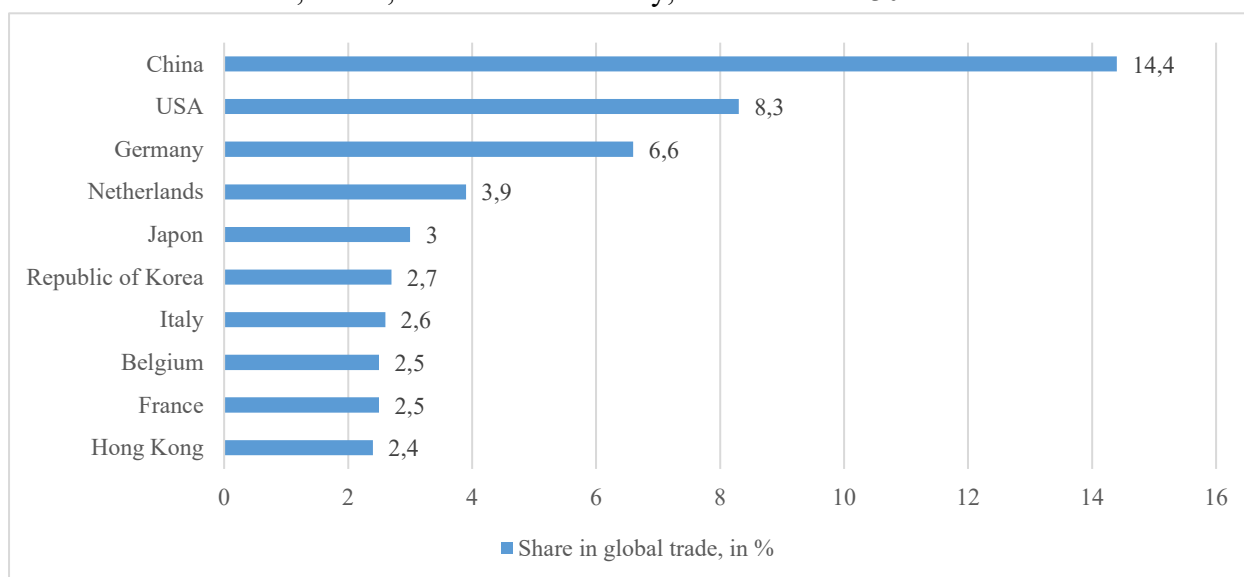


Figure 4: TOP 10 countries participating in international trade

Source: WTO. World Trade Statistical Review, 2023.

Since 2008, when China surpassed the major leaders in international trade—the USA and Germany, who alternated at the top position since 1982—China has remained the leading country in international trade and the largest exporter of goods worldwide, followed by the USA and Germany in second and third place, respectively. (UNCTAD, Trade Analysis)

According to the *Global Trade Outlook and Statistics* published by the WTO in 2024, **the volume of global merchandise trade is expected to grow by 2.6% in 2024 and by 3.3% in 2025**—indicating a rapid ascent and the achievement of new heights in international trade, projected to reach \$36 trillion by 2025.

For the first quarter of 2024, global trade trends have become positive, with the value of merchandise trade increasing by approximately 1% compared to the previous quarter, and services rising by about 1.5%. This growth, fueled by the positive trade dynamics characteristic of the United States and developing Asian countries, is expected to contribute approximately \$250 billion to goods trade and \$100 billion to services trade in the first half of 2024, compared to the second half of 2023.

According to the *UNCTAD Report on Global Trade* in 2024, trade growth varied significantly across sectors, with green energy and products related to artificial intelligence registering stronger increases. The commercial value of electric vehicles has also grown considerably, by around 25%.

In the context of geopolitical tensions, the trend towards renewables and technological advances, especially in artificial intelligence (AI), have led to an increase in government interventions in the economy. Developed and emerging economies focus on support measures aimed at increasing the competitiveness of strategic industries, supporting local companies to specialize and provide strategic products that meet environmental standards and market needs. Policies such as the US Inflation Reduction Act, China's Made in China 2025 initiative and the EU's Net Zero Industry Act are largely motivated by strategic considerations related to the rapidly evolving environmental, technological and geopolitical landscape.

How does this affect global trade? Political interventions take the form of industrial policy – which aims to increase the competitiveness and performance of specific industries to enhance adaptability to market demands and structural changes in the context of globalization. From a commercial point of view, the industrial policy aims at the development of SMEs and the cooperation between them, in order to substitute imports, support domestic producers and facilitate vertical consolidation; Such interventions usually have a negative effect on trade. All these trends can generate a series of global challenges in the medium and long term:

- **Increased concentration of supply:** Industrial policy may increase the concentration of the global supply of strategic products in even fewer economies. By providing substantial subsidies to their own industries, developed countries and major emerging economies are expected to enhance their global competitiveness in these sectors. This will impact not only their domestic markets but also the context of global trade, marginalizing smaller economies from entering these profitable markets, which could have significant implications for developing countries.

- **Fragmentation of global trade among major blocs:** The fragmentation of the market into major blocs, generated by geopolitical tensions, the revision of global value chains, the hegemony of developed states, etc., can have a significant impact on the market, characterized by increased trade costs, welfare losses, but also a divided economic landscape, with major benefits for developed economies and minimal for developing economies.

- **Increased protectionism, trade costs, and uncertainty:** Unilateral measures, such as industrial policies, frequently disrupt trade dynamics. As a result, trading partners may react by

imposing trade restrictions, increasing protectionist measures, and potentially engaging in retaliatory actions that threaten the integrity of the rules-based global trading system.

The positive outlook for trade growth presented by UNCTAD remains strong, indicating that the factors discussed reflect trends in trade activity rather than the overall value of trade. This highlights a hegemonic view of trade flows in favor of developed economies; the creation of "monopolies" in strategic sectors such as information technology, the green economy, infrastructure projects, and an uneven increase in trade, with high values for developed countries and multinational corporations, and low values for developing countries development and small and medium-sized enterprises (SMEs).

In addition to monitoring trade flows and global trends related to imports, exports, leading countries and strategic sectors, it is essential to study foreign direct investment (FDI) trends and prospects, which are essential to understanding the impact of globalization .

According to UNCTAD's *World Investment Report 2024*, in 2023, FDI flows reached \$1.33 trillion, marking a 2% decrease compared to 2022. This figure was influenced by significant fluctuations in a few European conduit economies. When excluding these conduits, global inflows experienced a decline of over 10%. FDI inflows to developing economies, which had shown resilience in recent years, dropped by 7% in 2023. In developed economies, net of conduit effects, inflows decreased by 15%. This decline was impacted by corporate financial restructuring, partly due to efforts to implement a global minimum tax for large multinational enterprises (MNEs), as well as a substantial reduction in the value of cross-border mergers and acquisitions (M&As).

In contrast, there was a slight increase in greenfield project announcements, both in terms of quantity and value. This growth was primarily driven by a rise in manufacturing industry announcements, marking a departure from a decade-long trend of decline in this sector. Chinese firms played a significant role in this uptick in manufacturing projects. Notably, the increase in greenfield investment was observed solely in developing countries, where the number of announced projects rose by 15%. In developed countries, however, new project announcements fell by 6%.

Developed countries represented 35% of global FDI flows, a share that has been steadily decreasing. It was only in 2019 that their portion fell below 50% for the first time. Despite this decline, developed economies continue to attract the majority of greenfield projects and international project finance deals.

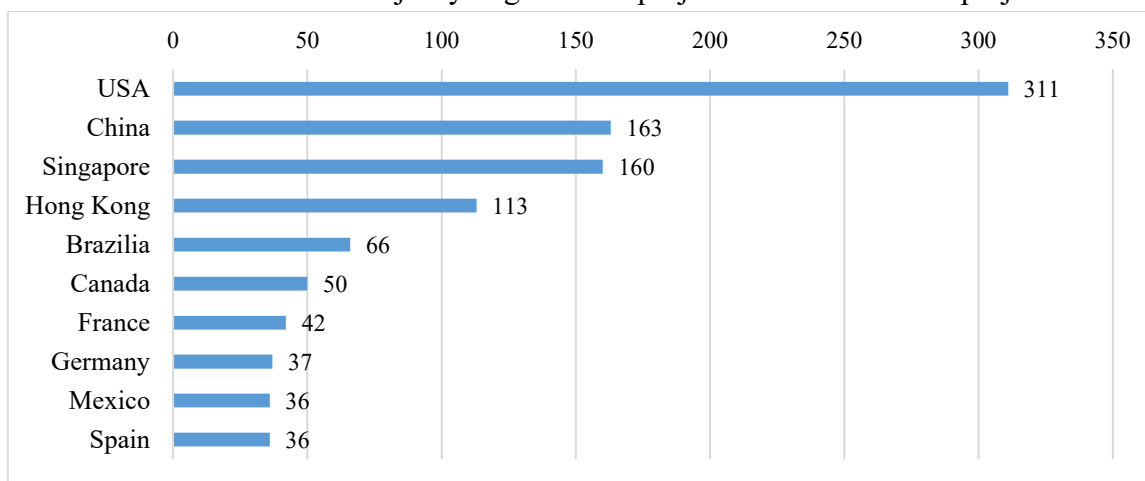


Figure 5: FDI inflows, billion US dollars, 2023

Source: UNCTAD. *World Investment Report 2024*

In developed economies, financial transactions by multinational enterprises (MNEs) contributed to fluctuations in FDI. When including conduit flows, the overall figure for FDI inflows reflects a 9% increase; however, excluding these conduits, FDI actually decreased by 15%.

On the other hand, inflows to developing economies fell by 7% in 2023, primarily due to an unusual downturn in Asia. Despite this decline, FDI continued to be the largest source of external financing for these economies, comprising 44% of total financial inflows for the year, while remittances, development assistance, and portfolio investment accounted for the remainder.

On investment outflows: In 2023, FDI flows from developed economies rose by 4% to \$1.1 trillion. Similar to FDI inflows, corporate restructurings in Europe had an impact on FDI outflows. Several investment-hub countries with significant conduit FDI experienced large negative outflows, though these were less negative than in 2022, resulting in a net positive gain. Excluding the effect of these conduits, global outflows were approximately 10% lower. More, FDI outflows from developing economies decreased by 11% to \$491 billion.

The United States and Japan were the leading home countries for investors in 2023. Outward FDI rose by 10% from the United States and by 14% from Japan, contrasting with the overall trend for developed countries. In Europe, outward investment decreased by 11% when excluding five conduit countries. Germany, Sweden, and Spain, which are known for their significant outward investors, all saw declines in their outflows. In contrast, FDI outflows from France, another major investor country, increased by approximately one-third. Among the 20 largest economies by outward FDI flows, Asian countries now account for nearly half (9 in total), with changes in the relative rankings of India and Taiwan.

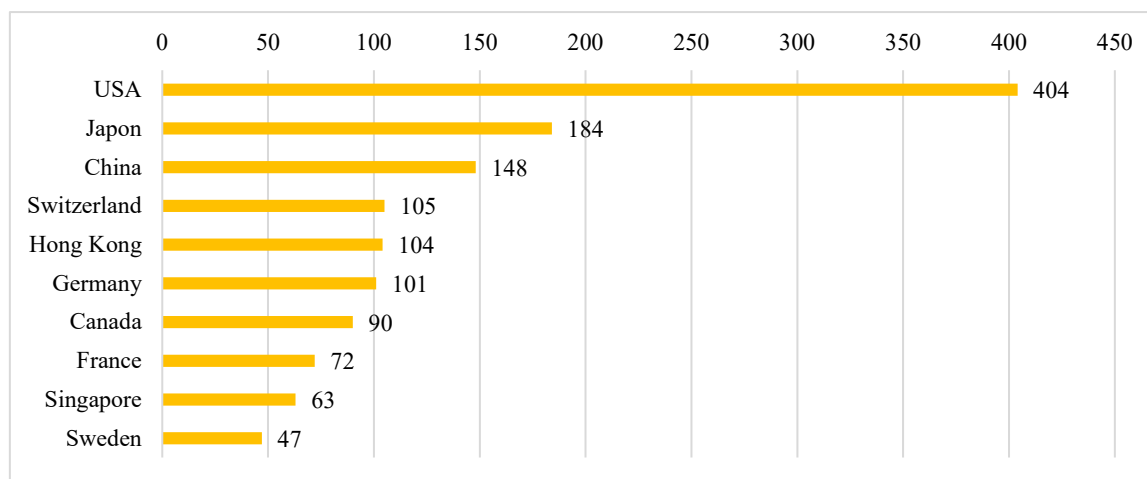


Figure 6: FDI outflows, 2023

Source: UNCTAD. World Investment Report, 2024

In 2023, greenfield project announcements, especially in industrial sectors, increased in both number and value, continuing the strong growth from 2022, particularly in renewable energy. Despite this growth, project finance, primarily in infrastructure, declined. Infrastructure projects are sensitive to interest rate changes due to their significant debt components, but overall values remained high compared to pre-2021 levels. A decrease in cross-border M&A values, especially in the ICT sector, contributed to this decline. The renewable energy sector led greenfield infrastructure projects, representing over 45% of announcements and 65% of expenditures, with announcements rising from

fewer than 700 in 2015 to over 2,000 in 2023. Additionally, investors tend to switch between project finance and greenfield FDI based on changing financial conditions.

The majority of greenfield projects of major interest for investors are in the field of: Electronics and electrical equipment (185 274 mln dollars), Automotive (90 979 mln dollars), Semiconductors (55 271 mln dollars), Machinery and Equipment (23 424 mln dollars) and Textiles, clothing and leather (17 062 mln dollars). The number of greenfield project announcements in digital industries fell by half – 187 projects in 2023, compared to 344 in 2022 and 378 in 2021. The value of these projects reached 20 382 mln dollars, the vast majority returning to e-commerce projects (102 projects, with a value of 17 178 mln dollars).

The report, titled Global Economic Fracturing and Changing Investment Patterns, warns that factors beyond economic determinants are increasingly shaping investment decisions, complicating standard approaches to investment promotion.

From the graph below, it is evident that the growth of FDI and global value chains is aligned with the growth of GDP and trade, indicating a significant shift in the global economy; Since 2010, global GDP and trade have grown by an annual average of 3.4% and 4.2% respectively, even amid rising trade tensions. Meanwhile, FDI growth has stagnated close to zero in recent years - being in decline.

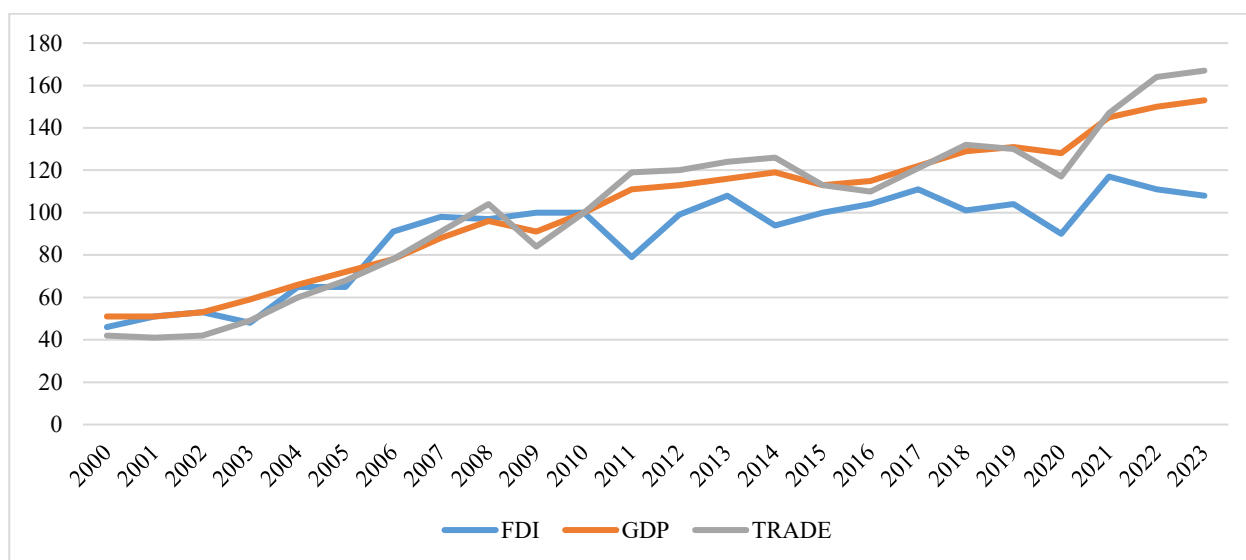


Figure 6: Foreign direct investment (FDI), gross domestic product (GDP) and trade trends, indexed 2010 = 100

Source: Adapted by the author from UNCTAD data, Financial Times Ltd, fDi Markets (www.fDimarkets.com).

This gap reflects increased investor caution due to changes in international production and global value chains, rising protectionism and rising geopolitical tensions. Given the trends and challenges outlined above, it is paramount for the world's economies:

-)} To review their economic development strategies and models, because the traditional dependence on investments no longer guarantees economic growth and development
-)} To strengthen relations with neighboring countries and regional cooperation, in order to strengthen regional value chains.
-)} To promote investments in sustainable and green technologies, as well as in other sectors, based on sustainability objectives and policy considerations.

3. Conclusions

International trade and foreign direct investments, which, among other things, are some of the main indicators of the economic situation and competitiveness of a country, know an evolution marked by the world economic and political landscape; The decision to invest, as well as the decision to trade or not, is deeply influenced by the geopolitical factor, by the objectives of sustainable development, by human capital and its ability to innovate, etc.

Actually, FDI flows are characterized by: Long-term stagnation; Deglobalization of manufacturing from an FDI perspective; The diminishing role of FDI in China; Fracturing along geopolitical line and the sustainability imperative. In the context of the sustainable development goals and the directives adopted by the countries and regions of the world in this regard, the FDI trends are facing an increased interest in sustainability, environmental objectives and sustainable technologies, the sector of green economy and all of its parts being of strategic interest for investors.

International trade, driven by the exchange of goods and services across borders, is undergoing significant transformations that complement FDI trends:

1. **E-commerce revolution:** The rapid growth of e-commerce is reshaping global trade patterns, enabling small and medium-sized enterprises (SMEs) to participate more actively in international markets. Platforms like Alibaba, Amazon, and eBay facilitate cross-border trade, offering new opportunities for businesses worldwide.
2. **Digitalization of trade:** This includes online payment systems, blockchain technology for supply chain management, and digital trading platforms.
3. **Expansion of trade in services:** Driven by sectors such as telecommunications, finance, and tourism, the cross-border movement of services is increasingly facilitated by advancements in communication technology and regulatory frameworks.
4. **Resilience strategies:** Businesses are diversifying their supply chains and adopting resilience strategies in response to geopolitical uncertainties and disruptions such as the COVID-19 pandemic. This includes reshoring production, nearshoring, and investing in dual supply chain models.

The outlook for international trade is positive, with expectations to reach \$36 trillion by 2025, compared to \$34 trillion in 2023. Conversely, FDI seems to be experiencing downward trends in the context of global political shifts, yet the same leading countries—primarily the U.S.—remain dominant in rankings as the world’s economic hegemon.

Given these developments, it is crucial for countries worldwide:

- } To review their economic development strategies and models, because the traditional dependence on investments no longer guarantees economic growth and development
- } To strengthen relations with neighboring countries and regional cooperation, in order to strengthen regional value chains.
- } To promote investments in sustainable and green technologies, as well as in other sectors, based on sustainability objectives and policy considerations.

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THE RISK - A LEADERSHIP STRENGTHENING RESOURCE

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Abstract: *the intention to trace a causal interdependence between the existing global risks and how they create a platform to remedy them through the direct involvement of a leader opens a wide space for extensive and intensive research. Examining the examples in this direction contributes through the factual specificity to the advance of some deductions. The discussed aspects, in the situation when uncertainty acclimatizes and becomes the natural element of reality, the leader profile as well as the leadership process will naturalize by accepting risk as a resource for development and strengthening.*

Keywords: *uncertainty, risk, leadership, degree of compliance, robustness*

JEL Classification: D 81, F60, F61

1. Introduction

It remains an ongoing challenge to define the sum of qualities and skills that would have the advantage of creating an adaptation to an increasingly uncertain environment with its many variations, thus requiring contemporary man to be exposed to turbulent situations as well as to remedy contortion by forming thresholds of resistance. As a consequence, uncertainty becomes an indication of modern reality, a fact demonstrated with the support of research through which we are encouraged to scale reality with the help of the World Index of Uncertainty [1]. Therefore, in accordance with the announced specificity of reality, scientific researches (Bloom, 2023) whose epistemic framework signals risk and ambiguity as derivatives of uncertainty are increasingly relevant. In other words, risk would be the first indicator to assess uncertainty, and once it increases, it increases ambiguity. By extension of reasoning, the more the gradation vector moves towards the area of risk and ambiguity, the more the results of decisions, following our actions, will be adrift. The layout of this observation helps us to identify a causal infogram between the development of a leadership model that acts in a contextual framework conditioned by risks [2].

The research results highlight the negative economic effects following shocks caused by uncertainty. As a result, we emphasize that not understanding or postponing analytical observations in order to identify a leadership development platform could make a decision-making institution vulnerable as it is meant to be. The incoherent and placid definition of the content of skills, competences, qualities would divert the expectations of the development of a model, endangering the pattern of its formation. From what has been said, it emerges that the environment of the existing reality with its challenges creates together with them the availability of identifying a leadership profile.

Such an approach facilitates the projection of hypotheses by which risks become indicators of leadership growth, provided that the leader manages to transform the consequences of the negative impact into a development strategy. To what extent the presented events reinforce this perception in the margin of the risk segment in an analyzed state space is the focus of this research. The foundation from which the argument starts is of an empirical nature, because it allows us to test the behavior, the action, the quality

of the decision of a leadership in which the risk is equivalent in a certain understanding to the "Mariana Trench", recognized as a major challenge. The potential of leadership is distinguished in this case by the feelings of security and protection, which decisively expand the adhesion space of its followers. What are the areas that create the pressure to develop a leadership to fit the response to certain challenges remains to be seen.

2. Materials and methods

The article starts from an axiomatic construct through which it tries to elucidate the leadership approach through the lens of risk theory increasingly seen as a formalizing indication of the reality we live in as well as a resource for exploring the possibilities of fighting its negative effects. Therefore, the stake of the research in question is exploratory and idiographic to create the necessary investigative path. For the data collection, the author chose questioning techniques, which helped to identify the causal loops between leadership - risk - the creation of a strategic vision, the manifestation of which is identified with the decisions of a leadership. The Global Risks Report, presented at the Davos Economic Forum, for the year 2023 served to identify the path of data collection downstream as a generative force [3]. The analytical processing of the data presented in the Report helped to substantiate some hypotheses, which in turn were exemplified with case studies. So, the hypothesis of the given study is the following: in the conditions of a reality in which the factors of turbulence and uncertainty are circumscribed to its description, the development of leadership provides the necessary platform to generate efficiency in conditions of high risk. Or, the risk becomes the resource to create a platform for enhancing leadership.

3. Results and discussion

3.1. Profiling Role Aspects Between Leadership and Manager

Starting from research that has identified the major distinctions between the role of leadership and manager, we found it necessary to offer a dichotomous interpretation of these roles, tracing the key components. In turn, the leadership role profile reveals the existence of a barycenter of influence, vision, and the ability to align with the tribulations of the human being for which he is ready to take high-scoring risks. In other words, the high risk becomes a resource for the growth of leadership, especially it feeds on the precondition of man to ensure his security and protection in all areas of human life. Thus, in the generality of its approach, risk in this elaboration designates an event that generates a negative impact on the reality in which man lives and acts. As a result, we advance the idea that the greatest "damages" produced by risk would be the weakening, worse degeneration or even atrophy of the mechanisms of robustness and securing vitality, in the conditions where reality itself invites us to see risk as a resource for strengthening resilience mechanisms. The leadership enhancement mechanism involves an action strategy in high-risk conditions, with the assumption of commitment that would reduce its exposure. The findings allow us to project a field of interpretation of the concept of leadership, as well as, by comparison, of the concept of manager, highlighting characteristics that contrast and create the imprint of some differences (Table 1)

Table 1. Distinction between the role of Leadership and Manager

<p><u>Leadership</u> boosts Create TOMORROW Vision Strategic Definition of objectives <u>Long term</u> scope <u>Unwritten</u> HIGH RISK question People courageous <u>Influence</u> Inspiration Commitment Context</p>	<p><u>Manager</u> Support Imitate TODAY Plans(Planning, personal remark) Tactical Putting the objectives into practice <u>Short term</u> Acts <u>Written</u> LOW RISK Answers things Lie <u>Control</u> education Compliance Content</p>
<i>Notional field of own interpretation</i>	<i>Notional field of own interpretation</i>
<p>The person who has the consciousness of belonging to a group / community for which he announces a commitment to create a unifying future, acting in conditions of high risk, with the assumption of the consequences of his decisions, the aspect of which involves the exercise of an influence capable of being the driving force of adhesion of others in achieving their goals.</p>	<p>The person who is aware of some professional attributions having decision-making leverage in order to identify and adapt solutions in accordance with certain protocols that are to ensure the overcoming of certain blockages.</p>

Source: According to Timothy R. Clark (2018), Character and competence in Leadership, Amaltea Publishing House, Bucharest, ISBN 978-973-162-180-7, [4, p. 81].

The concepts of leadership and manager, defined by the author at the bottom of the table, offer to interpret risk as a specific factor of the existing reality at the same time as a resource for strengthening leadership.

3.2. Risk - incentive to strengthen a leadership

The reference report Global Risks Report 2024 (GRPS) focuses attention on changes perceived as global risks with collapse effects, presenting them in a time horizon following the severity of their increase as well as the frequency of descriptors of a certain area of the existing reality. Global risk, in the given elaboration, is interpreted as "the possibility of the occurrence of an event or condition which, if it were to occur, would have a negative impact on a significant proportion of the global..."[3, 96]. The Global Risks Report sets the boundaries for a severity in future expectations by introducing the concept of structural forces to examine the impact of global risks over the next decade. The concept establishes the extent of their degenerative effects whose roots are: technological acceleration; geostrategic changes; climate change; and the demographic bifurcation. Each of these structural forces of the global landscape becomes the trial of the evolutionary aspects alongside the involutive ones that humanity is testing (Figure 1).

The contextual framework reverberates with the clustered construct of humanity today. It should be noted that climate change is seen in the trajectory of de-carbonization policies following the 2015 Paris Agreement, and the speed of implementation of these policies will determine future results. With a moment of attention, the list of risks with clear warning signs discusses the problem of the decrease of the source of fresh water, of the availability of hydrological sources, as a result the awareness of the agrarian system entirely dependent on this factor. As a result, climatic risks will cause discussions on the issue of food, water and health security, which will be factors to be taken into account for decision-making, especially as they could stimulate adverse effects such as migration, relocation of places of production and not only. Against this background, advanced technologies in the field of geo-engineering create expectations of recovery for developing economies. As for the technological changes, they aim at policies to regulate the border between man and everything that is anti-anthropocentric, i.e. machine. Geostrategic changes presuppose the identification of the source of concentration of geopolitical power, influencing alliances, the possibilities of alignment with power centers, an offensive and defensive decision-making framework on the part of political power. Economic power is increasingly contextually aligned with military power. As a result, power sources are increasingly associated with resource assets of raw materials converging with technological ones. And the demographic bifurcation explains the heterogeneous and disproportionate growth of the population, with Asia being the continent that will generate a continuous increase in growth. Indisputably, demographic changes involve related social and economic changes. The effects of the disparity between states with a continuing aging majority population, along with rising life expectancy and declining fertility rates are causal loops to reckon with. In turn, adaptation efforts trigger discussions about financial shortages, infrastructure investments, lack of economic opportunities.

The GRPS 2024 results set a predominantly negative outlook for the next two to ten years, with continued deterioration. The risks that will shape the global environmental landscape result from: Climatic, demographic, technological, geostrategic changes. And their generative effects group the palette of global risks into 5 categories: economic, environmental, societal, geopolitical, technological. The synoptic panel of turbulence specific to the reality we live in configures volatility and uncertainty as descriptors especially to be taken into account. Figure 2 covers the top 10 risks from a list of 34 presented, which provides clarity at the outset of the perceived severity of the risks ranked in the top 10 positions.

The analysis of the Report highlights some conclusions regarding the expected future whose circumscription conditions of reality are uncertain, vulnerable, with increasingly lower abilities to combat corrosive phenomena. Figure 2 projects that for the next 2 years Misinformation is perceived as the biggest risk we face, the dire consequences of which will degenerate trust in society, gearing the cumulative effect of eroding a societal and economic construct. Detection mechanisms involve not only skills of discernment but also of persuasion to purify the manipulative content, otherwise the consequences will trigger the cumulative effects produced: the fracturing between the segments of activities important for the social and economic life of a country, disrupting control over reality.

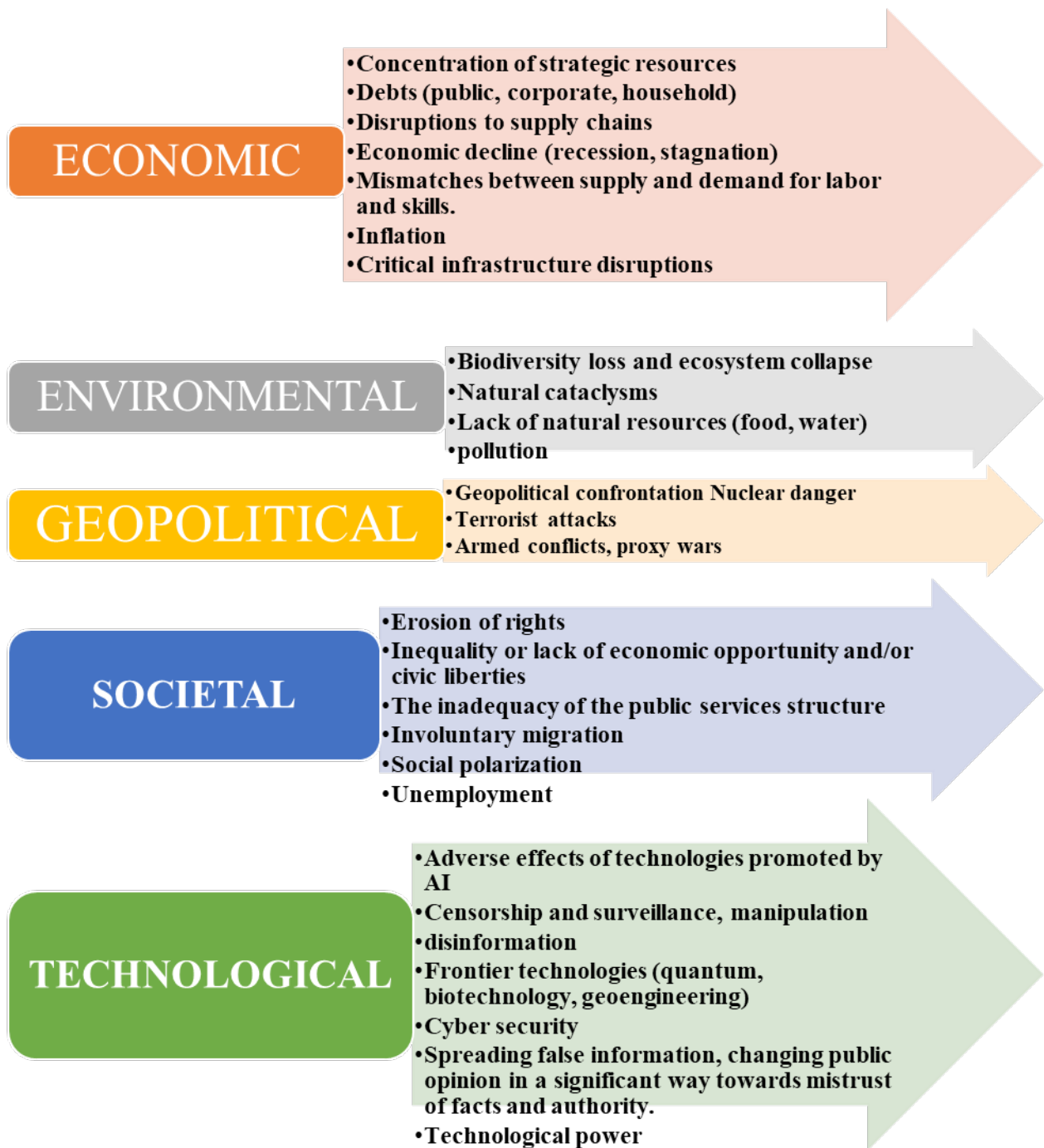


Figure 1. List of global risks included in the Global Risks Report, XIX edition, year 2024, the graphic presentation of the information belongs to the author.

Source: https://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2024.pdf, pp. 95-98.

The collapse will extend affecting the quality of the decision as an important protocol for leadership, especially they will be of an urgent manner. The Paradox of Information Accessibility forms a dichotomous paroxysm, distorting its quality, promoting censorship and restrictions. In these conditions, the resilience and robustness mechanism would be the development of a leadership whose profile coincides with the necessary qualities of adaptation and emergence.

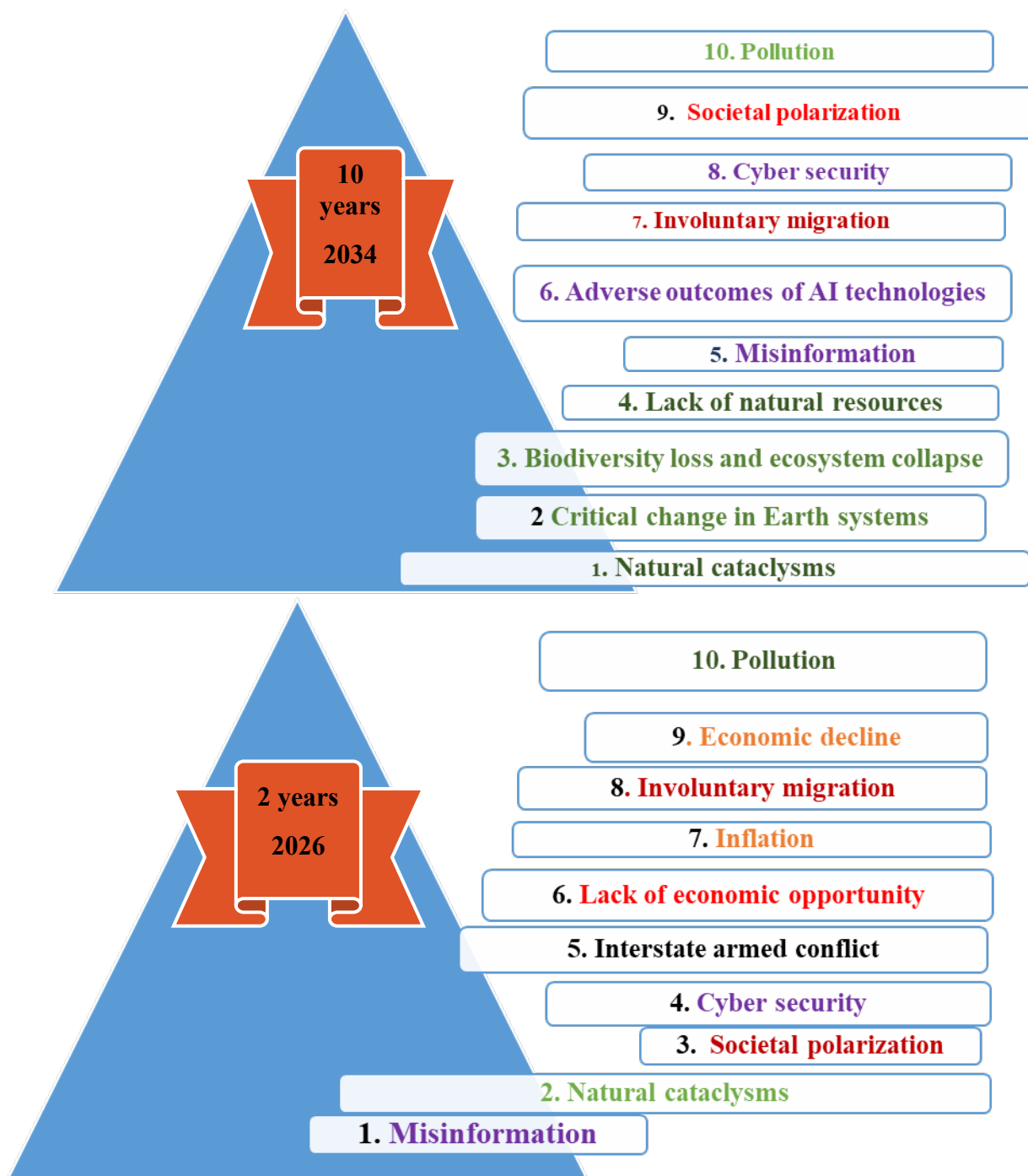


Figure 2. List of global risks seen in a 2-year and 10-year framework.

Source: The Global Risks Report (GRPS), 19th Edition, [3], pp. 7-15/37-44.

The graphic presentation of the information belongs to the author.

The outlining of a framework of possible risks for 10 years from now predicted encourages the identification of decision-making mechanisms whose attributive support would be the planning of activities and actions that are intended to prevent destructive and disruptive effects with everything that means the environmental ecosystem

Environmental and technological risks are among those expected to deteriorate the most in severity during this period and dominate the global risk landscape over the long term. The loss of biodiversity, the collapse of the ecosystem, the lack of natural resources, the growing social division to the extent of a disproportionate access to resources and advanced technological innovations are likely to cause

asymmetries in the development and remodeling of economies in the future. Moreover, the context of future risks advances increasingly conjugated disputes from technological power to technological war, terms that have entered the human habitat in such a way that they impose a rigid security agenda. “The widespread integration of AI technologies may create a new set of winners and losers in both advanced and developing economies” (3, p,54) Not for subsidiary, it is found that Artificial Intelligence will sensitize the market jobs ticking phenomena such as a saturated labor market, the crisis of new jobs, the withdrawal of jobs, retraining opportunities.

3.3. The remedial effect of risks promoted by leadership

The interest in the study of the Global Risks Report is determined at the same time by the ranking of their scaling at the level of states. Therefore, the study includes a ranking in which the principle of order mainly emphasizes the perception of risks for the respondents in a certain country related to the existing situation. The scaling of these risks is of interest as a way of analyzing and interpreting the leadership profile that acts based on the created situation. In Table 2 we present to your attention the perception of global risks depending on how certain countries order them. Risk categories also create a platform for distinguishing between states. We have chosen the states following the condition of regional representation according to the geographical as well as numerical principle. This is how we chose, following the evolution of the regional block of 10 states. The states that geographically represent Oceania are represented by Australia and New Zealand, in a smaller numerical proportion than the others.

Table 2. Risk scaling (first 5 positions)

	Order no	creep	1	2	3	4	5	Perception of Risks CUMULATIVE	Amount block
	1	Argentine	E	E	E	S	E	4E+ 1S	28 E
	2	Brazil	E	E	E	S	E	4E=1S	11 S
	3	Chile	E	S	G	S	E	2E+2S+1G	6 G
	4	Colombia	E	E	S	E	G	3E+1S+1G	5 M
	5	Uruguay	E	E	m	S	E	3E+1S+1M	
	6	Ecuador	E	G	G	E	m	2E+2G+1M	
	7	Canada	E	E	m	E	S	3E+1M+1S	
	8	US	E	S	E	G	E	3E+1S+G	
	9	Guatemala	G	E	S	m	E	1G+2E+1M	
	10	Costa Rica	E	E	S	S	m	2E+2S+1M	
	1	Bulgaria	E	E	E	E	E	5E	37 E
	2	United Kingdom	E	E	E	E	E	5E	5 G
	3	Bosnia and Herzegovina	E	E	E	G	S	3E+1G+1S	3S
	4	Czech	E	E	E	E	T	4E+1T	3 M
	5	French	E	S	E	E	E	4E+1S	2T
	6	Germany	E	E	E	E	S	4E+1S	
	7	greece	E	E	E	E	G	4E+1G	
	8	Italy	E	E	m	G	m	2E+2M+1G	
	9	Estonia	E	G	E	E	E	4E+1G	
	10	Romania	E	E	E	G	T	3E+1G+1T	
	1	Kenya	E	E	S	E	m	3E+1S+M	28 E
	2	Nigeria	E	E	S	E	E	4E+1S	14 S
	3	Morocco	E	E	m	E	S	3E+1M+1S	5 M
	4	Zimbabwe	E	E	E	S	S	3E+2S	2T
	5	Tunisia	E	E	m	S	E	3E+M+1S	1 G

	6	Egypt	E	E	S	E	G	3E+1S+1G	
	7	Ghana	S	E	E	T	E	1S+1T+3E	
	8	Angola	E	E	S	S	S	2E+3S	
	9	Cameroon	S	E	T	S	E	2S+2E+1T	
	10	Rwanda	E	m	S	m	E	2E+2M+1S	
	1	Bahrain	E	E	E	E	S	4E+1S	31 E
	2	Bangladesh	E	E	E	E	S	4E+1S	10 S
	3	India	T	S	E	E	E	1T+1S+3E	4 M
	4	Jordan	S	E	E	E	S	2S+3E	3 G
	5	Oman	E	S	E	E	S	3E+2S	2T
	6	Kazakhstan	E	E	S	m	G	2E+1S=1M+1G	
	7	Uzbekistan	E	m	E	m	E	3E+2M	
	8	Singapore	E	E	E	G	T	3E+1G+1T	
	9	Taiwan, China	E	E	G	E	E	4E+1G	
	10	Malaysia	E	E	m	S	S	2E+1M+2S	
	1	New Zealand	E	m	E	E	E	4E+1M	8 E
	2	Australia	E	E	E	E	m	4E+1M	2 M

Source: The Global Risks Report (GRPS), 19th Edition, [3], pp. 103-111. Tabular presentation of information belongs to the author. Legend of interpretation of symbols and colors: economic risks (E) - blue, societal risks (S) - red, environmental risks (M) - green, geopolitical risks (G) - yellow, technological risks (T) - purple.

An important remark for the interpretation of Table 2 involves detailing the aspects included in each risk category. Thus, in the category of economic risks, reference is most often made to: economic decline (in the first place), public debt, inflation, wealth/income inequality, illicit economic activity; societal risks include: erosion of social cohesion, censorship, freedom of expression, unemployment, involuntary migration, infectious diseases; geopolitical risks represent: weakening of the state, terrorism, armed conflict; technological risks are related to: disinformation, information manipulation, attacks on critical infrastructure; environmental ones: failure to adapt to climate change, lack of water supply, etc. Figure 3 shows the percentage share of global risks presented according to the data in Table 2.

Examining the bloc of states in North, Central and South America highlights the following trends. Well, Argentina is building its course in relation to the objective of the global energy transition. Possessing mineral resources such as copper in enormous quantities, Argentina by 2031 is projected to become the sixth largest copper producer. We remind you that Chile, from the same bloc of states, is the largest exporter of copper in the world, which is equivalent to 24% of world production and 11% of the country's economy, demonstrating consistency in this choice. The recently elected president of Argentina, Javier Milei, according to the data, is also targeting an economic growth objective by encouraging investment in the copper and lithium mining sector [5]. Against this background, the president's agenda has to face environmental restrictions that risk discouraging the set objective, and the synopsis of perceptions invoked in the table highlights this vulnerability for Argentina, (see Table 2) So, the economic objectives could degenerate into social risks.

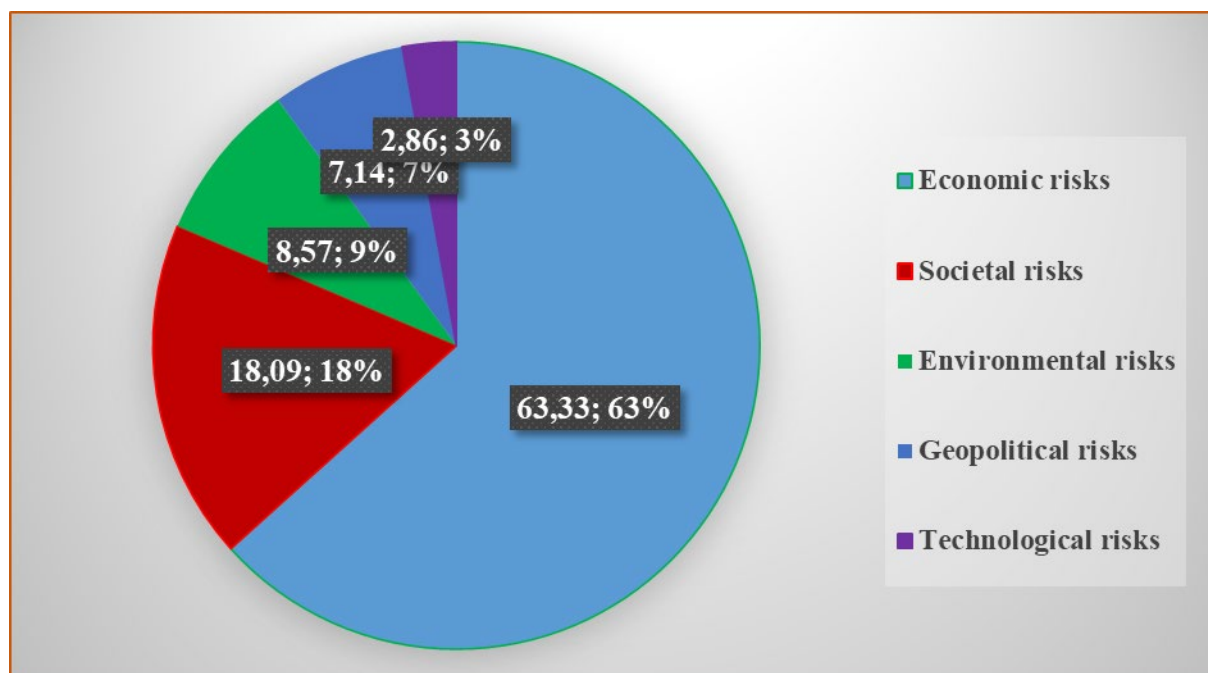


Figure 3. The percentage share of perceived risks established according to the data in Table 2.

Source: The Global Risks Report (GRPS), 19th Edition, [3], pp. 103-111. The graphic presentation belongs to the author.

Ecuador's economic, geopolitical and environmental risks are interpreted through a series of events selected from a kaleidoscope of news Good morning, the Ecuadorian authorities conclude an agreement with the IMF to support sustainable growth and the fight against drug traffickers [6]. In the same way, we notice that environmental vulnerabilities are on the agenda of the Ecuadorian authorities, especially since the country is facing environmental cataclysms capable of producing major emergency situations. The case of the electricity blackout throughout the country within 4 hours due to heavy rains proves this fact [7]. The eventuality of confronting the mentioned risks causes the authorities to align the action agenda with overcoming them.

According to the data in the same table, Guatemala is the only country in the American bloc for which geopolitical risks have created situations of force majeure, thus the position preceding the other risks is well founded. The obstructionist election of former president Bernardo Arévalo in August 2023 mobilized voters, with a support score of 58%. The political credo that made the current president victorious was the fight against corruption, social cohesion, democratization of state institutions, risks taken to create the flank of society's mobility [8].

The situation in the block of European countries arouses interest in the case of countries such as Bulgaria or Great Britain through the "monochrome" assessment of the risks whose focus is economic, according to certain observations. Examining the situation in Bulgaria, according to media sources, we find that there are vulnerabilities related to the phenomenon of corruption, a moment that prejudiced the partial entry into the Schengen area at the beginning of this year. The Financial Times reports "Sofia has had six elections in just over three years since former strongman Boyko Borisov was ousted in 2021 after anti-corruption protests. Another election is seen as likely this year after a vote in June failed to deliver a stable government. Bulgaria remains the poorest member of the EU, with a gross domestic product per capita one third below the bloc's average" [9].

Bulgaria's economic decline confirms the importance of a leadership whose contribution aims to eliminate or, in certain cases, mitigate risks. As we can see, the warning panel of risks, in the block of European countries, focuses on those of an economic nature, being shaped into geopolitical ones that generate the deepening of social faults. The example of France is eloquent in this regard. As an

example, with reference to recent events, we find "Even though ... there are ... the highest tax rates and public spending, many outside the big cities struggle to access health services, endure poor transport facilities and faced with a deteriorating education system. These regional imbalances fuel anger. Growing educational inequality, between those who know how to access a quality school and those who do not or cannot, raises parents' fears for their children's future. Most of the middle class is feeling the burden of taxes and is worried about slipping down the social ladder." [10]. The almost flow presentation of the existing situation creates convergence with the data in the table in which the Social Context in France tests the sensitivities of a leadership carried out [11].

The African continent highlights certain trends unlike the other two blocs of states analyzed. We observe that societal and environmental risks, in addition to economic ones, are numerically ahead. Ghana is included in the list of African states considered to be ore deposits. The given situation, even if it apparently promised the benefits of economic growth, regrettably caused environmental damage, a certain perception of social injustice and economic instability. According to a media source, the government has signed policies to regulate the mining sector in general, in this case regarding lithium. Ghana's lithium strategy is detailed in its Green Minerals Policy. Regarding the conclusion of the Agreements for the exploitation of lithium and gold deposits offered to foreigners by the Ghanaian leadership, civil society sounds the alarm considering them "colonial agreements" [12]. Nigeria according to data provided by the Western media under the leadership of the current administration is in a period of economic and social reform. In fact, literally The steps taken in this regard challenge the former image of the Nigerian state invoking a fight with the phenomenon of kidnappings) In fact, media sources confirm this fact "The vision is clear: to transform Nigeria into a center of innovation, production and trade that capitalize on its strategic position and human capital." [13].

The bloc of Asian states represents a mix of risks, however economic ones outweigh the other categories. A case with an extensive mix of heterogeneous risks is noted in this block of states. It is about Kazakhstan, To what extent the mix of risks triggers a platform to remedy them for a leader we will analyze below. It is known that the city-state of Singapore, through the voice of the prime minister, will mediate relations for its benefit with both the US and China. As the newly elected leader himself states "Singapore, which maintains friendly relations with both the US and China, is also navigating a more feverish geopolitical landscape in the Asia-Pacific region as a result of superpower rivalry" [14]. Singapore, otherwise known as the leader here, having a history of becoming a regional hub due to its location, today is increasingly competing with Malaysia for the data center industry. Concern for maintaining investment interest at this level is a future stake for Singapore [15].

In another region of the globe, the country-continent Australia, recognized for its large reserves of mineral resources, especially through reserves of uranium deposits, the Australian government supports the indigenous people in their effort to conserve the environment, even if the mining of uranium would create a loophole for the exploitation of energy transition with the help of nuclear energy. Therefore, the preservation of natural reserves remains an objective of sustainability translated into life [16]. It is an example of compliance between leadership and society. Thus, the data in Table 2 suggest a link between the leadership process at the level of decisions and the anticipation of possible risks.

Conclusions

The research infused situations in a factitious regime to find out about the power pattern of a Leadership. The examples presented highlight the approach of today's leaders to act by virtue of community or national requests in terms of increasing robustness in the face of risks.

The more leadership shows a degree of compliance to provide robustness in the face of risks, the more support it has for its decisions. More often than not, the approach to risks as a resource reinforces

this axiom, because leadership is committed to making decisions in order to overcome the risks it plans. The examples demonstrate: the switching in the risk space generates the influence power of the leader, it also stimulates the alignment to its objectives implicitly to the proposed agenda of actions, as a result it maintains the combustion of conviction for everything it does.

On the other hand, if the leadership fails to demonstrate, through its actions and decisions, that possible risks can be overcome, it will not strengthen a sense of adhesion and affiliation necessary for its perpetuation. It turns out that tomorrow's leaders will have support if they are able to "feed" us with certainty. The sledgehammer that we must anticipate in this request of ours for a leadership would be not to admit manipulation with the fears generated by the risks that reality offers.

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EMPOWERING WOMEN IN CYBERSECURITY: NAVIGATING CHALLENGES FOR A RESILIENT DIGITAL FUTURE

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Abstract:

In a global context characterized by a fast digital transition and a shortage of technical skills, promoting women in information and communication technology (ICT) and cybersecurity is becoming essential to reduce the workforce gap in the field and also to ensure a resilient and inclusive digital economy. Women, an underutilized source of talent, can bring innovative and various contribution, contributing to address challenges in ICT and cyber security. This article explores the issue of underrepresentation of women in cybersecurity, where they occupy only 25% of the roles available globally, despite recent initiatives aiming to change this status quo. The research methodology is based on a qualitative approach, using documentary analysis of relevant European policies and reports and articles. The research aims to answer the question “How can empowering women in cybersecurity, by overcoming existing barriers and building on European initiatives, contribute to a safer and more resilient digital future?” The study examines the structure and impact of European initiative, alongside with challenges faced by women in accessing and maintaining a career in this field. The results highlight that the European initiatives, such as Women4Cyber and Girls and Women in Digital, play a key role in bridging the gender gap in ICT and cybersecurity. Mentoring and educational programs developed under these initiatives have a positive impact on women’s participation in cybersecurity, but barriers related to gender bias and limited access to equal opportunities still exist. The contribution of this study is to highlight the importance of empowering women in cybersecurity and how the obstacles they face can be addressed through dedicated initiatives, essential for creating a supportive environment for women in this critical field. The study focuses on the European initiatives and future research may consider analyzing the initiatives globally. Furthermore, interviews with women cybersecurity experts may be conducted, thus providing deeper insight into the global dynamics of gender in cybersecurity.

Key words: women, cybersecurity, digital resilience, barriers, gender gap, European initiatives

JEL: J24, J16, I28, O33

1. Introduction

Digital resilience represents a major challenge in the digitalization era, but also a significant opportunity for cybersecurity development. In a dynamic and changing cyber landscape, cybersecurity experts face an unprecedented threat landscape, generating a need to attract and retain talent in the field, more than ever. The cybersecurity talent shortage, especially related to women, represents one of the most important obstacles encountered in strengthening this sector.

Despite some progress registered, women are still underrepresented in essential sectors such as ICT - Information and Communication Technology and cybersecurity. At European and international level this situation is acknowledged and represents one of the main concerns in workforce development strategies. Cybersecurity has been traditionally recognized as a technical domain. Currently it is regarded as encompassing multidisciplinary skills, including technical and non-technical competences, communication abilities, risk management and relevant policies and regulations knowledge.

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European and international programs and grant have been initiated to address this gender gap. Through its initiatives, the European Union demonstrates the commitment in reducing gender disparities and providing support to women in developing cyber carriers.

This research's objective is to investigate how empowering women in cybersecurity, by overcoming existing barriers and taking advantage of European initiatives, support a resilient digital future.

2. Methodology

A qualitative approach with a descriptive research design was the researcher's option in order to provide an overview of the representation of women in the cybersecurity field and the barriers encountered in developing a carrier in this sector. The research explores the challenges encountered by women and the initiatives aiming to support the participation of women in cyber field.

Secondary data from policy documents, reports, articles and studies were collected, aligned with documentary research methodology, with the aim of identifying relevant information related to women's participation in the cybersecurity field and current initiatives that support them.

Two key initiatives of the European Commission, namely Women4Cyber and Digital Europe Program (DEP)'s Girls and Women in Digital, were the author's option as case studies for research, for a detailed analysis, including analysis of the structure, objective and results of these initiatives, with the aim of providing an understanding of how these programs contribute to increase women's participation in cyber field and reduce barriers they face.

The first major assumption of the author is that women are still underrepresented in the cybersecurity workforce, limiting the diversity of perspective and innovative solutions, essential for addressing complex digital security challenges. A second assumption clarified during the research considered that women in cybersecurity face a range of systemic barriers that discourage them to enter or remain in this field. The third assumption of the research is considering that various European initiatives consisting in targeted programs to reduce the gender gap are essential in increasing the participation of girls and women in cybersecurity and ICT fields.

3. Results and discussions

According to ISC2 (2023), the global cybersecurity workforce increased with 8.7% last year and reached 5.4 million professionals (Figure 1). Considering the context of increasingly complex cyber threats and demand for cyber skills and solutions, this growth reflects a response to this situation. However, despite this growing, the gap between the need and their availability of cybersecurity specialists has continued to grow significantly. In 2023, the global deficit increased with 12.6% compared to the previous year and reached almost 4 million professionals. Europe is also facing significant challenges, with a shortage of around 348,000 experts.

This trend reflects a significant major problem for organizational security at global level, as skills gap mean that many organizations cannot effectively secure their systems against cyber threats. As cyberattacks become more sophisticated, the difference between the demand and the offer of specialists could influence the vulnerability of digital infrastructure at global level. Therefore, initiatives to attract more professionals in this field, education and training are essential, with a special focus on diversified workforce by promoting women's participation in cyber.

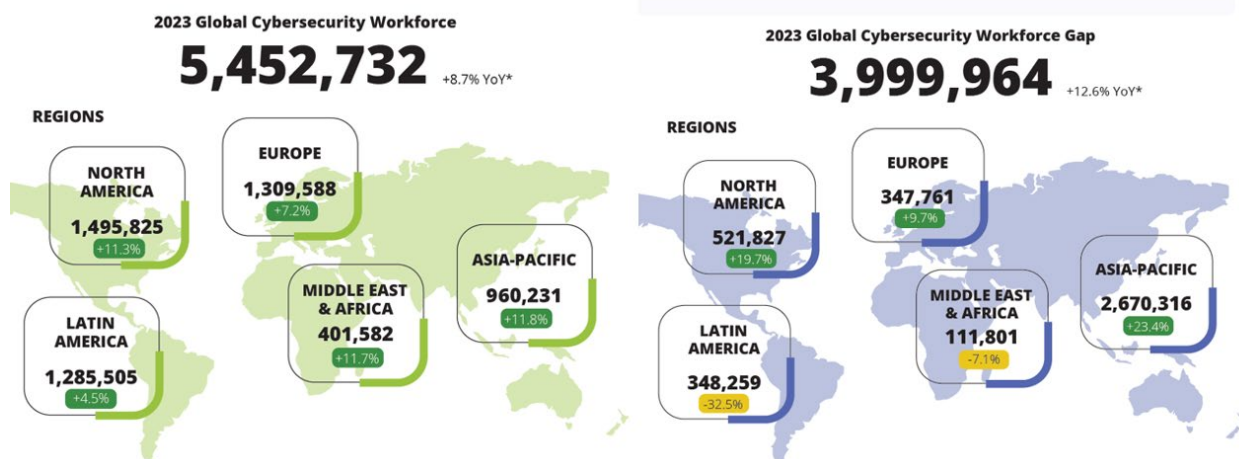


Figure 1. The cybersecurity workforce and gap

Source: [https://www.isc2.org/-](https://www.isc2.org/-/media/Project/ISC2/Main/Media/documents/research/ISC2_Cybersecurity_Workforce_Study_2023.pdf)

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3.1. Women representation in the cybersecurity workforce

In 2022, women represented approximately a quarter of global cybersecurity roles, which represents a significant increase compared to 20% in 2019 and only 10% in 2013 (Cybersecurity Ventures, 2022). This evolution reflects the recent efforts to attract more women in this critical sector. However, the percentage of women remains relatively low compared to men, indicating continuous barriers to women’s access and entering and advancement in cyber careers. Forecast is optimistic. It is projected that women will occupy 30% of cybersecurity jobs by 2025, and this percentage will increase to 35% by 2031, as shown in Figure 2. This potential growth could be attributed to the continuous effort to address the gender gap and to initiatives dedicated to education and training in STEM and cybersecurity. It will bring more perspectives and innovation, contributing also to digital resilience, through a stronger team in the face of complex challenges of the modern digital landscape.

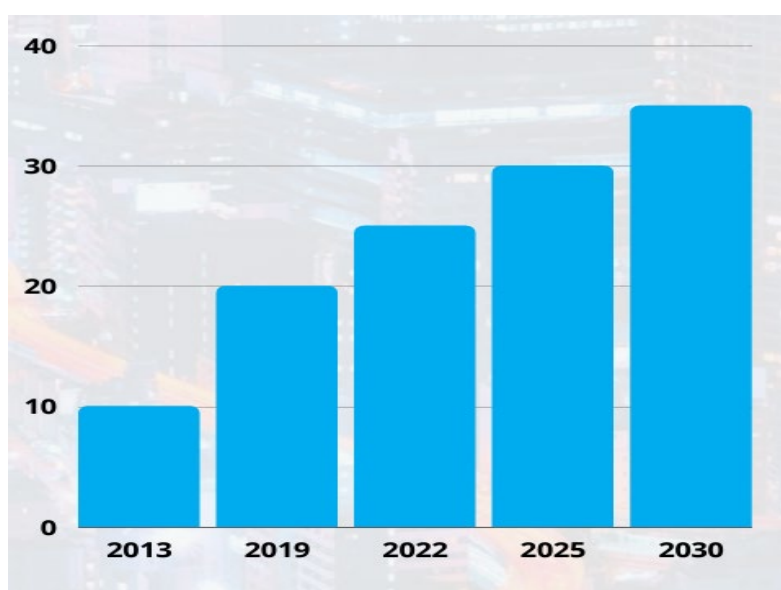


Figure 2. Representation of women in cybersecurity roles (%)

Source: <https://cybersecurityventures.com>

3.2. Key barriers to gender equality in cybersecurity

In cybersecurity field, women face a series of significant barriers that limit their participation in the field, and also their opportunities for career advancement. These obstacles, of a cultural, social and organizational nature, contribute to maintaining an underrepresentation of women in this critical sector, which requires advanced technical competences alongside with multidisciplinary abilities. (Women4Cyber Foundation, 2023)

The lack of confidence in their technical skills represents a major barrier for women which want to pursue a cyber career. Moreover, there is a false perception that this domain is strictly technical one and that women are less capable to perform advanced technical activities. This perception discourages women to develop the necessary skills to enter and advance in cyber field.

Many women are not fully aware of the diversified career opportunities available in the cybersecurity field that exceed traditional technical roles. The cyber field also offers various opportunities for specialists in law, risk management, and communication. The lack of visibility of these cyber career opportunities also contribute to the women's underrepresentation in this sector.

The cybersecurity is often perceived as a domain dominated by men, which discourage women to get involved. As a result, the gender stereotypes and less inclusive workplace perpetuate and women are not included and appreciated at the same level as their male colleagues.

The gender stereotypes and bias present in the cyber work environment also play an important role in discouraging women to pursue a career in the field. Women may often be perceived as less capable of performing technical roles, and their ideas and contributions may often be undervalued or ignored. These attitudes, along with the lack of equal opportunities for advancement, contribute to maintaining a gender imbalance.

Women in cybersecurity often face a lack of successful mentors and role models to guide them in their careers. Mentors play an important role in the development of professional careers, and their absence may cause less opportunities for advancement. Thus, mentoring programs are considered essential to improve participation and retention of women in this field.

The organizational culture and work environment in the cybersecurity field can often be unfriendly to women. They often face exclusion from informal networks, which are dominated by men, and could feel additional pressure to prove that they are as competent as their male colleagues. The workplace environment may also be characterized by the lack of flexible working policies, to ensure the balance between the professional and personal life.

Salary disparities between men and women represent an additional barrier to gender equality in cybersecurity. Women, even those who occupy similar positions with their male colleagues, are often paid less. This not only discourages them from entering the field, but also contributes to a higher rate of abandoning cybersecurity careers.

In addition to these obstacles, the lack of strong inclusion and diversity policies in many organizations that are active in the cybersecurity field must be highlighted. Existing initiatives are often insufficient to fully counteract the cumulative effects of these barriers and create a truly inclusive working environment.

According to Bagchi-Sen et al. (2010), the barriers that women face in advancing within cybersecurity are multi-dimensional, encompassing social, institutional, and personal challenges. Social factors include work-family conflict, the influence of informal networks, and societal expectations placed on women, which often pressure them to balance domestic responsibilities with demanding

cybersecurity roles. Institutional barriers consist of the lack of female role models and mentors, occupational cultures that are not always welcoming to women, and the demographic makeup of cybersecurity teams, which are predominantly male. The authors highlight that, while IT and cybersecurity share similar barriers, the personal factors—such as specialized cybersecurity skills, *work experience, knowledge in the field*—differentiate cybersecurity professionals from IT roles. (Figure 3). These personal factors are crucial for career success in cybersecurity, further emphasizing the importance of providing women with opportunities for skill development and mentorship to overcome these challenges.

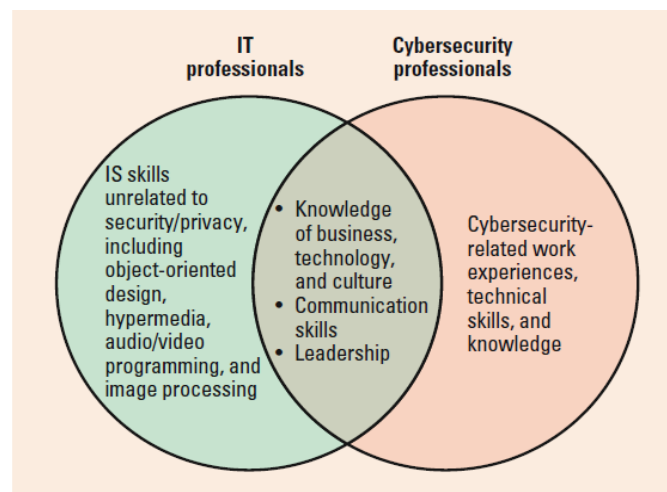


Figure 3. Barriers encountered by women in IT and women in cybersecurity

Source:

https://www.researchgate.net/publication/224110561_Women_in_Cybersecurity_A_Study_of_Career_Advancement

Giboney et al. (2023) recognize also that barriers to women's participation in cybersecurity are diverse and persistent, involving social, institutional, and personal challenges. Research reveals that social barriers include a lack of career awareness, misconceptions about cybersecurity being a male-dominated field, and fears of harassment. Institutional barriers are equally significant, such as the absence of role models, lack of mentorship, and workplace cultures that may not be inclusive of women. Additionally, personal barriers like inadequate skills, lack of *knowledge in cybersecurity, and work experience in the field*, further hinder women's ability to enter and progress in this field. These barriers are perceived differently depending on the career stage of the individual. Young women, in particular, express uncertainty about career paths and limited exposure to cybersecurity roles, while adult women, especially those early or mid-career, are more likely to report being underestimated or harassed in a male-dominated profession. Addressing these obstacles through improved awareness campaigns, mentorship programs, and more inclusive workplace policies is essential for creating a supportive environment for women in cybersecurity.

3.3. European context for promoting women in ICT and cyber

In recent decades, the European Union has recognized the essential role of information and communication technology (ICT) in *promoting the digital shift across economic and social areas*. Between 2013 and 2023, the number of ICT specialists increased by 59.3%, almost six times faster than the total employment growth. (Eurostat, 2024). However, women continue to be

underrepresented in this field, representing approximately 1 of 5 graduates and ICT specialists in the EU, with 19.4 % employed as ICT specialists in 2023 against 80.6 % men.

This underrepresentation of women in ICT led European institutions to develop policy and initiatives with the aim of enhancing the participation of women in the sector. In this context, the European Commission (2022) set up an essential framework that establishes ambitious goals for the future of the European digital economy. Among these, [one of the main targets is represented by the employment in the European Union of minimum 20 million specialists in ICT field until 2030](#), with a specific focus on promoting women in this field and also increasing the number of ICT graduates. The European Commission (2023) highlights the importance of digital skills for a successful digital transformation of Europe and identifies the urgent need to ensure an adequate number of ICT specialists and benefit from women contribution to reduce the talent shortage in the field and build an inclusive digital Europe.

One of the main tools developed to monitor progress in women’s inclusion in digital jobs and careers is the Women in Digital (WiD) Scoreboard. WiD scoreboard represents a mechanism to evaluate the performance of Member States regarding the Internet use, user skills, and employment in specialist positions. It offers a detailed overview of the level of integration of women in the digital economy, identifying gaps and areas that need improvement, and additional policies to ensure equal participation.

The “[European Union Agency for Network and Information Security \(ENISA\)](#)” (2019) is taking proactive steps to enhance its digital security capacities, recognizing that protecting its society, economy, and democracy requires strong cybersecurity measures. An integral aspect of achieving this goal is promoting diversity and gender balance within the cybersecurity workforce, which has been identified as a key factor for success. ENISA plays an active role in supporting initiatives that advocate for women in cybersecurity roles in various sectors, including IT security, IoT security, medical, transport, military and defense cybersecurity. ENISA emphasizes its commitment to creating an inclusive environment where women are valued, respected, and given equal opportunities, including equal pay and career development programs. Furthermore, ENISA's efforts aim not only at improving representation, but also at inspiring the next generation of young girls to pursue careers in cybersecurity, thereby changing societal mindsets and raising awareness about the importance of diversity in this growing sector. In this context, ENISA’s work contributes to a broader European strategy to close the gender gap in cybersecurity and build a resilient digital future by ensuring that the talent pool is both diverse and inclusive.

Girls and Women in Digital

The initiative “[Girls and Women in Digital](#)” and its call for proposal, launched by the European Commission (2024), is part of coordinated efforts to increase girls and women’s participation in ICT and cybersecurity. The initiative addresses a general context in which women remain underrepresented in ICT professions, despite the rapid growth of demand in this sector. Although in terms of basic digital skills, women register higher performance, they represent only 19% of specialists. The initiative is managed by the European Commission, Directorate-General for Communication, Networks, Content and Technology (DG CONNECT) and is part of Work program 2023-2024. The structure of this action is concentrated around several key objectives, aimed at supporting the commitment to reach the target of 20 million ICT specialists in the EU until 2030.

The objectives are clear and well defined, aiming not only at increasing the number of women in ICT, but also at building a network of expertise and involving the relevant stakeholders at the European level. Identification of the main obstacles that girls and women face in selecting and maintaining a ICT carrier, promoting actions and initiatives to enhance women’s representation in the field and building a network of relevant experts and actors represent the main objectives of the initiative.

The expected results encompass a detailed report that identifies the main obstacles women face in choosing an ICT career and proposes practical and effective measures that contribute to reducing the gender gap in this domain, an analysis of national and regional strategies to implement Women in Digital Declaration, including best practices and challenges encountered, establishing a platform where stakeholders can interact to evaluate progress and discuss new initiatives to promote women. The impact of these measures is expected to be significant in achieving the EU's goal of reducing the gender gap in ICT and increasing the number of women involved in this sector. By mapping and analyzing best practices, the initiative will contribute to changing the European digital landscape, facilitating a gender convergence that is essential for the digital success of Europe in the next decade. This initiative represents a major step towards bridging the gender gap in ICT. By identifying barriers, promoting concrete measures, and collaborating across sectors and relevant stakeholders, it will contribute to a more inclusive and equal digital environment. The results of this action will provide the European Union with valuable information on the effective measures needed to change the status quo and help build a more diverse and fair digital future.

ECSO “Women4Cyber” initiative

Initiatives such as “Women4Cyber”, launched by the “European Cyber Security Organization (ECSO)” in collaboration with the “European Union Agency for Cybersecurity (ENISA)”, aim to enhance the visibility and presence of women in cybersecurity, an essential field in the protection of European digital infrastructure. The Women4Cyber Foundation was created in 2019 as a [non-profit foundation based in Europe](#) focused on promoting and supporting the participation of women in the cybersecurity field and its journey is underlined in Figure 4 (Women4Cyber Foundation, 2023).

An essential element of the structure of this initiative is represented by national chapters that have a key role to play in facilitating local and regional collaboration to support the increase in the number of women in cybersecurity. Each national chapter operates as an extension of the main foundation, offering direct support to women established in that country through mentoring, education, and networking.

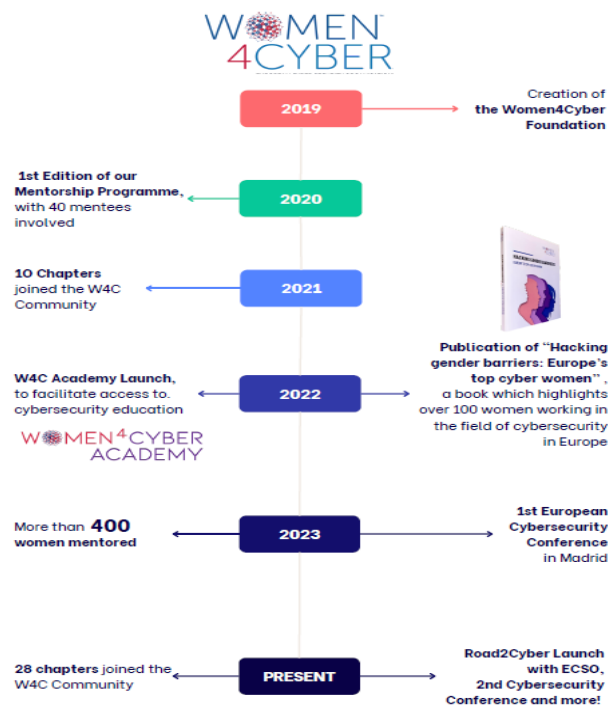


Figure 4. Women4Cyber’s journey

Source: <https://women4cyber.eu>

In 2021, Women4Cyber registered a significant growth of its community, expanding by 10 national chapters, and in 2024 the network reached 28 chapters, including many countries in Europe, thus demonstrating a broad coverage and extended commitment to support women in cybersecurity, as shown in Figure 5. Each national chapter has the objective of promoting the activities of Women4Cyber at the national level and adapting the initiatives to the specific needs and challenges of each region (Women4Cyber Foundation, n.d.).



Figure 5. Women4Cyber Chapters

Source: <https://women4cyber.eu/>

The main objectives of Women4Cyber are increasing the number of women in cybersecurity, in technical and nontechnical roles, through mentorship and education, establishing a support network at European level, including the national chapters that facilitate collaboration and mutual support

among women, and reducing barriers that women encounter in cybersecurity field, including gender stereotypes, lack of success models, and limited access to development opportunities. (Women4Cyber Foundation, n.d.).

According to Women4Cyber Foundation (2023), since its launch, Women4Cyber has achieved important results in terms of increasing women's participation in cybersecurity, namely more than 400 women who benefit from support through the mentoring program launched in 2020, contributing to their career development and professional confidence. Furthermore, the Women4Cyber Academy, launched in 2022, facilitates access to high-quality educational resources in the field, helps to reduce the skill gap among women, and contributes to new generations of women specialists. Moreover, through the additional national chapters included, the support network has expanded, thus consolidating the collaboration between professionals from various countries and cultures. Women4Cyber and ECSO promote a common platform, Road2Cyber, to bridge the cybersecurity talent shortage and increase diversity in the field by optimizing hiring processes, offering specific training suggestions, and actively motivating women to participate in the cybersecurity community. Women4Cyber and its network of national chapters play a key role in tackling the challenges women face in the field of cybersecurity. To address the lack of confidence and skills, the initiative helps women, through mentoring and educational programs, develop the necessary skills to excel in this technical domain and gain confidence in their abilities. Women4Cyber contributes to change the perception that cybersecurity is a male-dominated domain, offering visibility to successful women and creating support networks that encourage women to pursue a career in the field. The lack of successful mentors and success models is addressed by mentoring programs and publications that provide concrete examples of women who achieved to overcome barriers and excel in this complex domain. (Women4Cyber Foundation, n.d.).

This analysis details the structure, objective, and results of Women4Cyber and highlights the impact of this initiative in increasing women's participation in cybersecurity by overcoming the barriers they face, supporting the third hypothesis.

4. Conclusions

Promoting women in ICT and cybersecurity proves to be essential to reduce the workforce gap in the field and also to ensure a resilient and inclusive digital economy. Women, an underutilized source of talent, can bring innovative and various contribution, contributing to address challenges in ICT and cyber security. Their deeper integration into the digital workforce is a strategic step, recognized at European level. EU policies and dedicated initiatives support active participation of women, tackling the barriers they encounter and providing essential resources for career development in this critical sector.

Despite recently registered progress, women remain significantly underrepresented in cybersecurity, with 25% of global roles, limiting diversity and innovation in the sector. Traditional barriers continue to represent major obstacles that prevent the potential contribution of women in this field. Perception of cybersecurity as a male dominated field, gender stereotypes, lack of mentors and role models, lack of confidence and skills development need to be underlined. Addressing these obstacles through awareness campaigns, mentorship programs and policies dedicated to inclusive workspaces, is essential to create an environment that support women in cybersecurity field.

European initiatives have an essential role in addressing these challenges. Programs and initiatives such as Women4Cyber and DEP – Girls and Women in Digital offer specific support through

mentorship programs, training and professional network, important to enhance women’s participation in the field and to create a safe and resilient cyberspace. These initiatives contribute not only to the paradigm shift in the perception related to women’s role in cyber field, but also to consolidating an inclusive framework for professional development.

The implication of this research highlights the importance of empowering women in cybersecurity, through addressing the existing barriers and benefiting from the specific European initiatives, thus contributing to a safer and more resilient digital future. These efforts could be expanded by initiating new educational programs starting at secondary school and high school level, thus creating a continuous flow of qualified women for future ICT careers.

Research limitations include the dependency on secondary data and the analysis of specific initiatives, which, while relevant, do not provide a complete overview of the barriers and challenges women face in [cybersecurity at global level](#). Additionally, the research focuses on the European initiatives, which limits the applicability of the conclusions. Future research may consider expanding research globally and conducting interviews with women cybersecurity experts, thus providing deeper insight into the global dynamics of gender in cybersecurity.

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THE HEDONIC PRICES CONCEPT OF AGRICULTURAL LAND IN THE EDINET DISTRICT BY USING A SPATIAL AUTOREGRESSIVE MODEL FOR THE SUSTAINABLE RURAL DEVELOPMENT EVALUATION

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Abstract. *The aim of the paper is to identify the regression methodology capable of evaluating land resources in the Republic of Moldova under the aspect of criteria for the consolidation of agricultural land. The value of the plots in the sale-purchase process denotes an autoregressive spatial dependence in which the endogenous value of the market price is mutually influenced depending on the locality, the area, the creditworthiness of the land, the exposure and others. The autocorrelation coefficient is an indicator of the attractiveness of agricultural land in terms of further use for specific purposes (location next to the access road contributes substantially to the market price and adjacent location to rural settlements or economic units intended for storage/processing of agricultural production also considerably affect supply and demand). The fact that the price of parcels in sales-purchase transactions supports a non-stationary behavior according to the Dickey-Fuller test, imposes the hedonic approach in the evaluation of land resources. The spatial econometric model with lag (SAR), which includes the autoregressive component, makes it possible to eliminate the trend with negative effects in the assessment of the market price of agricultural land at the moment represents an appropriate tool in the market analysis of land transactions. The advantages of the SAR implementation in determining the optimal value of agricultural land in the Edineț district allowed the adequate calculation of the price of 8130 plots, in the commune of Zabriceni. The adjacency matrix W in the SAR model is identified by means of the value of sales-purchase contracts registered in the year 2022 in volume of 73 traded parcels. The agricultural land cadastral factors that are included in the spatial autoregressive model are evaluated according to the INGEOCAD maps for the respective year. As a result of the verification of the degree of correspondence of the agricultural land prices evaluated by the SAR method with the offers proposed by professional cadastral appraisers, the significant difference according to the Students' t distribution is lower than 5%. In this way, we can state that the hedonic prices of plots are adequately evaluated and the spatial autoregressive methodology proposed in the paper can be implemented in the practice of land transactions.*

Keywords: *hedonic price, autocorrelation coefficient, spatial econometric model with lag, Edineț district, INGEOCAD*

JEL: C01, C23, E31

1. Introduction

Concerning to 2023 year one may affirm that being endowed with agricultural black earth and a temperate climate, the Republic of Moldova during its history was based in a large measure on the agriculture and it has 2493 thousand of ha agricultural ground. The available total surface of 3384,9 thousand of ha is divided approximatively in 91% of rural environment and 9% urban environment. The utilization of agricultural areas includes approximatively 73,6% from the total surface of the fields of the Republic of Moldova. In accordance with the official statistical data 74,9% from agricultural fields are arable and only 10,8% from these ones are covered by perennial plantations

[1]. The forests cover approximatively 13,8% from the total surface of the fields. In accordance with the local cadastral code the surface of the land resources may be structured in the following way:

- 75% from the territory is covered by the black lands;
- 28,8% of population is occupied in the agricultural sector producing 15 percent from GDP of the country;
- 51,1 % of population lives in villages;
- 69% of the fields are being in private property.

Table 1. The primary information referring to the surface of the agricultural fields and number of transactions of purchasing-selling in the period of the 1999-2023 years

Years	Number of transactions selling purchasing, unities	The surface of the land sold-bought, ,ha		The market price selling-purchasing		The weighting of the surfaces sold-bought, %	The total sum of the transactions Selling-purchasing	
		Total	In calculation at a transaction	Lei MD/ha	Dollars USA/ha		Millions lei MD	Thousands of dollars USA
1999	1931	1454,0	0,75	3323	315,75	0,08	4,83	459,1
2000	9753	7338,0	0,75	3687	296,54	0,40	27,05	2176,0
2005	47382	21825,0	0,46	4778	379,21	1,18	104,28	8276,3
2015	30805	18379,9	0,60	17757,2	943,72	0,99	326,36	17345,5
2016	305514	18201,0	0,59	22556,5	1132,14	0,98	410,55	20606,1
2017	30224	18082,0	0,60	27356	1479,50	0,98	494,65	26752,3
2019	28550	17215,8	0,60	23542,6	1286,50	0,93	405,31	22148,1
2020	27480	16392,1	0,66	19422,8	1121,41	0,88	318,38	18382,3
2021	24362	14490,5	0,59	27434,8	1551,74	0,78	400,16	22633,4
2022	17829	11787,5	0,66	43946,7	2326,45	0,63	518,02	27423,3

Source: elaborated by the author on the basis of collected primary data

In the Republic of Moldova, the contribution of the agricultural sector to GDP recorded an abrupt diminution in the last 20 years from 30-35% in 2000 year until 12-13 % in the present period. Parallel, the weighting of the labor force in agriculture decrease from 40-45% till 30-35% in 2023. This tendency of diminution is much more stressed in comparing with other countries of the region (such as Georgia, Belarus and Azerbaijan). The migration of the population led a real deficit of labor force in the rural environment and the percentage of the rural population remained nearly 40-45 % in comparison with 55-60% in 2000 year. Concerning the revenues, the agricultural sector is being recorderd the smallest middle monthly revenues comparatively with other economic sectors evolving from 500-600 lei in 2004 to 1200-1800 lei in 2011 year. Referring to the 2023 year the smallest values of the profit of monthly middle salary were recorded in the activities of agriculture, forestry and fishing with a value of about 7000 lei. The agricultural sector in the Republic of Moldova is being distinguished as one of the biggest levels of using of agricultural field, the arable grounds

representing 55,1% from the total of these ones. But under the aspect of economic efficiency the land stock with agricultural destination in a large measure is broken up as a result of the reform of land from 1998. In comparison with the countries of the European Union (EU) the Republic of Moldova generally has a more reduced agricultural productivity being influenced by more factors as for example the outdated agricultural infrastructure in certain zones, the limited use of the modern technologies, the brokening of agrarian fields, the limited access to the financing for agricultural investment and climatic fluctuations [2].

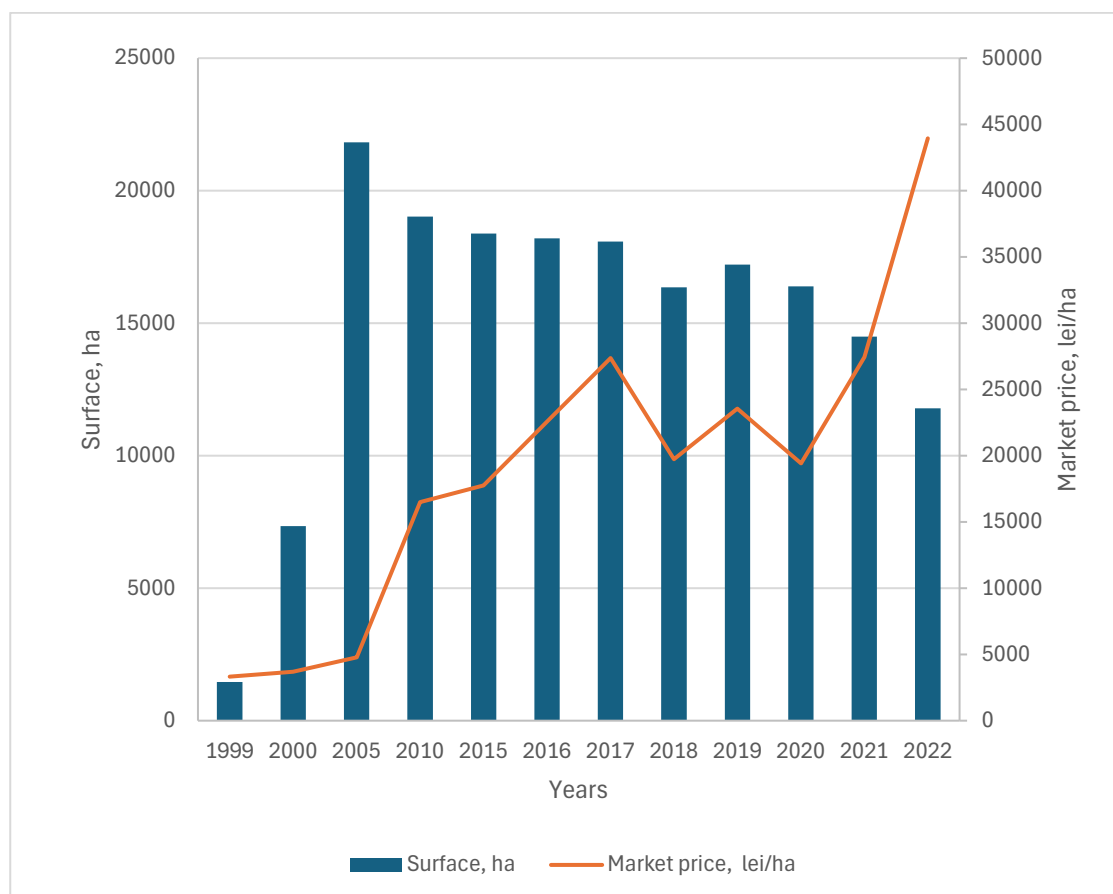


Figure 1. The market price of selling-purchasing depending of the area of the sold-bought land by years

Source: elaborated by the author on the primary collected data

The well-balancing of the agrarian sector in the total of the investments in the fixed means had activity, forestry and fishing constituting 7,7% in 2020 year, 9,3% in 2021 year and 12,5% in 2022 year noticing the tendency of increasing of this indicator. For all that the deficit of financing for the agriculture remains significant (60-70%) but the trade balance records a negative tendency on the fond of a significant increase of the import of the agricultural products in comparison with export. Concerning the export, the Republic of Moldova principally dominates in the sector of alcoholic beverages though the weighting of these ones exports decrease from 45% in 2000 years in 22-23% in 2012. Others important products for export are fruits, nuts, seeds and oleaginous fruits. It is also being noticed that the Republic of Moldova is the unique in the world whose territory is covered by

black soil. The structure of the agricultural grounds by its allowance (grad/ha) the following: the compass of 81-100 represents 26%, the compass of 71-80 represents 20%, the compass of 61-70 represents 15%, the compass of 51-60 represents 15%, the compass of 41-50 represents 11%, the compass of 21-40 represents 6% and the compass of 0-20 represents 7%. Having achieved the land reform in the Republic of Moldova the structure of the land fund (stock) includes in accordance with the destination the following components:

- With agricultural destination – 59%
- Forest -13%
- Emergency (spare) -14%
- Waters -3%
- Industry and transport -2%
- Localities -9% [3].

The land market in the Republic of Moldova is relatively young. During of the period of 20 years of functioning it passed thoroughly changes concerning the structure of scientific reasonable transactions of the calculation of the market prices, the operativity of effecting transactions etc. On the basis of the cadastral systematized is being recorded a dynamic tendency of rising of the prices on the market of the farm fields in the Republic of Moldova. The agricultural farm land market constitutes an important factor in the formation and development of the most competitive of juridical and organizational of the land use by forming of the best surfaces. In the last decade in the Republic of Moldova more and more actively goes the process of farming land markets and particularly of the grounds markets with agrarian destination. In the business environment of our country rises the understanding that the land is not only a principal producing factor but it is also a valuable active that can generate comparable revenues with the investments in the financial instruments. It is evidently that the investments in the farm lands are exposed to great risks as a consequence of the land market badly developed, the absence of a transparent objective information regarding the land value [4].

In a such conditions a very important role below to an adequate evaluation of the lands with agrarian destination. So more important became the land evaluation for the determination of the land tax being an important source of forming the local budget. Analyzing the country situation, we can affirm that the market of the farm land is at a level of development weak enough. This market is being characterized by an absence of a unique base concerning the present prices of transactions with agricultural fields. Every company creates its own data basis. The creation of a data basis with real prices of transactions from the contact of selling-purchasing would present a positive step in developing of a land market but at the moment we have significant differences between the indicated prices in the contracts and real ones [5].

In the result of analysis of land costs, the primary data referring to the number of transactions of selling/purchasing and paying price (in leis and dollars USA) are presented in the table 1. In the context of the market of agrarian lands the direct selling represents only a third of total transactions. The others two thirds consist in legacies, gifts changes, long terms leasing and inclusion in the capital of the enterprises yearly about 17,0 thousand of hectares are sold constituting 1,0% from the total of the private agricultural lands (1701,86 thousand ha), the rest of 2,0% being assigned to other types of transactions. It is a significantly the fact that in accordance with the Agency of Public Services, every 30-35 years (the average being of 33 years) the agricultural grounds change their land owner reflecting the longevity of a generation of active farmers. This information underlines the importance

of transactions diversity in the market of agrarian land and the cyclic implication of the properties change in the economic dynamic of the sector.

Subjectively, the approach of the land market imposes the modality of the grounds change by the decision of the owner. As we have already mentioned one can affirm that about one third from these transactions brings to the selling of the lots, supplementary another third the decision of changing the owner confines himself to the legacy or gifting and the arrears in a volume of a third supposes the modalities of alternative transitioning. According with the table 1 it is evidently the upward trend in the number of transactions of selling-purchasing and the paying cost in national currency is in increasing. The big differences concerning to the unitary price for a hectare for different periods of time are caused of the technological factors of the lots (the distance till the mayoralty of the commune, the distance till the road with a rigid cover, geographical exhibition, preponderantly to southern, height on the slope and bonity as well as of the economic factors (the rate of the profit of the National Bank of the Republic of Moldova, the inflation and the currency course). One may affirm from the data of the table 1 that the average value on the market of a one hectare of agricultural ground in the study period rised from 3,4 thousand lei per hectare in 1999 till 19,7 thousand lei in 2021. The graphic presentation of the upward trend in the dynamic evaluation of the selling-purchasing market price is exposed in the figure 1 with the surface of achieved transaction area in the left part and in the right part of the image is scale concerning the sold-bought total plots of the parcels in ha [6].

During the years the level of the information quality is diverse too. If in 1999 year were recorded in total only 1933 of transactions on a surface of 232 hectares then the calculations of the value estimation for the 2016 year based on 367 thousand of hectares. It is evidently that the level of veracity of the selected information in 2016 is higher. Among the general factors influencing directly on the selling purchasing cost of the forum land are:

- raising of maturity level of the market;
- ration between demand and offer;
- investment policies;
- subvention policies.

At the same time the graphics analysis of the average value of the farm lots shows yearly us that during the study the ground value was exposed to diverse developing stages: increasing, stagnation and even failure. It is reasonable the question under the action of which factors the average value of market of the agricultural grounds are in failure. One of the most foreseeable factors that devaluates the far lot is the high inflation of the national currency yearly, only because of the inflation. Because of inflation, annually the value of the land falls by approximately 10 percent. The high rate of inflation has negative influence on the value of agricultural land [7].

2. Material and methods

The model of evaluation of land with agricultural destination as every economic model reflects certain basic cadastral relationships but cannot escape the economic reality in its entire intricacy the model of evaluation of lands with agricultural destination offers a schematized image of essential feature considered by the researchers from here is the major importance of economic theory for the success of modeling.

The scientific understanding of the economic theory permit the selecting of essential variables, the establishment of interdependence relations. In the process of econometrical modelation it is

necessaire the formalization of the relations between the categories economical definite primary as model of model. In this way is being made up the qualitative model of the process phenomenon the model that is being fixed as diagrams of waves. The interdependence between the phenomenon are being described in the form of equations but the parameters of the variables characterize the structure of the relation between the variables. Conceptually the elaboration of the methodology of achieving econometrical models for evaluation impose the necessity of defining endogen factors (influencing the market price of the lots) and of the exogen factors (causatives characterizing physical and chemical properties or technological of the lots being in the gestion of the owners).



Figure 2. Interface of Database Navigator DBeaver with indication of the bill of fare and portfolios structure with making evident the inserted objects

Source: application interface DBeaver

The determinative factors of the cost of the agricultural lots on the land market from the Republic of Moldova may be characterized from the point of view of the primary cadastral information from the Data Bases of *LC_cadastr.dbf*. The principal instrument for achieving the collection of technologic parameters of the cadastral unities represents the application of DBeaver being universal data basis open-source supporting a wide set of primary data in the format SOL, NoSQL and others. It also allows the utilization of the medium of traditional programming with an interface comfortable for the current work with data basis the drawing up and modification with economic analysis of reference [8].

Database Navigator represents an interface and medium of programming defining the structure and the and the content of database in accordance with the figure 2. For opening of the data base *LC_cadastr.dbf* in the medium Windows we apply the bill of fare *View*, by which is being opened the cadastral structure of data base and the windows afferent to the types of endogen and exogen

variables. Structurally the data base is presented in format of tree of the objects inserted as notions apart consist of the following elements:

-portfolio with cards concerning to the SQL scriptures of primary processing of cadastral data the endogen and exogene variables;

Table 2. The land market analysis for 2018 year in accordance with administrative regions of the Republic of Moldova

Regions		Number of transactions	The surface of the territories sold-bought, ha	The market price selling-purchasing, lei/ha	The total sum of selling-purchasing payments, lei
North region		110775	7146	21196	151472605
1.	Balti	122	78	47530	3708200
2.	Briceni	480	307	14861	4555679
3.	Donduseni	493	368	27350	10063297
4.	Drochia	559	526	20235	10650594
5.	Edinet	1158	829	18652	15456055
6.	Falesti	509	269	23974	6441472
7.	Floresti	220	203	20412	4153682
8.	Glodeni	1040	573	24830	14223581
9.	Ocnita	833	664	25610	16999092
10.	Riscani	1405	915	22991	21033380
11.	Singerei	1365	592	28081	16618673
12.	Soroca	2591	1823	15121	27568900
Center region		10049	5247	20928	109813003
13.	Chisinau	307	165	1011484	16711151
14.	Anenii-Noi	807	777	14094	10947087
15.	Calarasi	701	206	18125	3742578
16.	Criuleni	113	129	25192	3244191
17.	Dubasari	470	253	21287	5379718
18.	Hincesti	832	339	14861	5040827
19.	Ialoveni	1265	549	33130	18186366
20.	Nisporeni	893	362	15474	5599744
21.	Orhei	1750	733	14597	10706173
22.	Rezina	254	225	21739	4882081
23.	Straseni	666	271	15807	4290606
24.	Soldanesti	1064	618	14118	8729603
25.	Telenesti	254	147	23129	3395041
26.	Ungheni	673	473	18927	8957836
South region		5504	3513	14654	51486132
27.	Basarabesca	286	194	21097	4083216
28.	Cahul	699	573	17165	9827720
29.	Cantemir	641	375	17903	6708248
30.	Causeni	731	478	15148	7239536
31.	Cimislia	195	208	25824	5377136
32.	Leova	2272	1244	8747	10878899
33.	Taraclia	172	233	13673	3180601
34.	Stefan Voda	508	210	19951	4190777
Gagauzia		548	443	22110	9789920
Total		26876	16350	19729	322561660

Source: elaborated by the author on the basis of NBS data

-interrogation in the frame of DBeaver tables and other labels of the data basis;

-the DBeaver objects includes application window overview tables, limitations indexes, sequences, triggers.

The utilization of the instrumentary of data base supposes the access defining to the structural information arranged according to the implicit format with the limitation of the possibility of giving away of personal data cadastral [9]. Methodologically the evaluation of agricultural lands in the Republic of Moldova has at the its base the concept of hedonically prices on the land market and the utilized application of space autoregressive model (SAR) represents the basic instrumentary in defining calculation algorithm. The argumentation of approaching of autocorelative of price dependence is based on the space nonstationarity and is a basic condition in the criteria of elaboration of econometric model with the option of geographical ponderability.

$$\begin{aligned}
 y &= \rho * W * y + X * \beta + \varepsilon \\
 y &= (I_n - \rho * W)^{-1} * X * \beta + (I_n - \rho * W)^{-1} * \varepsilon \\
 \varepsilon &\sim N(0, \sigma^2 * I_n),
 \end{aligned}
 \tag{1}$$

where:

β – parameters of equation of space regress;

X - the exogen variables included in the model (the surface of the lots, the bonity, perimeter, the distance till the village, till the road, the inclination, exposition and altitude);

y - the cost of the transactions selling purchasing of the agricultural grounds;

ρ - the space component in the regression equation;

W - the adjancency weighted matrix of the sold-bought area;

I_n - the unitary matrix with n dimension;

σ - the standard square deviation of the residue as part of normal distribution (Gauss) with the mean equal zero and the dispersion σ^2 ;

ε – the aleatory regression residuals component.

The principal objective in the frame of the utilization of regression geographically pondered consist in the identification of the type of relations existing between the exogen and endogen variables [10]. It may be achieved by calculation of the statistics or evaluation of the parameters β for calculated values in different lots with a diverse spacing and specific valuable zone. Implicitly it is being supposed that the evaluated statistics of the parameters are constant in the space thought the utilized supposition is in a large measure is disputable and the hedonic composition of the model impose contradictory values. Reasonably we may suppose that in the equation 1 exist autocorelative relations of the level lag AR(1), AR(2)... having a composition intrinsic space which generates unsolved problems concerning the specifying of econometric model with serious consequences for the aleatory component ε (the residues in accordance with the test Jarque Bera does not tolerate a normal distribution with zero mean average and standard deviation σ).

The consequences of this approach (the supposition that $\rho=0$) involves inadequate distribution of equation parameters of regression and the value β is out of the place (bias in approaching BLUE). It is evidently that ponderated geographically regressional model presented in the equation 1 contains elements that give the possibility to remove these impediments by means of the adjancency weighted matrix of the sold-bought area W confirms:

$$W_{ij} = \exp \left[-\frac{1}{2} * \left(\frac{d_{ij}}{h} \right)^2 \right] \quad (2)$$

where:

d_{ij} – represents the distance between the locations i and j ;

h – the bandwidth criterion of high fidelity of the space composition in the econometrical model and in the option of rising of this parameter the evaluated value of the lot adjacent with the price of transaction being definite. In conclusion one can affirm that the geographically weighted regression (GWR) allows the evaluation of the parameters β in the BLUE format and the price values of evaluated agricultural grounds on the basis of the presented model in the equation 1 are adequate to the land market [11].

3. Results and discussions

In the result of the analysis of land market in the Republic of Moldova for 2018 year we may affirm that the hedonic approach of transactions selling-purchasing of the agricultural grounds are being confirmed from data of the table 2. If in some zones the prices offered at selling of one hectare were being raised, the interest of buying dismissed. For all that after a small stagnation the farmers still keep the interest in acquisition of agricultural lots. The principal criteria of establishing the prices are: the bonity, emplacement the access to the irrigation, infrastructure ways of accessing and others. The highest prices for the traditional agriculture ground are offered in the North Zone of the country. The cost of quota reaches till 70-80 thousand lei (45-50 thousand/lei hectares). In the districts of Donduseni, Drochia the price is about 45 thousand/ha. In the district of Briceni the price of a quota of lot is 60-80 thousand or 45-53 thousands lei/ha. In Soroca the price of one ha of lot was about 50-60 thousand lei. The highest prices are offered for the land emplaced hereabouts of Nistru river fact determining the possibilities of irrigation of these ones. The selling price varies 100 and 150 thousand lei/ha. In the zone of the district Floresti the price of a hectare was approximatively 25-35 thousand lei. The price of one hectare of agricultural lot in Ialoveni varies from 60 till 100 thousand lei, but the selling were achieved rarely after a had year. In the district of Telenesti the price offered for a quota equivalent with 2,2 ha was 80 thousand lei. Respectively the price per hectare is a little over 35 thousand lei. In the district of Leova the agrarian lot is being sold of a cost of 15-25 thousand lei. The land for cultivating of wine are being offered the maximum price of 20-30 thousand lei/ha. In the south zone (Basarabeasca, Comrat) is being offered maximum price of 20-30 thousand lei/ha. Let together with the number of transactions were being reduced [12].

The land market in 2018 a little changed comparatively with the previous year. In 2018 there was being achieved a test with agricultural farmers for learning the price offered per hectare of lot agricultural land in different districts of the country. We will present below the average of selling prices this year. The researcher results make evidently the fact that is exists a direct relationship between efficiency and the cost. Thus bigger prices for the agricultural land are being offered in the zones where approaching of the progressive technology in agriculture is more developed and the number of the persons involved in this sector is larger. At the same time on price influences the bonity of the lot and the emplacement of this one with reference to the access ways. The surface of the lot also influences on the price. In the North zone in Briceni there are zones of the biggest prices for the agricultural lands 60-100 thousand leis (approximately 3-5 thousand euro) are offered per quota (1,2 ha) but in Ocnita 60-80 thousand lei (about 3-4 thousand euro). A middle price is offered in the district of Drochia the price of a hectare of land is approximatively 30-35 thousand lei.

Table 3. The primary data concerning exogene and endogen variables in commune Zabriceni for the district Edinet in 2022 year

N	Cadastral cod	The value of the transaction, lei	Surface, ha	Bonity of the soil, bal	Perimeter of the lot, m	Distance village, m	Distance road, m	Slope, degrees	Exposition, degrees	Altitude, m	Coordinate, X	Coordinate, Y
1	41521070386	5000	0,072	68	209	2016	2	2,16	52	200	116441,7461	323970,1025
2	41521050475	8000	0,131	75	231	2168	1033	6,14	41	139	118638,0586	325511,2126
3	41521050368	5000	0,122	53	141	2100	1114	2,84	59	161	118509,9670	325245,5870
4	41521050372	5000	0,067	52	117	2051	1114	4,26	40	160	118479,0214	325274,1046
5	41524010058	10000	0,150	66	156	1580	1089	2,97	233	198	114445,5518	330384,2946
6	41524010059	10000	0,150	66	156	1586	1123	6,78	200	201	114469,8700	330408,6698
7	41524020017	17000	1,074	66	668	662	635	2,94	203	175	115611,2274	329734,6704
8	41524040002	35000	0,860	66	581	2501	4	3,63	222	199	117309,1754	330696,2778
9	41524040003	45000	0,920	66	585	2465	4	3,05	219	196	117287,0396	330671,0136
10	41524040016	54620	0,860	94	576	1984	9	2,01	170	180	116962,6740	330300,8074
11	41524010055	55000	1,022	66	483	1625	979	5,04	180	206	114306,8002	330572,5962
12	41524010056	45000	0,958	66	421	1635	1032	4,74	190	207	114369,4456	330571,9794
13	41524030080	30000	1,029	82	420	1880	1050	1,21	138	188	116027,2922	330842,7636
14	41524040296	12000	0,788	88	575	4856	743	2,56	195	209	119307,4004	331150,8640
15	41524050161	42311	0,682	94	577	1416	2	4,67	217	202	116774,5944	329091,2808
16	41524020446	2600	0,175	75	707	1025	924	4,86	227	190	115532,6500	330101,8084
17	41521040152	30000	1,160	94	665	1223	444	2,11	106	178	117266,6452	326981,9032
18	41521070554	8000	0,135	68	248	2269	181	1,92	78	213	116310,6608	323630,1432
19	41521020094	48000	1,300	94	745	2578	2	1,57	45	195	118147,5607	328437,0831

Source: Elaborated by the author on the basis of primary collected data

In Soroaca the average price of commercialization is of 80-100 thousand lei with access to the irrigation reaches to 150 thousand lei. In Riscani the average price is of 40-45 thousand leis. In Floresti the average price of one hectare of farm land is 30-35 thousand of leis. In Glodeni the average price is 50 thousand of leis per hectare, in Soldanesti 25-40 thousand leis but in Falesti 40-50 thousand leis. In Criuleni the price of one hectare of farm land is approximatively 60-100 thousand leis. In Hancesti the price per hectare varies from 25-45 thousand leis, but in Straseni one hectare costs 25-30 thousand leis.

Table 4. The evaluation results of agriculture lots in the commune Zabriceni of district Edinet in the year of reference 2022

Cadastral code	Surface, ha	The value of transactions from the contract, lei	The value calculated with model SAR, lei
41521050475	0,131	8000	2797
41521050534	0,101	5000	2381
41521050564	0,101	5000	2375
41521050724	0,110	3000	3623
41521050751	0,120	3000	3639
41521050804	0,110	4000	2959
41521060067	1,426	60000	50717
41521060141	1,228	50000	34653
41521060202	1,177	45000	32405
41521070076	0,929	49000	40310
41521070386	0,072	5000	2459
41521070452	0,066	5000	2028
41521070554	0,135	8000	3398
41521070594	0,066	2000	1634
41521090281	0,323	9000	6536
41521090300	0,323	10000	9326
41522010235	0,236	7000	6193
41522010325	0,117	4000	3720
41522010690	0,059	2000	1666
41522020031	0,650	21000	26694

Source: Elaborated by the author on the basis of collected primary data

In Cimislia in average one hectare of agricultural lot may be bought with 40-45 thousand of leis, in some localities reaching till 47 thousand of leis or even more [13]. In Cahul the mean price of commercialization of one hectare of agricultural land is 50 thousand leis. The 2018 year there were analyzed the prices reflected in the contracts of selling purchasing. There were calculated the mean prices excluding preventively the outliers which do not reflect the real market situation. In the frame

of current calculation there were collected the primary data in according with the indicated variables in the space ponderated econometrical model from the equation 1 for the commune Zabriceni for the district Edinet the reference 2022 year. The contracts including multiple transactions with different lots per owner are being excluded from the table 3 as an example of erroneous data which have not to take into consideration for econometrical processing.

The information primary includes the cadastral code of the unique lot (for the owner) with cartographical coordinates (the coordinate X and coordinate Y in the maps format 4026). The value of included transactions in the contract of selling-purchasing is presented in leis at rate of exchange for the respective period that is why the evolution current of the lots in currency (\$ USA) must be adjusted to the tent of the profit rate NBM.

The surface of the agricultural lots is presented in hectares but the transactions with a surface smaller of 10 m² were eliminated from cadastral reasons, the destination of these lots is evidently not agricultural and imposes an errors approaching. The bonity of the soil has a graduation from zero till 100 balls, but some lots are emplaced in places having an inferior quality and have an alternative destination. The indicator of the lot quality reflecting the adequate form of utilization with agrarian purpose (the square variant where the height and width are equal at the adjacent ungle of 90 grades) is perimeter relatively with the surface of the lot [14].

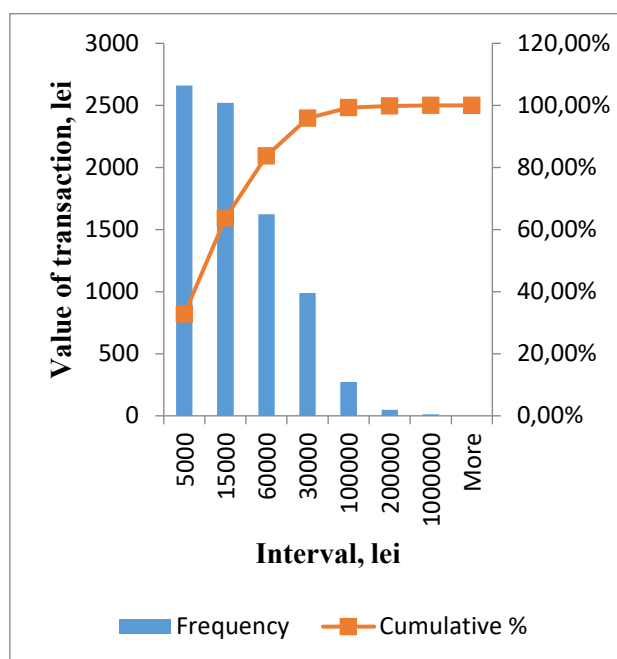
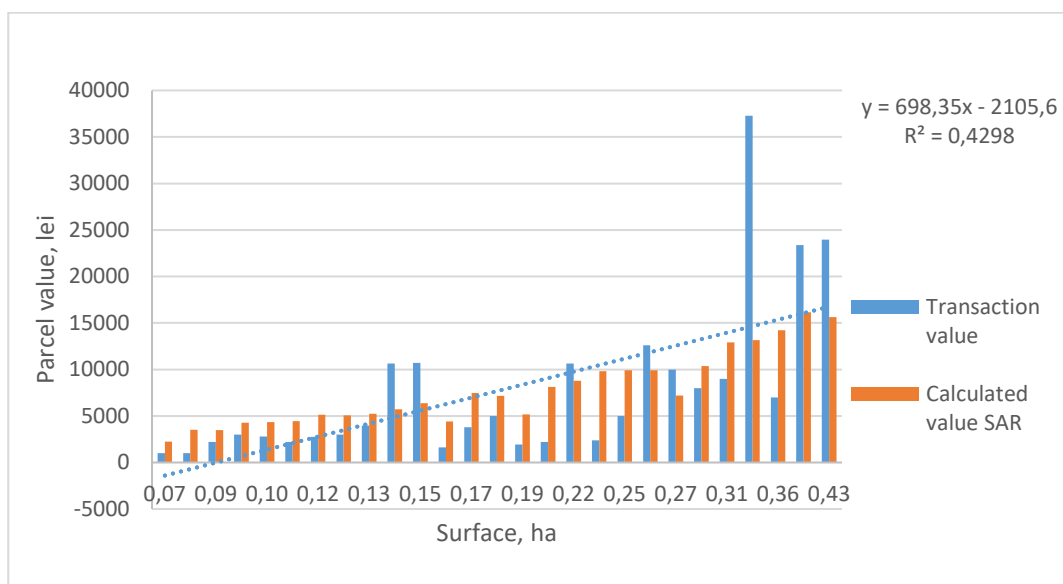


Figure 3 The histogram the of transactions value distribution in the commune Zabriceni according with the cumulative option and relative frequency.

Source: Elaborated by the author on the data basis primarily collected

The distance till the village of the evaluated lot represents an important fact in the space evaluation of the agricultural lots under the aspect of necessity of transportation of the yield to the warehouse or at the house of the owner. Also some lots emplaced directly at proximity of a welling space of the commune a bigger price because that there are legislative premises of transferring of the intravilan in a surface with industrial destination or to the construction of living houses. The measure unity for the

exogene variable the distance till the road is evaluated in meters and represents a significant factor concerning the leger access to the plot of land. The definition of road to access supposes the utilization of a rigid covering with the indication of the coordinates of the transom on the INGEOCAD maps. The fact reflecting the quality of the emplacement of the lot in the agricultural ground is the slope evaluated in degrees and this variable influences significantly the price of transactions of selling purchasing. The exposition of the lot is presented in degrees and maximum value of 180 degrees represents the Southern orientation (the more solicited) but the minimal value zero degree reflects the northern orientation (with a reduced challenging). The last technological indicator included in the econometrical model is the altitude of the emplacement of the lot that is being calculated in meters and the advanced requirement is being referred to the situation in the zone of plain or moderated height of the agricultural lots.



The figure 4. The graphic of the value dependence of transactions of selling-purchasing and the calculated value of the agricultural lots concerning to the surface in the pitch 0÷0,5 ha.

Source: elaborated by the author on the primary collected data

The cadastral approaching in the primary information concerning to 12916 parcels from the land transactions in the Republic of Moldova for 2022 year attest a set of technological data including the lot characteristic in the process of selling-purchasing and the value from contract of this one. In the result of processing of primary data of table 3 by using SAR application to the primary stage by the method of the ordinary least squares (OLS) is calculated with the Cobb-Douglas linear regression in which the technological variables are logarithmed and we have evaluated the partial parameter values of regression equation (elasticity of the exogen cadastral factors). The quality of the econometrical model special being proposed may be appreciated with help of the R², determination coefficient being equal with 0,6813 for the commune Zabriceni with this quota part total variabilities one can affirm that the technological variables have a diverse partial ponderation with the value of 1,42 for surface of agricultural grounds 0,94 for the bonity of the soil where the lot is placed and minority values for the rest factors. The precision of the coefficient evaluation of elasticity according with the student distribution is being framed in the pitch of 95% and we may affirm that the values of the price of

evaluated agricultural lots have the confidential interval acceptable for the land transactions. The test Durbin-Watson of heteroscedasticity of the residues in the special econometric model is equals with 1,033 and attest a normal dispersion (Gauss) with a repartition undeplased at the deviation. The evaluation in concordance with the spacial econometric geographically weighted regression SAR of the primary data for the commune Zabriceni shows a value of the determination coefficient $R^2=0,666$ and confirms the model valability by the quota part of the elasticity of the exogen factors. The direct approaching of the appreciation of agricultural lots price concomitantly with the spatial econometrical indirect evaluation invokes the value of the elasticity surface of the lot equals with 0,854 for direct variant, 0,261 the case the indirect option and 1,116 total option. The Student distribution with the precision of 95% for the parameters of special regression equation confirms a error probability smaller than 0,05 in cadastral calculations.

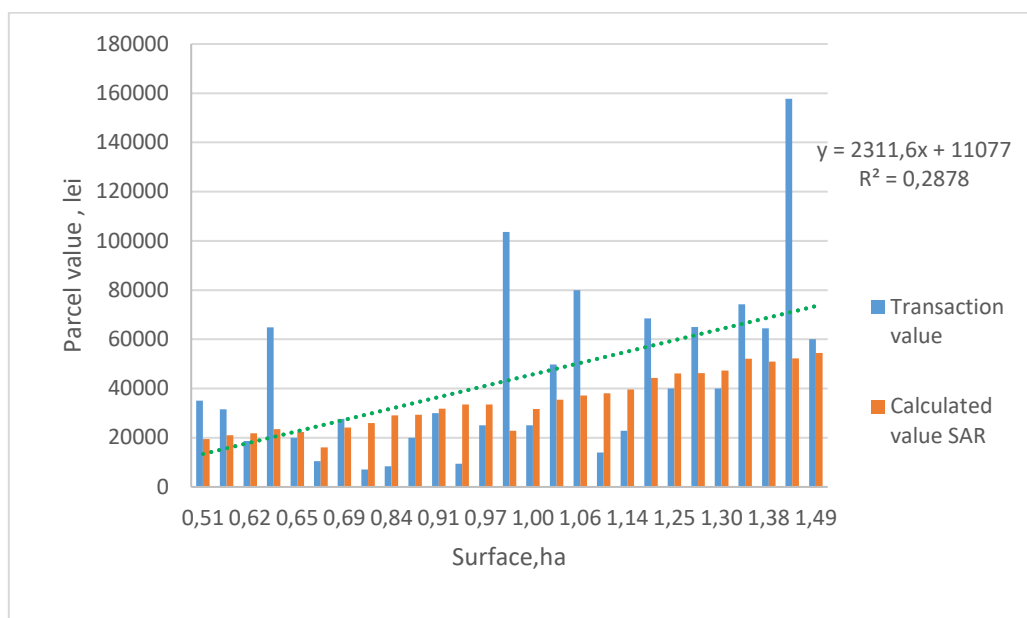


Figure 5. The graphic of the dependence of transaction value of selling-purchasing and the calculated value of agricultural grounds concerning to the surface of the lot in the diapason of 0,5÷1,5 ha

Source: Elaborated by the author in the basis data primary collected

In the table 4 there are presented the results of prices calculation of the agricultural lots from the commune Zabriceni, the district of Edinet for the 2022 year with the indication of the afferent cadastral code, the surface of the lot and the value of selling-purchasing transactions according to the contract. The exogen factors included in the frame of econometrical model may be characterized in the following approach:

- the average value of agricultural surface of the lots is of 0,54 ha with reliable interval from 0,52 up 0,56 with mean squary deviation of 0,752. This technological indicator correlates massively $r = 0,97$ with the value of the contract transaction value in leis with a precision of evaluation net superior to $p = 0,05$. The minimum value of the lot surface in sample is of 0,015 and the maximum value represents 26,91 ha with the indicator Standard Skewness equals with 398 and Standard

Kurtosis – 5228. In the figure 3 there is presented the resulted information of the distribution of the surface of the lots in sample;

- the arithmetic average of the soil bonity of included lots in sample is equaled with 59,5 balls and the scuary average of deviations represents 27 with the interval reliable in option of distribution student 95% from 58,9 up to 60,1. The variation coefficient concerning the bonity represents 45% and this one confirms the homogeneity of the primary data with values Skewness -25 and Kurtosis -12 in accordance with the test of normality Jarque-Bera. The soil bonity in sample varies between the minimum value 6,0 and maximum value 94,0 that attests a relatively high quality of agricultural lots concerning the productivity. The coefficient of correlation of the soil quality has maximum value with the altitude of the lot emplacement of the lot $r = 0,25$ represents a considerable value in reference with the geographical exposition of the slope of the ground $r = 0,12$ and is only negative with the exogen factor the slope $r = -0,014$ and the evaluation precision is satisfactory with a error probability smaller than $p = 0,05$;

- the form of the lot that in the primary data is expressed by perimeter has a middle arithmetical value of 481 meters and the scuary average deviation of 302 m is being framed in the reliable interval according with the distribution student 95% from 298 up 307 m. The maximum perimeter in sample is 6723 m and with the minimum value of 6 m generates a distribution of primary data in accordance with the test of normality Jarque-Bera in a value of 111 for Skewness and 670 concerning Kurtosis. The repartition of the data in sample concerning the homogeneity is characterized by the coefficient of variation equals with 51% and represents an acceptable value from the point of view of dispersional analysis. The intensity of the relation between the exogen factors of the econometrical model is evaluated with the help of the coefficient of correlation and perimeter has a maximum affinity in comparison with the surface of the lot with a maximum value of $r = 0,643$.

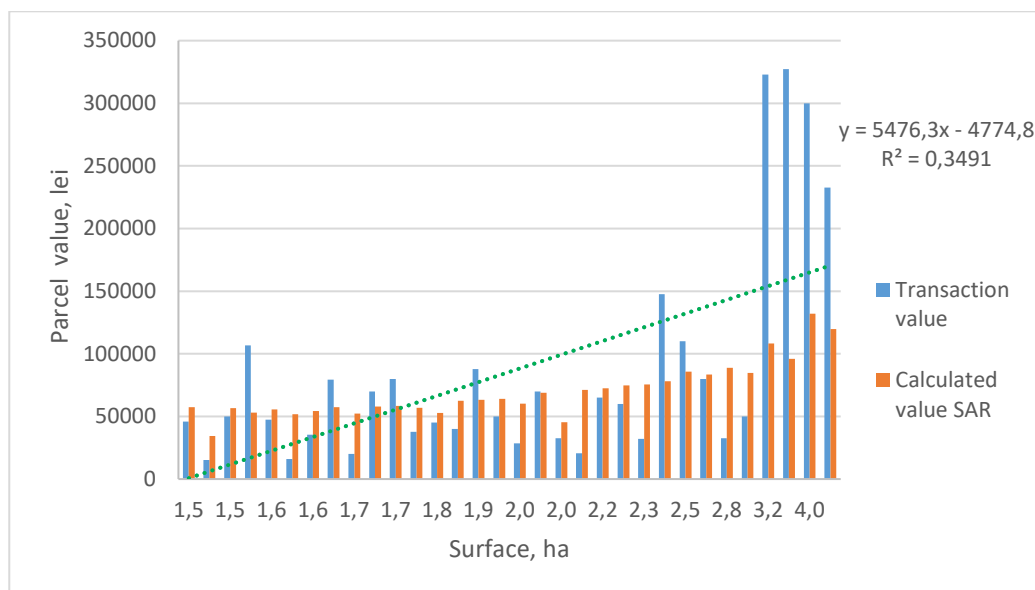


Figure 6. The graphic of dependence of transaction value of purchasing-selling and the calculated value of agricultural lots concerning the surface of the lot in the diapason 1,5÷4,0 ha

Source: Elaborated by the author on the basis of primary collected data

In the figure 4 there is presented the linear dependence of the value of agricultural lots (from the contract or calculated with the indication of the trend) for different diapasons of the lot surface. The buyers of agricultural lots psychologically they have an intuitive preference referring the large surfaces and in the presented graphics (Figure 4-6) the trend OLS is maximum for the diapason 0,5-1,5 ha, with the value of the coefficient regression 698. It is evidently that the values of agricultural lots evaluated under the model econometric ponderated geographically SAR are net inferior to evaluated values by means of OLS because of the linear regression is sensitively inadequate under the aspect concerning the nonstationarity of the primary data reflecting by the hedonically price of lots (bigger than 3 ha) certify an overlapping of the calculated values OLS a fact that is being confirmed from the distribution Pareto of the behavior of the consumers (buyers) from the economic theory.

The average value of the transactions concerning to the data of the Republic of Moldova in 2022 represents 85584 leis from the contract selling-purchasing and equals with 69814 leis for the lots values of calculated lots according to the model econometrical SAR. The deviation of the square average of 86944 leis concerning the transactions from the contracts is net superior to the afferent statistic indicator 21519 leis calculated with the help of the space econometrical model confirming the visible difference in the dispersion of the primary data in the presented graphics. The minimum value of transactions from contracts is 15111 leis and the maximum value 327323 leis but the diapason concerning the estimated value of the lots is being definded from 34286 leis minimum up 132079 leis. The reliance interval according with the distribution student 95% for the transactions registered in contracts are found in the diapason from 31346 till the maximum value 80883 leis and respectively the calculated values of the lots are in the interval from 7758 leis till 491235 leis. The coefficient of correlation of the transaction from the contracts with the surface of the lots represent financial relation with a strong intensity $r=0,97$ and respectively the value of the afferent statistic indicator between the surface of agricultural lots and the data the space econometrical model presents a relation near linear with high intensity $r=0,98$

4. Conclusions

The durable development of the rural space in the Republic of Moldova is an objective of major importance taking into account of offered conditions of the perspectives to adhere to the European Union. The basis make-up in increasing of efficiency of utilization of financial resources in the agricultural sector of the country represents the adequate evaluation of the land lots with agricultural destination that is not achieved at this moment in the massive variant for those approximatively four million of lots identified by the cadastral code.

The essential objective in the present work under aspect of methodological argumentation of the hedonic price in the transactions of selling-purchasing of the agricultural lots imposes the necessity of utilization of the space econometric model. It was achieved the complete set of calculations for the commune Zabriceni district of Edinet with the presentation concerning 8130 lots with the calculated values of integral agricultural lots of the village. Graphically is presented the comparative analysis of the calculation results by means of space econometric model SAR the values the transactions of selling-purchasing and the linear trend from three specific pitches distincted under the aspect of distribution of the lot price on the market land.

For the minor values 0-0,5 ha the calculated values by the regression method ponderated geographically are net inferior to the values of linear trend (OLS) and vice-versa the major values transactional surfaces:1,5-4,0 ha, the linear trend OLS is net inferior to the calculated values by the space econometrical method. The respective aspect requires a specific approaching in agricultural politics of the decision factors in the agricultural sector concerning the behavior of the consumer (buyers) on the land market. The proposed model for evaluating of agricultural lots is adequate to put problem for achieving and may serve as a working instrument in practical implementation.

Note: The given article is being published in accordance with the achieved study in the frame of the Technical University of Moldova. The project of scientific researches „Researches oncerning the insurance of durable development and increasing of the competitiveness of the Republic of Moldova in the European context/CADDCCRMCE/020408” achieved in the frame of National Agency for Researching and Developing in 2024 year.

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Section 2: MANAGEMENT AND MARKETING

LEGAL AND INSTITUTIONAL ASPECTS REGARDING HUMAN RESOURCE MANAGEMENT IN COURTS

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***Abstract:** This article analyzes the legal-institutional aspects through the prism of human resources management. At the present stage, the effects of the reform on the efficiency of judicial services and the cost-effectiveness of the courts are a topic of discussion that is of concern to many stakeholders in society. The analysis of performance indicators shows that there are problems and difficulties related to the performance of human resources in the courts. The evaluation of the legal-institutional framework of human resources management in the courts of the Republic of Moldova made it possible to determine its adequacy for enhancing the performance of judicial and non-judicial staff.*

***Key words:** human resources management, reform, CSJ, CA, substantive courts.*

JEL: M10; M12.

Introduction

Since the acquisition of the independence of the Republic of Moldova, the judicial system has been subjected to a process of significant transformations with the aim of improving operational efficiency at all hierarchical levels: the Supreme Court of Justice (SCJ), the Courts of Appeal (CA) and the territorial courts. The reforms applied to the judicial system in the Republic of Moldova must lead to reasonable balances and manage crimes of various types in a continuously evolving society. Under these conditions, court personnel play an essential role in guaranteeing and respecting the fundamental human rights in a state of law.

Regulation of the activity of the courts and their staff

The judicial system is characterized by a double dimension: on the one hand, as public institutions, on the other hand, as entities that provide dispute resolution services, their operation and efficient management fall under the responsibility of the court management.

The impact of the reform on the efficiency of judicial services and the profitability of courts is a subject of debate of interest for multiple parties involved in society. At the same time, it is crucial to assess to what extent the reforms applied so far have contributed to improving the performance of the courts.

For the first level in the hierarchy of the court system, the court tends to deal with similar types of cases, generally covering a wide range of civil, criminal and family matters. Also, the responsibility for solving these cases rests with a single magistrate. Second, given that the first court takes on the bulk of the country's judicial workload, the busy calendar is not unusual. Even though certain specific types of cases may predominate in some courts and be absent in others, the similarities in the

distribution of routine and complex cases are far more pronounced than the differences. As a result, many magistrates intuitively understand the need for an efficient approach to routine cases, so as not to be overwhelmed by the timing required to resolve more complex issues. Third, magistrates have to cope with the demands and pressures associated with first-instance cases. They are familiar with the fast pace of the judicial process and their central role in resolving all types of litigation. However, to one degree or another, magistrates recognize the need to do more than hand down judgments. They must manage a complex network of people before, during and after each legal proceeding. The work context requires administrative skills, giving magistrates a secondary managerial role in the trial court.

The quality of court results reflects not only the character of the magistrate's decision, but also the management of the judicial process. Aspects such as the treatment of participants, the management of time and attention given to cases by magistrates, the implementation of innovative practices and the cooperation of magistrates with each other are crucial to the success of the court's work and the public's perception of it.

In order to avoid different interpretations in the process of court administration, it is important to make a distinction between jurisdictional administration and court administration.

Table 1.1. The differences between jurisdictional administration and court administration

Jurisdictional administration	Court administration
It covers issues of jurisdictional, procedural and administrative law.	It includes all the tasks and functions of support and infrastructure that allow judges to fulfill the judicial tasks of the court, as an institution that fulfills the obligations, considered as the third power in the state.
Improving the judicial system by: <ul style="list-style-type: none"> • integration of judicial systems; • regulating and providing the authority of the courts; • improving judicial selection procedures; • change of record keeping rules, etc. 	It refers to court administrators, clerks, and the diversity of support staff (courtroom staff, reporters, interpreters, IT staff, human resources specialists, accountants, etc.) to enable justice to be delivered through judges.

Source: Developed by the author based on [1].

Court administration is crucial because it enables courts to function efficiently and effectively. As Peter Drucker remarked: "Without institutions there is no management, and without management there are no institutions" [1]. When the courts operate effectively, the rule of law is enhanced and the 3rd power in the state suffers the same approach as the first 2 powers. Therefore, the administration of the courts directly influences their performance, regardless of the category of the court.

Subsequently, according to the Constitution of the Republic of Moldova, "judges of the courts are independent, impartial and immovable" [2]. In addition, according to the Law on judicial organization, "the judiciary is independent, separate from the legislative and executive power, having its own powers exercised through the courts" [4].

In Republic of Moldova, the judicial system is structured according to Figure 1.1.

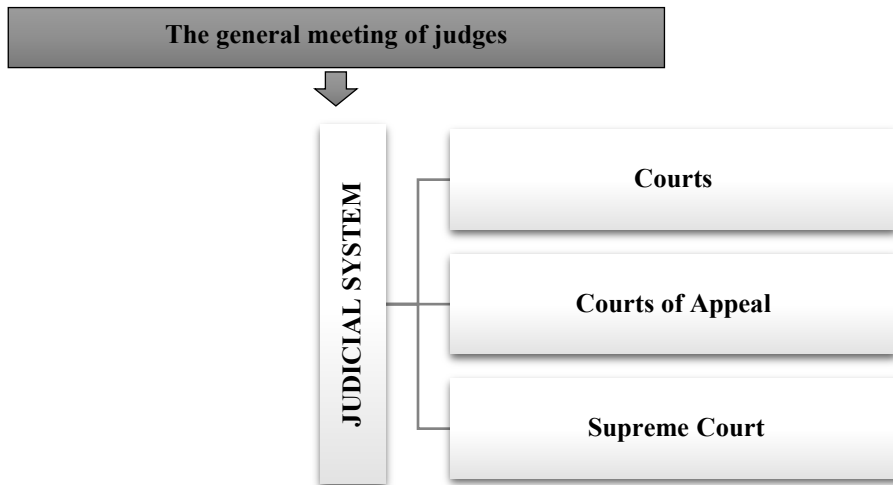


Figure 1.1. Organization of the judicial system in the Republic of Moldova

Source: Developed by the author based on [4].

The SCM represents an independent entity established for the purpose of organizing and ensuring the functioning of the judicial system, at the same time guaranteeing the independence of the judicial authority and its self-administration.

According to the law on judicial organization, "The General Assembly of Judges is composed of judges of all courts in the Republic of Moldova and ensures the implementation of the principle of self-administration of the judiciary" [4]. Judicial self-administration represents the right and the effective capacity of the courts to solve problems related to the "autonomous and responsible functioning of the judicial system" [4].

Until 2016, courts were present in every district residence and in all sectors of the Chisinau municipality; however, the adoption of the Law on the Reorganization of Courts reduced their number to 15 district judges. Also, the Courts of Appeal operate in a constituency that includes several territorial courts.

The Supreme Court of Justice (SCJ) operates in accordance with the Constitution of the Republic of Moldova and Law no. 64/2023 regarding the Supreme Court of Justice. According to this law, the SCJ is the supreme court in the Republic of Moldova, having the responsibility to ensure the uniform interpretation and application of legislation in the judicial system.

The number of judges and the staff required for each court are established according to the criteria provided in the law on judicial organization and the decisions of the Superior Council of Magistracy, including the Regulation on the criteria for establishing the number of judges in courts. The July 31, 2023 amendments to the law on judicial organization established a number of 504 judge posts for all courts in the Republic of Moldova.

It is important to note that the number of judges in the SCJ is determined by the Law on the Supreme Court of Justice, adopted in 2023, which provides for a total of 20 judges. According to this law, 11 of them are selected from among judges, while the other 9 come from among lawyers, prosecutors or university professors with a scientific degree in law.

As mentioned above, the Regulation on the criteria for determining the number of judges in courts aims to determine the optimal number of judges for each court. For this, a multitude of principles and criteria are applied (Figure 1.2).

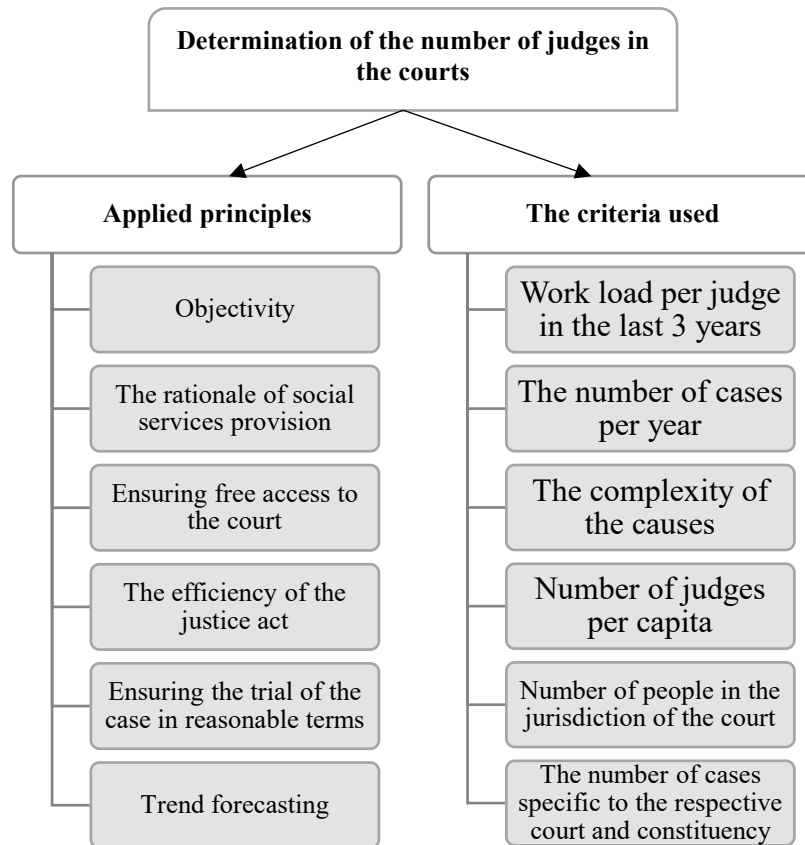


Figure 1.2. The principles and criteria applied to determine the need for judges
Source: Developed by the author after [3].

According to the respective methodology, the determination of the number of judges in the court is done at the initiative of the president of the court, who can make a request in this regard every 3 years. The Superior Council of Magistracy (CSM) can accept or reject that request. As for the other categories of personnel in the courts, their number is determined in accordance with the legislation in force.

The managerial activity of the court is coordinated by its president, while the organization and administration activities are managed by the court secretariat, which includes several positions. The regulation of specific HRM attributions for different categories of positions in the courts is carried out on the basis of specific laws adopted for this purpose (according to Figure 1.3).

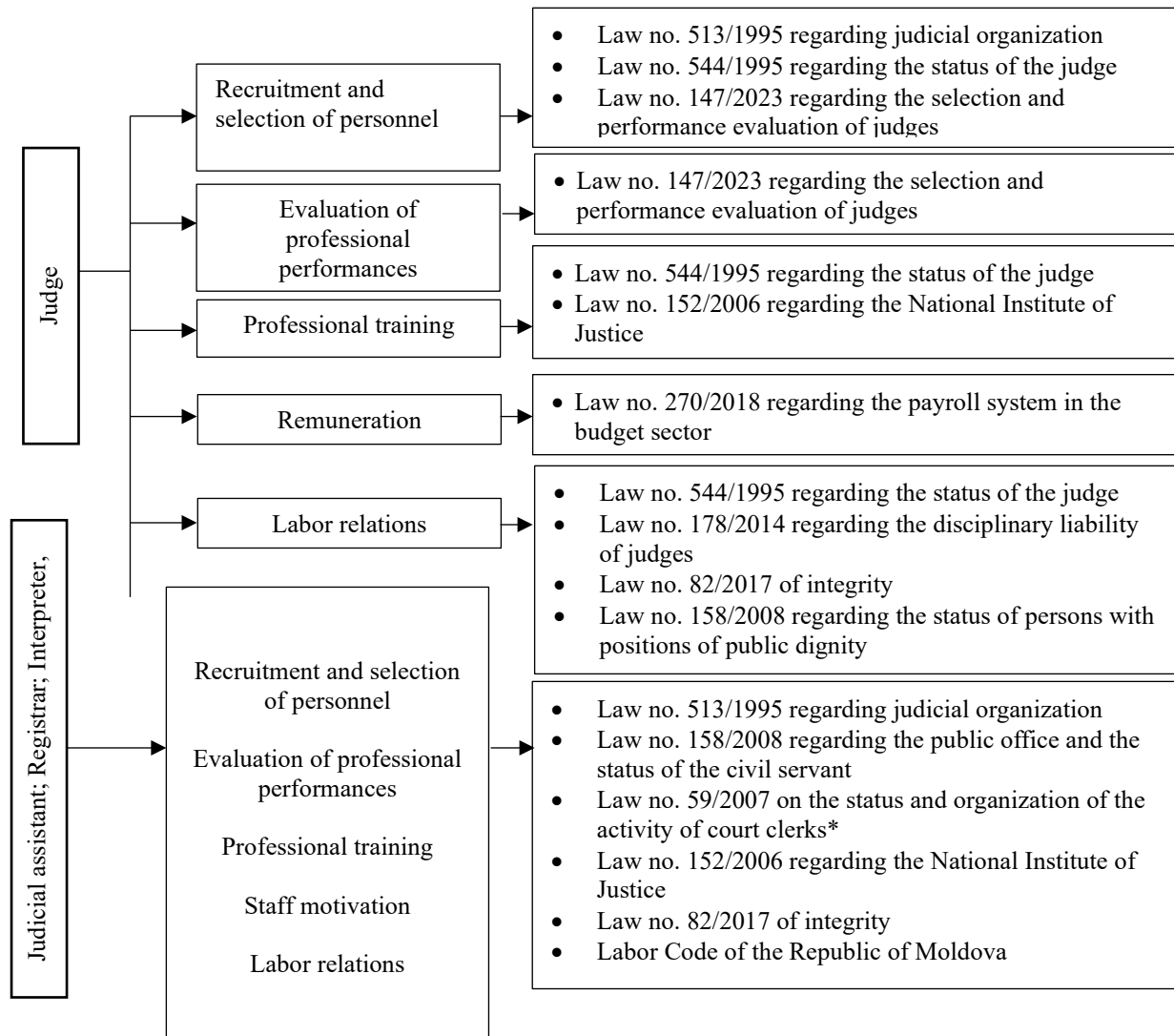


Figure 1.3. The legal framework regarding the regulation of HRM activities for certain positions in the courts

Source: Developed by the author after [5]; [6]; [7]; [8]; [9]; [10]; [11]; [12]; [13]; [14].

Starting from the HRM activities reflected in Figure 1.3, the Law 147/2023 shows the principles and criteria for the selection of judges. According to Annex 4, the stated principles and criteria allow for the most objective selection to ensure an efficient functioning of the courts, which will ultimately increase society's trust in the justice system. In the case of the other categories of personnel active in the judicial system, the selection is made in accordance with the Law on the public office and the status of the civil servant, as also reflected in Figure 1.3.

Another activity related to HRM and which is one of the objectives of our research refers to the evaluation of professional performances. According to the Law on the selection and evaluation of judges' performances, "judges' performances are evaluated in order to establish the level of knowledge and professional skills of judges, as well as the ability to apply theoretical knowledge in practice, to identify the weak and strong aspects of the judges' activity, to stimulate the tendency to improve professional skills and increase the efficiency of the activity of judges at the individual level and at the level of the courts" [14].

The professional evaluation of judges has an ordinary and an extraordinary character. The ordinary evaluation is carried out on the basis of three criteria: professional competence, organizational competence and integrity (Figure 1.4). Inter alia, from Figure 1.4, we note that the national legislation provides a set of indicators for the evaluation of the three categories of competences. Thus, for the evaluation of professional competence, 7 indicators are applied, in the case of organizational competence – 9 indicators, and for the evaluation of integrity, 5 indicators are used. If in the case of the evaluation of professional and organizational skills more quantitative indicators prevail that can be compared, in the case of the evaluation of integrity more qualitative indicators are observed, which makes their assessment more difficult. The interconnection between these indicators would increase the level of competences and skills of judges at work.

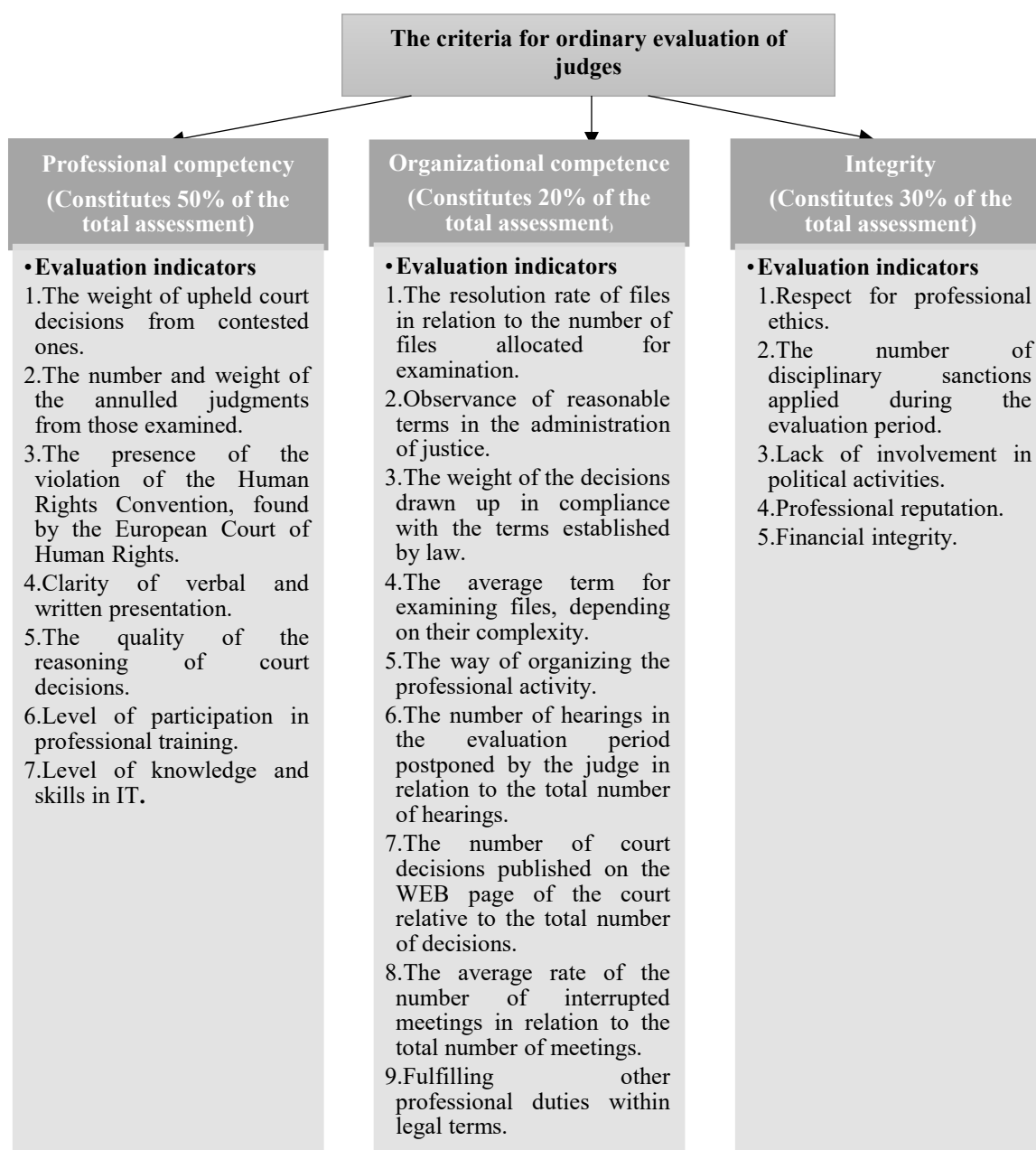


Figure 1.4. The criteria for ordinary evaluation of judges

Source: Developed by the author based on: [14].

Apart from the ordinary evaluation of judges' performances, the extraordinary evaluation is also applied. Usually, the extraordinary evaluation is used in the case of obtaining the qualification "insufficient" in the ordinary evaluation, or when promotion to a higher court is desired, or in the case of occupying a managerial position at a court of the same level. In the case of the extraordinary evaluation, the managerial capabilities of the judge are assessed, based on the performance indicators. The indicators in question aim to follow the professional path of the judge for the development of his career.

For the other categories of personnel in the courts, the performance evaluation is done according to the Law on the public office and the status of the civil servant. In the given case, performance evaluation is done by comparing the results obtained during the evaluation period with the predetermined objectives, and the results are used for salary, promotion or transfer. The performance criteria and indicators are established according to the specifics of the activities carried out at the court level.

The professional training of judges, judicial assistants, clerks and other categories of court employees is carried out within the National Institute of Justice, which periodically conducts continuous training courses, the duration of which must be 40 hours per year, as well as initial training courses for future judges and prosecutors. In the case of the other categories of court employees, the annual duration of professional training is established by consulting other governmental and legal institutions.

Although the HRM activities in the courts are regulated by a multitude of laws, nevertheless, at the current stage, society offers little confidence in the activity of judges. This could also be determined by the fact that even if more magistrates are targeted in criminal cases, until now no judge has executed his sentence, having an irrevocable Decision in this regard, a different fact for people who have no connection with the system judicial. This state of affairs in the judicial system perpetuates in the Republic of Moldova, which causes other sectors of the national economy to be affected.

Conclusions

As a result of the investigations carried out on the administration of personnel in the courts and their performance at all levels - the Supreme Court of Justice, the Courts of Appeal and the territorial courts - the following conclusions were drawn:

1. In the Republic of Moldova, there is an adequate legal and institutional framework for carrying out the legal act in accordance with the requirements of the European Union. Courts operate under a comprehensive set of laws that regulate legal, financial and behavioral aspects. They are engaged in a continuous process of improvement and adaptation to new requirements and changes taking place in society.
2. The administration of human resources in the courts is regulated by a multitude of laws and is supervised by several higher legal institutions. These institutions have the mission of supervising the activity of both judges and other categories of personnel within the courts. The Superior Council of the Magistracy (CSM) plays the role of a "watchful eye", monitoring the activity of all courts to ensure an efficient operation, in accordance with the legislation in force, which is constantly changing, according to European standards.

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CONCEPTS OF OPTIMIZING EDUCATIONAL MANAGEMENT IN THE REPUBLIC OF MOLDOVA

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Abstract: *Performance monitoring and evaluation are essential for the continuous improvement of the quality of education and for ensuring effective educational management. International and local examples show that transparent, continuous and evidence-based assessment can guide schools and teachers to better adapt teaching methods and curriculum to students' needs. The implementation of a digital monitoring system in the Republic of Moldova could contribute significantly to the improvement of school results and the general performance of the educational system.*

In this article we present some concepts for optimizing educational management in the Republic of Moldova, based on digitalization, participatory management and strategic leadership, with emphasis on the importance of monitoring the managerial human resource in general education, considering the prospects and opportunities for the socioeconomic development of the country.

Keywords: *digitization, educational management, participatory management, efficiency in education, strategic leadership.*

1. Introduction

Because **education**, in the Republic of Moldova, represents a national priority, being the basic factor in promoting democratic values, ensuring human and citizen rights, in the development of human capital, in the formation of national consciousness and identity, in capitalizing on integration aspirations European, with a primary role in creating the premises for sustainable human development and building a society based on knowledge, with a view to integration into the European Union, a connection of national educational policies to European ones and the implementation of education for sustainable development is required. This would primarily mean focusing on the development of concepts for optimizing the educational system, including its management, and the development of a quality educational society, the culture of quality being centered on a system of values, recognized and assumed in the long term.

The optimization concepts of educational management in the Republic of Moldova are closely related to the modernization and efficiency of educational processes, the improvement of the quality of teaching and learning, as well as the adaptation of the educational system to contemporary needs, which include:

1. *Developing flexible and competency-based curriculum.* Adapting the curriculum to reflect changes in the labor market and to develop relevant skills among pupils/students.
2. *Continuous training of teaching staff.* Improving the training and professional development of teachers to increase the quality of the educational act.

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3. *Decentralization of educational management.* Giving more responsibilities to local educational units, for greater autonomy and adaptation to local specifics.

4. *The use of information technologies in education.* Integrating digital tools and online platforms into teaching and management processes to streamline access to resources and administrative processes.

5. *Increasing community involvement.* Stimulating partnerships between educational institutions, communities and the private sector for better cooperation and mutual support.

6. *Performance monitoring and evaluation.* Implementation of a transparent evaluation system based on performance indicators to improve management efficiency.

We will analyze the last three concepts in more detail, through the prism of optimization, which implicitly provides for the valorization of human resources, transparency and time efficiency.

2. Basic content.

The use of information technologies in education or the digitization of education. Among the main features of the process of using information technologies in education are:

1. *Digitization of educational processes,* which involves the integration of digital tools (tablets, laptops, projectors) and online platforms to improve teaching, learning, assessment and administrative management.

2. *The use of e-learning platforms and open educational resources (OER),* online that provide free and diversified access to learning materials.

3. *The use of collaboration and communication tools,* applications which facilitate communication between teachers, students and parents (ex: Google Classroom, Microsoft Teams, Zoom, etc.).

4. *Analysis of educational data,* using educational management systems that collect data on student progress and the effectiveness of teaching methods, for a constant improvement of the educational process.

In this sense, concrete examples of good practices can serve as:

- *Google Classroom and Microsoft Teams in Moldova:* Following the pandemic, many schools in Moldova have adopted platforms such as Google Classroom and Microsoft Teams to facilitate remote teaching. These platforms allow teachers to distribute educational materials, assign homework, and assess students in an efficient and organized manner. In addition, students can work collaboratively and access materials from anywhere, increasing accessibility to education.

Technology-assisted education in Estonia: Estonia is one of the leaders in the use of educational technologies. In Estonian schools, every student has access to a computer or tablet, and most school activities are integrated into digital platforms. Students learn programming from an early age, and teachers are constantly trained to use technology creatively in the teaching process.

- *Romania - EduCred Digital Platform:* In Romania, the Ministry of Education has developed the EduCred platform, which offers training courses for teachers, but also digital educational resources for students. This is an example of good practice in the digitization of education, allowing uniform access to educational materials and training for teaching staff to ensure an efficient transition to digital education.

- *Assessment and educational management platforms in Finland:* Finland uses advanced educational platforms that integrate student progress monitoring, personalized statistics and automated

assessments. This system provides constant feedback to students and teachers, allowing continuous improvement of educational performance. Finland has also focused on reducing administrative paperwork by digitizing school administrative processes.

- *E-learning platforms and digital resources*: In the Republic of Moldova, various schools and educational institutions have started to implement e-learning platforms, such as Moodle and Khan Academy, which provide access to a variety of open educational resources. Also, portals such as *educatieonline.md* were created to offer video lessons and other digital resources, freely accessible to students and teachers.

The challenges to which the process of using information technologies in education is subject are: lack of access to quality technology, especially in rural areas; continuous quality training of teaching staff; lack of permanent technical support and maintenance.

Community involvement in educational management. Among the main features of the community involvement process in educational management are:

1. Promoting collaboration between schools, parents, local organizations, public authorities and the private sector to create a stronger and more connected to community needs educational environment by establishing *school-community partnerships*.
2. Promoting *volunteering and mentoring* by encouraging the involvement of volunteers from the community, as well as specialists who can become mentors for students and young teachers, establishing a new practical format in education.
3. *Participatory decision-making* by creating decision-making structures that include community stakeholders so that they actively contribute to the formulation of local educational policies and priorities through digital tools such as surveys and evaluations of educational services.
4. Organization of *community educational and extracurricular events and activities*, meaning in partnership with the community, to integrate students in projects and events that reflect local culture and needs.

In this regard, as examples of good practices can serve:

- *"School-Community" programs in Finland*: In Finland, close collaboration between schools and communities has led to the creation of extracurricular programs that encourage active participation of students in community life. For example, integration of volunteer activities into the curriculum, where students are encouraged to participate in community projects such as supporting the elderly, environmental protection or public health initiatives. It helps students develop social responsibility and transversal skills.
- *Romania - "School after School" Program*: In Romania, the "School after School" program promotes the involvement of the local community in supporting the education of students from disadvantaged backgrounds. The community contributes through donations, volunteering and the involvement of local mentors, who help students improve their academic performance and participate in creative extracurricular activities. Thus, a continuous learning space, supported by the entire community, is created.
- *Moldova - Community projects in rural schools*: In Moldova, various community projects were launched in rural schools, where collaboration between local authorities, parents and teachers led to the improvement of educational conditions. For example, projects to renovate schools or organize extracurricular activities were carried out through local contributions and grants provided by NGOs.

One such project is the "Community School", which involves parents and volunteers from the village in organizing traditional craft workshops or digital skills courses.

- *Great Britain - "Community Schools" Initiative:* In Great Britain, Community Schools are institutions that work closely with families and community organizations to provide extended services and support. These schools not only provide formal education, but also access to counseling programs, after-school care, parent training, and other community services. This initiative reduces the barrier between school and community, providing holistic support for students and their families.
- *"Youth Civic Engagement" program in Moldova:* In Moldova, an example of good practice is the "Youth Civic Engagement" program, which encourages students from various schools to get involved in local civic projects. This program offers young people opportunities linked to leadership, personal development and direct involvement in solving community problems. Projects range from organizing cultural events to environmental and social initiatives.

At the same time, the process of community involvement in educational management is also accompanied by certain challenges, such as: lack of human and financial resources; lack of interest or involvement; ineffective coordination of community partnerships and low institutional support from the community.

Performance monitoring and evaluation in education. Among the main features of the process of monitoring and evaluating performance in education are:

1. Creating clear sets of *educational performance* indicators that measure the performance of students, teachers and educational institutions. These indicators include academic achievement, graduation rate, individual student progress, involvement in extracurricular activities and other aspects of holistic development.
2. Making assessment of educational performance an ongoing process that provides feedback to both teachers and students to improve teaching and learning in real time. *Continuous assessment and feedback* allow rapid and personalized adjustments to teaching methods and curriculum.
3. Implementation of *digital assessment tools* such as digital platforms that facilitate performance monitoring and collection of relevant data in real time. These tools allow detailed analysis of educational progress based on interactive reports and graphs.
4. *Periodic institutional evaluation* not only based on the academic performance of the students, but also based on the internal management, the resources used and the quality of teaching. *Periodic self-assessment* is also an important tool for continuous improvement.

In this regard, specific examples of good practices can serve as:

- *Digital Assessment System in Estonia:* Estonia uses a digital student performance monitoring system that integrates data on academic progress, teacher feedback and parent involvement. The system is accessible online and allows tracking the progress of each student in real time. Teachers and parents have access to detailed reports that help identify strengths and areas for improvement. This allows rapid adjustment of teaching methods.
- *Romania - ADMA school management platform:* In Romania, the ADMA platform (Academic Development Management Application) allows schools to monitor in detail the activity of students and teachers. Through this platform, data (class attendance, grades, extracurricular activities) is automatically collected from various sources, analyzed and transformed into personalized

performance reports for each student and class. The platform also provides information on school progress at regional and national level.

- *The PISA program and its use in the Republic of Moldova:* The Program for International Student Assessment (PISA), carried out by the OECD, provides an important framework for monitoring educational performance at a global level. In the Republic of Moldova, PISA data is used to analyze the weak points of the education system and to implement improvement strategies. For example, poor results in certain areas have led to the adoption of specific measures to improve the curriculum and teacher training.

- *Moldova - National Performance Evaluation System:* In the Republic of Moldova, the Ministry of Education implements a national evaluation system based on key performance indicators for each educational level. This system monitors both academic achievement and involvement in extracurricular activities, absences and dropout rates. The data is collected annually and used to make decisions about the allocation of resources and the adjustment of educational policies.

- *Great Britain - "Ofsted" (Office for Standards in Education):* In Great Britain, Ofsted is the government agency responsible for the inspection and evaluation of schools and other educational institutions. Ofsted assesses the performance of educational institutions based on clear criteria, including the quality of teaching, management and leadership, pupil outcomes and school climate. Ofsted reports are public and provide parents and the community with a transparent picture of how schools are performing. This approach creates a positive pressure to improve the quality of education.

- *Self-evaluation of schools in Finland:* In Finland, schools are free to carry out annual self-evaluations, where they collect data about their performance and receive feedback from students, parents and the community. This process is seen as an opportunity for learning and continuous improvement without the pressure of rigid external assessment. Self-assessments focus on identifying areas for improvement and implementing effective solutions at local level.

The challenges that arise on the given subject would be: limited resources (financial and technical) for the implementation of digital assessment systems; resistance and reluctance to change; lack of transparency and fairness.

Creation of the EduManager - national level digital software. In the sense of recognizing the importance of optimizing and confirming the concepts described, we propose the project of a digital software: EduManager – monitoring system of managerial human resources in education, at the national level, the design of which can be elaborated with the help of the Figma application, and in the 1st figure is presented the start page of its prototype.

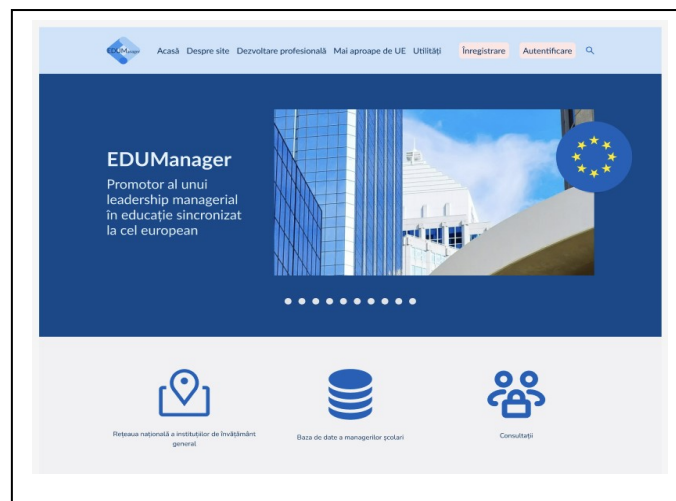


Figure 1. Home page

Source: https://www.figma.com/proto/VICWPLrhDpDarAciH7KJoY/Project3_Duca-Diana?node-id=3-3&t=0oMgi7aiFNZMSULv-1

Among the main factors that determine the need to develop such a digital software for monitoring the managerial human resource in education are:

- the need to have, at a national level information on the composition and qualification of managerial human resources in the education system in order to supply educational institutions with qualified teaching and managerial staff, to plan and implement measures to attract and maintain staff in education, initial and continuous training of specialists in the field of education;
- the need of real data about: each educational institution; the number of managerial staff; the number of students; employees of educational institutions, necessary for effective planning, monitoring and evaluation; correctness and legality of the use of material and/or financial resources, in real time;
- the current lack of informational support for measuring the performance of educational actors and making rankings of educational institutions, collecting and publishing open data about each educational institution and management team, including about the education system as a whole;
- the need of prevention of cases of erroneous, difficult and expired reporting;
- the current lack of informational support for finding cases of faulty management of educational institutions in the Republic of Moldova.

The **specific objectives** of the proposed system are:

- *Implementation of innovative digital tools for development of leadership skills, community involvement and use of digital technology in educational management;*
- *Streamlining administrative processes and reducing costs associated with educational management;*
- *Formation of a more qualified and more adaptable to the market economy workforce;*
- *Facilitating access to educational resources and increasing the quality of education, thus preparing students for the demands of the digital economy.*

And as a **major objective**: *Streamlining the management of the field of education in the Republic of Moldova in order to increase the performance of teaching staff.*

The **principles** that will act as the basis for the creation of the digital tools included in the system:

- to be focused on real needs and problem solutions;
- to contain SMART indicators (Specific, Measurable, Accessible, Relevant, Time-bound);
- implementing clear and objective assessment procedures to avoid distortions or personal preferences.

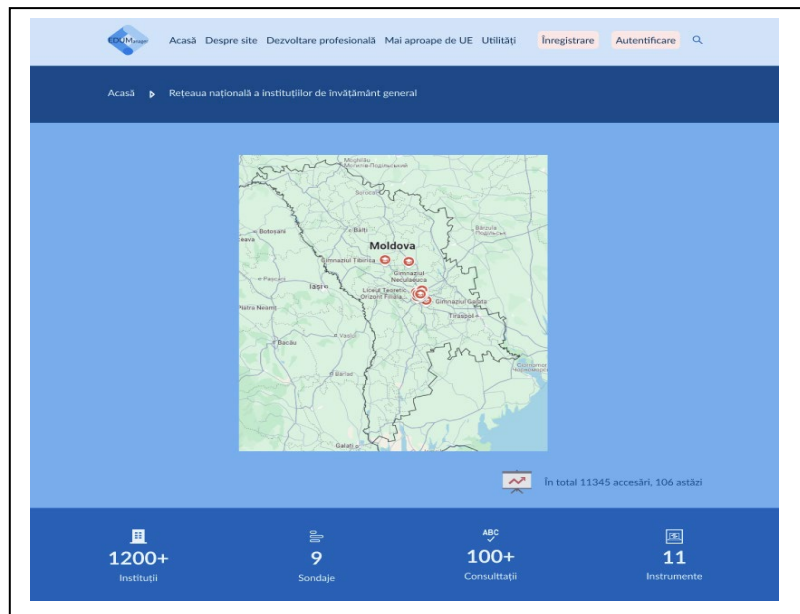


Figure 2. Page National Network of educational institutions

Source: https://www.figma.com/proto/V1CWPLrhDpDarAciH7KJoY/Project3_Duca-Diana?node-id=3-3&t=0oMgi7aiFNZMSULv-1

2nd and 3rd figures show sections of this system, such as the National Network of educational institutions, the Database of school managers, both linked to the actual geographic map of the country, and 4th Figure shows Strategic Directions and Site Map, where we can see which sections are included in the system and the tools available for the activity of managers, authorities with control rights or civil society. 5th and 6th figures show examples of dialog boxes that provide account creation for managers or login, if an account already exists.

All these program or design sequences are parts of the prototype of the proposed system, which means that many more, more diverse and interactive work tools can be included in the actual system, depending on the results of its wider design.

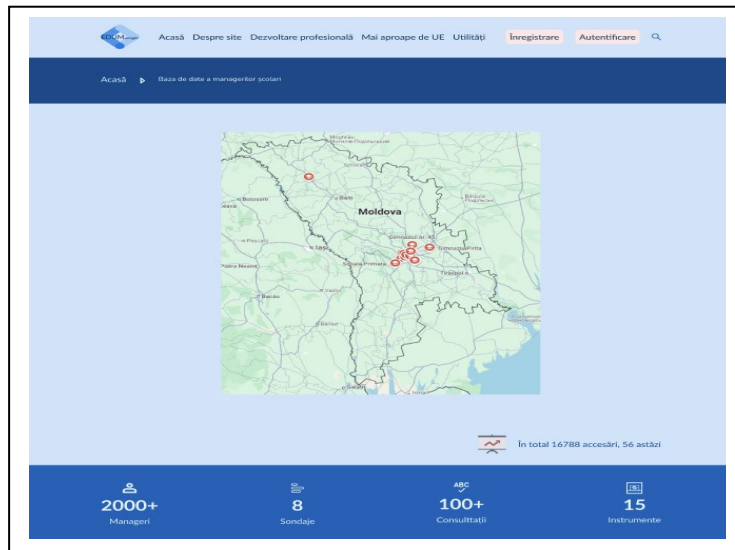


Figure 3. Page Database of school managers

Source: https://www.figma.com/proto/VICWPLrhDpDarAciH7KJoY/Project3_Duca-Diana?node-id=3-3&t=0oMgi7aiFNZMSULv-1

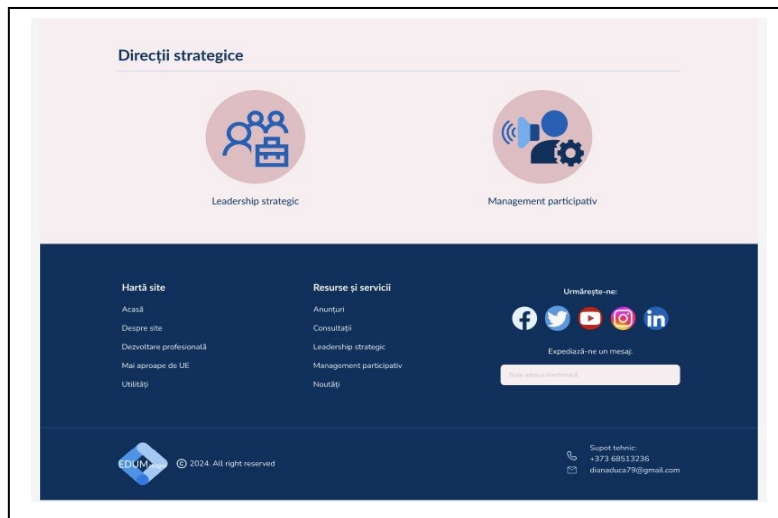
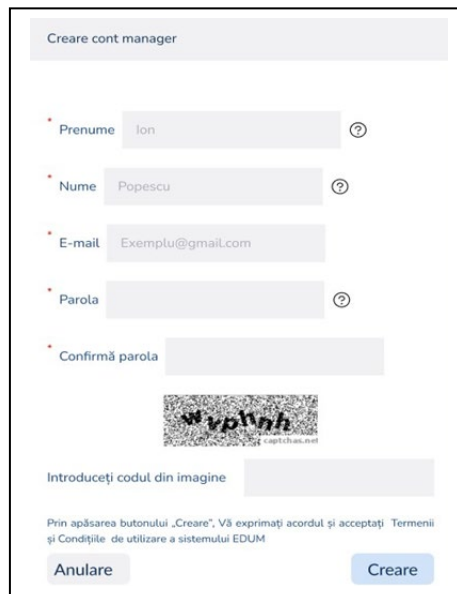


Figure 4. Section on the Home page

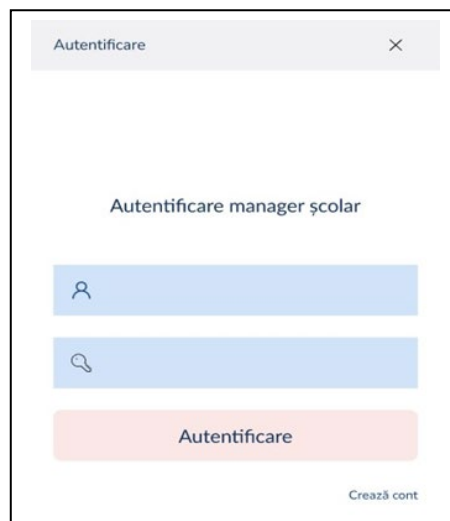
Source: https://www.figma.com/proto/VICWPLrhDpDarAciH7KJoY/Project3_Duca-Diana?node-id=3-3&t=0oMgi7aiFNZMSULv-1



The image shows a web form titled "Creare cont manager" (Create manager account). It contains several input fields with red asterisks indicating required fields: "Prenume" (First name) with the value "Ion", "Nume" (Last name) with the value "Popescu", "E-mail" with the value "Exemplu@gmail.com", "Parola" (Password), and "Confirmă parola" (Confirm password). There is a CAPTCHA image with the text "wvplnh" and the URL "captchas.net". Below the CAPTCHA is a text input field with the placeholder "Introduceți codul din imagine" (Enter the code from the image). At the bottom, there is a disclaimer: "Prin apăsarea butonului „Creare”, Vă exprimăm acordul și acceptăm Termenii și Condițiile de utilizare a sistemului EDUM" (By clicking the "Create" button, I agree and accept the Terms and Conditions of use of the EDUM system). There are two buttons: "Anulare" (Cancel) and "Creare" (Create).

Figure 5. Account creation questionnaire

Source: https://www.figma.com/proto/VICWPLrhDpDarAciH7KJoY/Project3_Duca-Diana?node-id=3-3&t=0oMgi7aiFNZMSULv-1



The image shows a login dialog box titled "Autentificare" (Authentication) with a close button (X) in the top right corner. The main heading is "Autentificare manager școlar" (School manager authentication). There are two input fields: the first has a person icon and the second has a magnifying glass icon. Below these is a large pink button labeled "Autentificare" (Authentication). At the bottom right, there is a link "Crează cont" (Create account).

Figure 6. Login dialog box

Source: https://www.figma.com/proto/VICWPLrhDpDarAciH7KJoY/Project3_Duca-Diana?node-id=3-3&t=0oMgi7aiFNZMSULv-1

It is certain that the proposed digital system will preserve a certain degree of individuality of the management teams and/or educational institutions depending on the geographical location, the number of students, employees, the profile and type of the institution, the neighboring community, etc. Likewise, this system will offer the transfer of managerial activity from paper to digital, in terms of planning-reporting, including the opportunity to communicate in real time about problems,

solutions, proposals, enrolling and participating in various trainings, organizing various discussions, surveys, evaluations, etc.

3. Conclusions.

Following the above, we can generalize the article to the following conclusions:

1. The educational management optimization concepts presented will allow: the reduction of the administrative workload, the efficiency of teaching and learning and the monitoring of the performance of students, teachers and managers, the creation of an educational system better connected to the real needs of students and the community.
2. International and local examples show that the successful implementation of information technologies depends on the continuous training of teachers and managers, access to digital infrastructure and the creation of a support system for users, and the active involvement of the community and all educational actors leads to the creation of more inclusive, innovative and effective schools.
3. The impact produced as a result of the creation of this support system in terms of qualitative and effective monitoring and evaluation of educational performance will more than justify the material resource invested.

As **additional recommendations** to prevent the challenges of implementing the described concepts, we propose:

1. Implementation of government programs to provide equipment and digital infrastructure for all students and a well-established system for keeping equipment and platforms functional;
2. Investments in effective continuing education courses and support resources for teachers;
3. Attracting external funds, such as grants from international NGOs, collaboration with the private sector and encouraging local authorities to prioritize education through participatory budgeting;
4. Organizing awareness campaigns that emphasize the long-term benefits of active involvement in the education of the younger generation and creating advisory committees that include representatives from all segments of the community.

Thus, only through long-term, well-thought-out investments connected to the technological and socioeconomic development of the countries in the region will we ensure the relevance, sustainability and durability of the educational system in the country.

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HEALTH TOURISM MARKET SEGMENTATION

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Abstract: *Health and tourism are viewed together as a growing industry based on strong opportunities to develop a new face of healthcare away from home. These social and economic sectors have different aims, creating a way for profitable business. Health units become entrepreneurs, and patients are targeted as customers. The study's main objective is to show the importance of market segmentation strategy, which entrepreneurs view as an opportunity to gain present customers for their future products or services. It is qualitative research based on semi-structured interviews of 12 people (3 doctors, 3 tourism entrepreneurs, 2 transport entrepreneurs, 3 wellness and spa entrepreneurs, and 1 professor researcher in the healthcare field). Points of discussion show the most important criteria for dividing the health tourism market, through entrepreneurs and customers, and answers for each planned decision. Health tourism players create management plans based on this marketing strategy according to each product or service category. Respondents were introduced to the subject of healthcare and the possibility of choosing a destination for better care and with persuasion asked for individual opinions about the image of healthcare as a business, an opportunity to create leadership and tourism destinations, and the segmentation of the health tourism market. Accordingly, in ethical procedures, every voice was appreciated as an important opinion without manipulation for targeted answers.*

Keywords: *health tourism, segmentation, marketing strategy, customer classification.*

JEL: I11, I12, I18, L83

1. Introduction

Every person, patient or tourist, is an individual entity; different choices, independent or influenced by someone for decisions, with individual social, economic, cultural, or educational positions. Predictive, preventive, and participatory medicine have all received a lot of attention; however, personalization is frequently overlooked beyond the molecular level, even though patient-centeredness is widely acknowledged as a fundamental component of high-quality healthcare and a cornerstone of biomedical ethics (Biller-Andorno, N., Ferrario, A., & Biller, A., 2024).

This study shows the difference between the segmentation of the market, in segments or categories, as a targeting marketing strategy and the differentiation of a company's products for a large market. Kotler describes segmentation as a part of the essence of strategical marketing near targeting and positioning, to divide customers with the same needs, attendance, and behavior, and establish for each segment a customer profile (Kotler, P., Keller, K. V., 2016, p. 57). The possibility of creating segments of customers perhaps to plan a business, implement it, and control the results, because customers have the same needs and wants, but they are not identical (Gillian, 2011). Commercial effectiveness is the main focus of STP (Segmentation, Targeting, Positioning) marketing, which also identifies the most valuable market segments for the business before creating a product positioning and marketing mix for every market that is being targeted (Hanlon, 2024). Segmentation is the process of classifying purchasers according to certain characteristics. These shared characteristics frequently aid health tourism companies in comprehending motivating behaviors, elements, and variables that might be replicated to persuade prospective or current clients to purchase a good or service

(Torkzadeh, L., Jalilian, H., Zolfagharian, H., Torkzadeh, H., Bakshi, M., Khodayari-Zarnaq, R., 2021). According to the literature, the most frequent variables used for market segmentation are gender, age, geography, and revenue. Specifically health tourism, the literature mentioned travel motivation (Weerakit, N., Tkachuk, A., 2024), behavior and attitudes toward foreign healthcare (Yeomans, C., Karg, A. and Nguyen, J., 2024), level of innovation of services (Zeng, Q., Liao, M., & Wang, Y., 2024) (Choe, J. Y. (Jacey), & Si Tou, C. F., 2024). Conversely, an entrepreneur defines a "competitor" by focusing on a market segmentation strategy. This method can be applied to determine competitors (Arnett, 2024) or can improve the organization's culture to create a structured efficient team (Surbaya, S. H., Khan, A. A., Surbaya, S. H., & Alzahrani, S. M., 2024).

2. Health tourism market segmentation

To better understand and market to potential customers, market segmentation is grouping them into groups or segments according to psychographic, behavioral, geographic, or demographic characteristics. Analyzing the context of interviews with respondents, the results of segmentation criteria are represented below:

Table 1. Types and criteria of market segmentation

Healthcare service: <ul style="list-style-type: none"> • Medical • Wellness • Spa 	<ul style="list-style-type: none"> • Homogeneity: common needs of customers • Distinction: individuals from a group • Reaction as a response to a market 	Primary types: <ul style="list-style-type: none"> • Demographic • Firmographic • Geographic • Behavioral • Psychographic
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Source: own

Respondents consider the health tourism market as a large market, segmented by entrepreneurs for better-targeting customers:

Table 2. Health tourism market segmentation

By service: <ul style="list-style-type: none"> • Medical treatments • Cosmetic procedures • Alternative treatments 	Age group: <ul style="list-style-type: none"> • Babies • Children: 2-12 years old • Teenagers: 13-19 years old • Young people: 20-30 years old • Adults: 31-45 years • Vulnerable: 46-53 years old • Siks patients: 54 years old < • Seniors 	Type of service: <ul style="list-style-type: none"> • Dental treatments • Rehabilitation after surgery • Oncological treatments • Surgery procedures • Infertility treatments • Cardiovascular treatments • Neurological treatments • Addiction recovery care 	Service providers: <ul style="list-style-type: none"> • Hospitals • Rehabilitation clinics • Health resorts with professionals • Spa resorts • Intermediaries • Health tourism tour operator • Cruises providers with health programs • Patient transport providers • Insurance providers • Market researchers
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Source: own, based on answers of respondents

Respondents consider the segmentation of services between regions, countries, or destinations as an international targeted plan driven by providers based on natural, educational, and cultural environments, histories of places, and sustainability reforms viewed by authorities and populations as a successful strategy for better world life.

Table 3. Health tourism market segmentation, by region/ country/ destination

Wellness destinations: <ul style="list-style-type: none"> • Hungary • Italy • Thailand 	Cosmetical surgeries: <ul style="list-style-type: none"> • Turkey: hair implants, liposuction • Mexico: esthetical procedures • South Korea: rhinoplasty, facial contouring • Brazil: augmentation and body contouring • Thailand: facelifts, gender reassignment • Italy: minim invasive plastic facial surgeries 	Medical surgeries: <ul style="list-style-type: none"> • Austria/ Spain/ Germany: neurological surgeries • Mexico • South Korea • India • Turkey 	Dental treatments: <ul style="list-style-type: none"> • Hungary • Mexico • Poland • Turkey • India • Thailand • Romania • Malaysia
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Source: own, based on answers of respondents

Table 4. Benefits, opportunities, and necessity of market segmentation

Benefits for customers: <ul style="list-style-type: none"> • Gain time waiting for a better life • Gain travel experience • Save money for high-standard quality of professionals and service • Travel with family for cultural/ shopping and health reasons • Discover potential healthcare destinations 	Opportunities for providers: <ul style="list-style-type: none"> • Create leadership for a healthcare • Research and offer important results for the market • Create a blockchain model for businesses and be attractive • Empathy with visitors and transform them into customers, gain them as new consumers • Create influencers team into customer segments for large market 	Necessity: <ul style="list-style-type: none"> • Reducing the suffering of patients and their families • Reducing risks of epidemics • Offer true value for health payments • Reducing waiting lists for expensive treatments • Gain the correct price for expensive procedures • Research and prevent disasters in healthcare
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Source: own, based on answers of respondents

2.1. Market segmentation of patients

Regarding patients as tourists traveling for medical services, respondents mentioned the importance of segmented groups with the same diagnostic or the same treatments, or as patients for the same hospital. Findings also show the necessity of entrepreneurship and co-creation for targeted services, as it is mentioned in the literature (Sarhadi, A., Akbarnia, M., Bagh Shirin, L., Daronkola, H. K., Shabankareh, M., & Aznab, E., 2023).

Based on the Health Belief Model (HBM), respondents mentioned the traveling distance between home and the place of consuming traveling package (Jiang, M., Qiao, G., Hou, S., & Zhao, L., 2024).

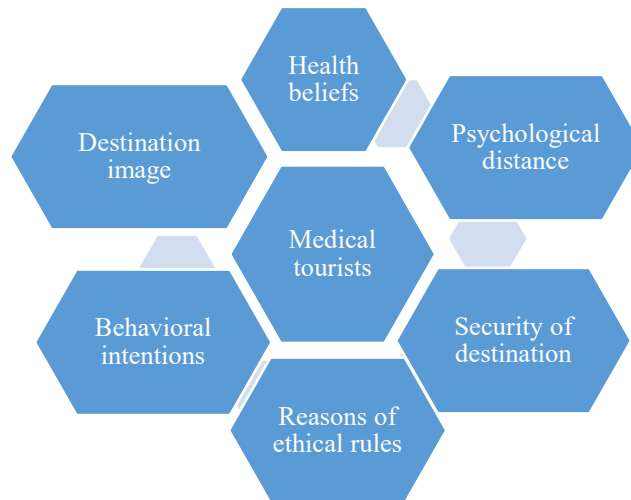


Figure 1. The most appreciated segmentation criteria for medical tourist
Source: own

In the respondent's opinion, healthcare organizations must segment their patient populations to identify high-risk, high-cost patients, comprehend the complicated care requirements of different patient groups, and customize care delivery or engagement initiatives according to those particular requested needs. These discrete categories may be delineated by several variables, including functional status, pain, discomfort, and risk of morbidity or death, typically characterized by chronic and several procedures; demography status; anticipated behavior; or socioeconomic determinants of health.

Individuals' quality of life is significantly impacted by their health and how they perceive it. Update services on patient needs are possible in modern practice due to innovation, researchers, high-quality education, and the digitalization phenomenon, creating a trend called personalized medicine (Green, S., Prainsack, B., & Sabatello, M., 2023). According to the literature, all respondents mentioned that not all market segments are interested in hospitals or private health tourism clinics. Their efficiency should be measured and help entrepreneurs create targeted plans.

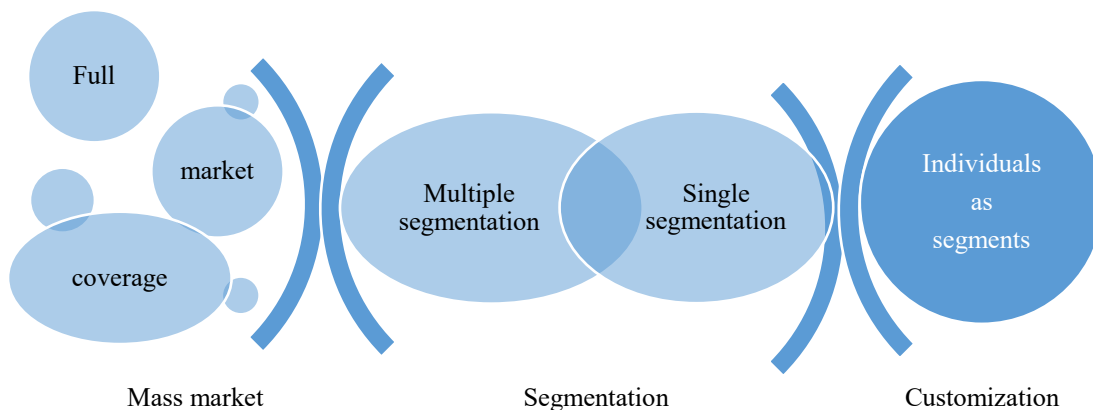


Figure 2. Marco and micro-segmentation efficiency.
Source: (Kotler, P., Keller, K. V., 2016, p. 286)

The ability of a business to fulfill the needs of each client by mass-producing specially created goods, services, initiatives, and communications is known as mass customization. International demand requests personalized medicine. Partnerships co-create health tourism packages based on clients' wants. Actually, it is characteristic of medical tourists from tourism providers. Marketing management targets this strategic plan helping to prevent and gain time for better health. (Hagedorn, J. M., George, T. K., Aiyer, R., Schmidt, K., Halamka, J., & D'Souza, R. S., 2023). Only recently has the use of AI in the healthcare sector come to light. Its application is being investigated in several areas, such as the ease with which patients can be diagnosed and treated, the automation of payer and provider workflow, and the improvement of manufacturer-developed technology, and respondents mentioned the efficiency of AI implications in the segmentation of customers. Regarding this idea, AI can help to create a PPP (the Patient Preference Predictor), a fantastic opportunity to fully embrace personalized medicine by capturing the values and preferences that shape people's expectations for their future healthcare (Biller-Andorno, N., Ferrario, A., & Biller, A., 2024).

2.2. Wellness Market Segmentation

The wellness tourism market as a business function is based on the same rule: segment customers, target each segment, and get a position for a service or product. Specifically, some given answers mentioned that wellness means „feeling good” with some perceptions (see Figure 3).



Figure 3. Views of wellness for a better life.

Source: (Callaghan, S., Losch, M., Pione, A., Teichner, W., 2021)

AI can monitor customer behavior by an algorithm, segmenting individuals with the same needs or wants and creating individual programs to be attractive in the tourism market as individual-created tourism package entrepreneurs. Figure 4 shows the wellness spending in 2020.

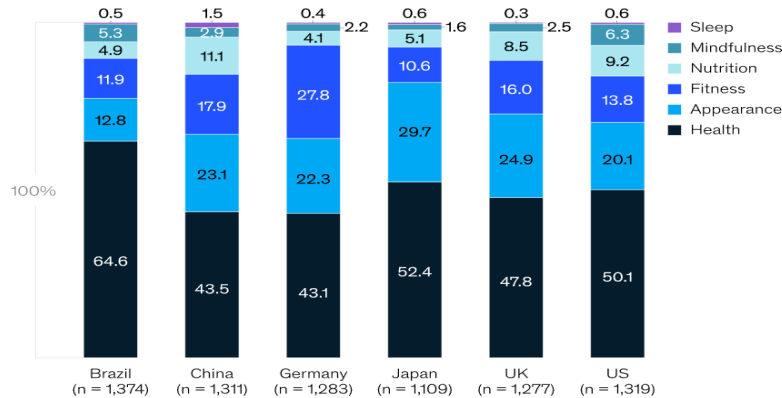


Figure 4. Wellness spending by country.

Source: McKinsey Future of Wellness Survey, August 2020. (Callaghan, S., Losch, M., Pione, A., Teichner, W., 2021)

2.3. Spa Market Segmentation

In the respondents' opinion, the Spa market can be segmented by several types of criteria:

- Customers: Spa lovers, High spenders, price sensitives
- Service: medical spa, wellness spa, hotel spa, daily salon spa
- Facilities: complex resort spa, cruise spa, entertainment spa
- Users: men, women, families with children, seniors, patients

In alignment with based criteria (gender, demographic, revenue, psychographics), providers develop products and services to measure demand, level, and type of payments. Figure 5 shows the market size of the wellness industry.

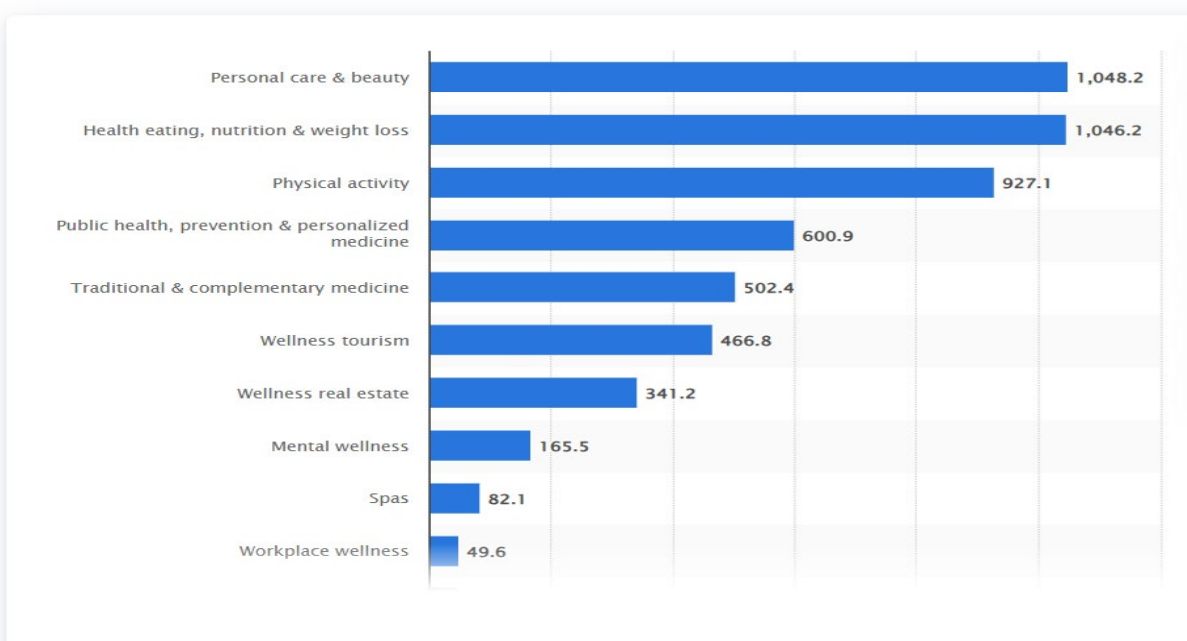


Figure 5. Market size wellness industry in 2022, in billion U.S. dollars.

Source: Statista (Gough, 2024)

3. Conclusions

The process of defining target markets, which are the market groups you desire to draw into your business, is aided by market segmentation. The market segment is a collection of consumers in your sector who are unique from one another but have some traits in common. The market potential—the entire demand for a product in an environment—is then understood using this study. With the respondent's answers, I conclude that segments differ based on psycho-graphics, demography, and place of residence, depending on health tourism packages; often, multiple marketing strategies are implemented to reach any target segment. Based categories for segmentation of customers are geographic segmentation with the following elements: regions, the density of home place/ destination, city size, and country size; demographic segmentation with the following indicators: gender, age, the status of family, region, culture, revenue, social class; psychographic segmentation with elements: personality, attitudes, price sensitivity, loyalty. The segmentation market of health tourism is a strong pilon near targeting and positioning for entrepreneurs, creating opportunities to be profitable and invest in personalized customer values.

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PAKISTANI TOURIST POTENTIAL FOR THE GROWTH OF THE MOLDAVIAN TOURISM INDUSTRY AND SEVERAL TYPES OF TOURISM FOR MOLDAVIANS TOURISTS IN PAKISTAN

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Abstract: *Tourism is an essential component for the socio-economic development of any country. Pakistan is the fifth most populous country in the world and its population is 241.50 million which is more than half of the European Union's population. The population of Moldova is 2.5 million. Pakistani tourists have zero shares in Moldova's tourism statistics. Tourism contributes to all the sustainable development goals of the United Nations. The infrastructure of Moldova supports international tourism activities.*

Moldova and Pakistan must open their diplomatic missions in their respective capitals to boost bilateral tourism. Moldova is required to start the visa-free regime for Pakistani tourists up to ninety days with mandatory requirement of a paid return air ticket for Pakistani tourists. In addition, direct flights between Moldova and Pakistan are necessary to start. The Travel & Tourism Development Index (TTDI) of Pakistan is far below Moldova. There are many forms of tourism that exist in Moldova. For example, rural tourism, cultural tourism, gastronomic tourism, nature tourism, agritourism, river tourism, archaeological tourism, etc.

A digital portal in Romanian, English, Urdu languages, and other languages of the world is required to rent accommodations for tourism purposes in Moldova. Pakistanis understand English and Urdu language. Pakneftegaz is ready to voluntarily assist in English and Urdu translation to the Government of Moldova for the development of a tourism digital portal to attract Pakistani tourists to Moldova.

Safety and security are the keys to attracting international tourism. Moldova is a safe place for international tourists but safety measures need to adopt in Pakistan. Moldavians are very hospitable. Moldovan cuisine is not as spicy and oily as Pakistani cuisine. Borscht, a soup made from vegetables, meat, and beetroots is a common dish in Moldova.

Upper Trajan's Wall is an important part of archaeological tourism in Moldova. The length of the wall is 120 kilometers and, it stretches from the Dniester River to the Prut River. An archaeological site of the Memorial Column is located in the city of Vulcanesti, an autonomous region of Gagauzia, Republic of Moldova. This monument was designed by the architect Bouffeuau for the victory of the Russian Army over the Turkish army in the battle of Cahul in 1770 in the city of Vulcanesti. Stephen the Great Central Park is famous for the monument of Stephen the Great and very famous archaeological heritage for international tourism. The great hero of the Moldavian nation and Romanian nation is Stephen the Great. He was great fighter and wise ruler. The monument was designed by architect Alexandru Plămădeală. Low-cost and safe river tourism is another form of international tourist attraction in Moldova. Kayaking tours are offered on multiple water locations in Moldova.

Pakistan is a multi-ethnic, multi-cultural, and multi-linguistic country but the majority of the nation understands the Urdu language. The Pakistani tourism industry is male-dominated. Moldavian women tourists are advised to wear the Pakistani dresses in Pakistan. Mountaineering tourism, cultural tourism, miscellaneous festivals, and Pakistani cuisine can be the centre of attraction. Kabaddi and Polo are a kind of sport and a new sport for the Moldavian tourists. K2 is the second highest mountain and international tourism attraction in the world which is located in Gilgit-Baltistan part of Pakistan. Pakistan has a number of archaeological sites and forts.

Keywords: *Digital tourism portal, Moldovan cuisine, archaeological tourism, monument of Stephen the Great, river tourism.*

JEL: Z32, L83

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1. Introduction

International tourism is the key driver of sustainable development. Tourism is a powerful tool to reduce economic and social disparities and conserve cultural and archaeological resources. Both Moldova and Pakistan are rich in tourism assets. Tourism provides 1 in 10 jobs worldwide. It is a major tool for social and economic transformations in many regions of the world.

In 2022, Moldova earned \$0.68 billion and Pakistan earned PKR 208.9 billion from visitor exports. Pakistani international tourist potential can significantly improve the earnings of Moldova from visitor exports. Spending within the country by international tourists for both leisure purposes and business purposes, including spending on multimodal transportation is termed as visitor exports, and it is a prime component in the direct contribution of tourism.

In 2023, percentage-wise visits of Moldavian international tourists or Moldavian outbound tourists to mention below countries are inked. Türkiye 47%, Bulgaria 18.9%, Egypt 10.6%, Romania 10.3%, and the rest of the world 13.2%. There is no share of Moldavian outbound tourists and excursionists in the Pakistani tourism sector.

The Republic of Moldova is a landlocked country and it has an area of 33,483 square kilometers. It has a small population of 2.5 million. It is bordered by Ukraine to the north, east, and south, and Romania to the west. Romanian is the national language of Moldova but Russian language, Ukrainian language, and Gagauz language. Moldova is an upper middle-income country.

Pakistan has a population of 241.50 million and is the fifth most populous country in the world. Pakistan is lower-middle income and its poverty rate is 40.1 percent as per the World Bank. Pakistan has a total area of 881,913 square kilometers. Pakistan shares land borders with China to the northeast, Iran to the southwest, Afghanistan to the west, and India to the east. Pakistan has an Arabian Sea which is in the south. Pakistan is a multi-ethnic and multi-linguistic country. More than seventy languages are spoken as first language in Pakistan. Most of Pakistan's languages were brought to the area of Pakistan is the result of steppe migrations between the first and second millennia BCE. These Pakistani languages descend from a common ancestor that was spoken in the Sintashta region (an archaeological site in Chelyabinsk Oblast) of the Russian Federation during the mid-bronze age. Educated people of Pakistan can speak in the English language.

The share of Pakistani women employment in the tourism sector is 2.4 percent which is extremely low. Indecent behaviour and harassment are normally observed towards Pakistani women in the tourism industry and other areas of the economy. Pakistani male occupies all forms of tourism in Pakistan. Women empowerment in the tourism sector of Moldova is much higher than in Pakistan.

The research methodology involves both qualitative research and quantitative research. This includes observations, Interviews with foreign tourists in Pakistan, websites, email correspondences, YouTube videos, and ethnographic research and local people's behaviour towards tourists. In addition, relevant tourism sources include United Nations World Tourism Organization (UNWTO) and World Travel & Tourism Council (WTTC) publications, the literature review of case studies, books, government publications, and UN publications, etc.

2. Basic content

2.1 Travel & Tourism Development Index of Moldova and Pakistan

Framework of the Travel & Tourism (T&T) Development Index consists of five pillars. Pillar No.1: Enabling environment; Pillar No.2: Travel and Tourism policy and enabling conditions; Pillar No.3: Infrastructure and Services, Pillar No.4: Travel and Tourism resources; Pillar No.5: Travel and Tourism Sustainability

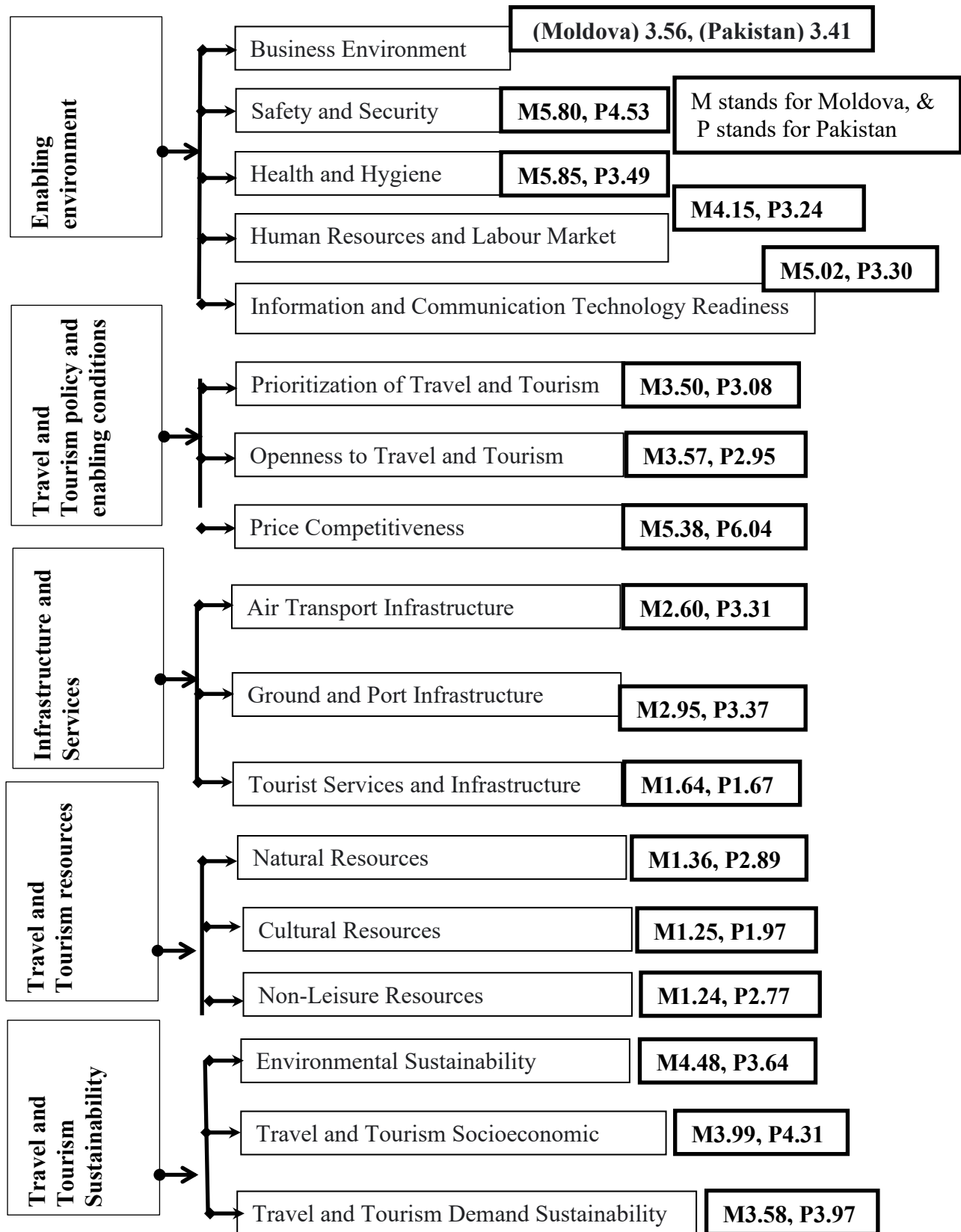


Figure 1. Travel & Tourism Development Index Scores of Moldova and Pakistan in detail.

*Source: Travel & Tourism Development Index 2024, Insight Report May 2024.
 (https://www3.weforum.org/docs/WEF_Travel_and_Tourism_Development_Index_2024.pdf)*

Rank of Travel & Tourism Development Index of Moldova is much better than Pakistan and it ranks 88 while Pakistan ranks 101. Travel and Tourism contribution to the economies of Moldova and Pakistan is 9.1% (USD 9.90 Trillion) in 2023.

Moldova has a bigger surface area than Belgium (total area is 30,688 km²). The rank on the Travel & Tourism Development Index of Belgium is 23 while Switzerland (total area is 41,285 km²) is 10. It means that Moldova can improve its Travel & Tourism Development Index by having a small surface area.



Figure 2. From Google search engine

Accommodation and food services in resorts in miscellaneous parts of Pakistan are not in the affordable range of the common Pakistani people. On January 7, 2022, 23 Pakistani domestic tourists died in their vehicles on the road of the high-altitude town of Murree because of the freezing temperature of snowfall and traffic jams. In addition, hotels tremendously increased the food and accommodation prices. Murree is hardly 54 kilometers from the federal capital of Pakistan. The traffic jam occurred because vehicles entering and leaving the city of Murree were beyond the road capacity, and there were no traffic counters and classifiers installed at the entrance and exit of the Murree.

In May 2011, one innocent Tajik citizen and four innocent Russian citizens including seven months pregnant Russian woman were shot dead near the Kharotabad area of Quetta city, Balochistan province, The Russian woman was born in Yakutsk, Republic of Sakha of the Russian Federation. In January 2024, Motahhreh Abbasi of Iran, Charlie West of the United Kingdom, and Alex Sidney of Italy were misbehaved and tortured in the Sadiqabad Saddar police area of Sadiqabad, Punjab province, Pakistan. All three persons were international cycling tourists.

The safety, security, and hygiene situation is much better in Moldova to attract international tourism. That's why more tourist traffic is anticipated from Pakistan to Moldova. International motorcycle

tourism, international cycling tourism, and international walking tourism are the forms of tourism that can attract international tourists.

International tourism generates imports. The Economic leakages exist in the travel and tourism industry. If the country is less developed, the leakages will be more. A certain amount of leakage is inevitable in international tourism. Two types of leakages are identified in tourism. When international tourists demand certain products, equipment and food that the host country cannot supply, it is called import leakage. The Pakistani tourists in Moldova will demand certain products for example rice, pink Himalayan salt, dates. Mangoes, Pakistani pickles, miscellaneous herbs and spices, leather products and Pharmaceutical industry related products etc. which are not available in the local economy of Moldova. In this case, Moldavian suppliers will look to Pakistan or somewhere else to import these goods. This all is related to import leakage in tourism and Pakistan can benefit from it.

Export leakages are related to multinational corporations, large foreign businesses, International hotel chains, etc in Moldova or Pakistan.

2.2 Linkages of United Nation’s Sustainable Development Goals with International Tourism:

Moldova and Pakistan can collaborate on the inked below United

Nation’s sustainable development goals to promote international tourism in their respective countries.

Sustainable Development Goal No.1- End poverty in all its forms everywhere

International tourism will generate decent job opportunities, increase income levels, reduce the risks of poverty, and improve the situation of economic opportunities in miscellaneous regions of Moldova. Low skills are needed. Any local Moldavian woman or man who has one or two-bedroom spaces in his/ her house and knows cooking skills can easily attract international tourists from Pakistan.

Sustainable Development Goal No.2- End hunger, achieve food security and nutrition, promote sustainable agriculture

International tourism enhances the demand for fruit, vegetables, fish, dairy industry, livestock industry, poultry industry, mushrooms etc. Local Moldavian farmers can take the economic benefits by supplying agricultural products to hotels, restaurants, and international tourists. It will promote the sustainable agricultural activities in Moldova. International tourists from Pakistan and other countries will enjoy staying in the Moldavian farmhouses. It will promote the Agritourism in Moldova.

Sustainable Development Goal No.3- Ensure healthy lives and promote well-being for all at all ages

Moldova has an Under-five child mortality rate of 14.2 deaths per 1,000 people. This is higher than Monaco (1.91 deaths per 1,000 births), Luxembourg, Finland, Japan, Norway, Singapore, Sweden and Iceland. The government of Moldova can reduce the child mortality rate and improve healthcare facilities via revenue generated from international tourism.

Sustainable Development Goal No. 4- Ensure inclusive and equitable quality education and promote lifelong learning for all

International tourism can promote inclusiveness. It provides direct and indirect decent jobs for women, old people, young people, disabled people, and marginalized groups.

Sustainable Development Goal No. 5- Achieve gender equality and empower all women and girls

International tourism can empower Moldavian women and young girls in the hotel industry, restaurants, and other areas of tourism. In Pakistan, the concept of gender equality does not exist in tourism industry. Women's share in the Pakistani tourism sector is very low, and the Pakistani tourism industry is male-dominated.

Sustainable Development Goal No. 6 - Ensure availability and sustainable management of water and sanitation for all

Moldova is rich in water resources. These include lakes, rivers, and artificial ponds. There are more than five thousand small dams in Moldova for drinking water and agricultural purposes. Dubăsari Dam and Stânca-Costești Dam are two big water reservoirs. Rural communities of Moldova get their drinking water from underground deep wells. The sanitation situation in Moldova is much better than in Pakistan.

Sustainable Development Goal No. 7 - Ensure access to affordable, reliable, sustainable, and modern energy for all

International tourism cannot grow without a cheap and uninterrupted supply of electricity. Pakistan is facing the problem of costly power generation and interrupted supply of electricity to its domestic and industrial consumers including the tourism sector. The electricity cost in Moldova is much better than in Pakistan.

Sustainable Development Goal No. 8 - Promote sustained, inclusive and sustainable economic growth, employment and decent work for all

Approximately 1.4 million Moldavian workforce are working in foreign countries. Remittances from Moldovan emigrants are decreasing because their families are reuniting in the host countries. International tourism will promote the number of tourism industry-related services and generate decent work for Moldavian people. These services include tourist transportation, hospitality service of rural communities, promotion of Moldavian culture, cuisine, insurance, banks, etc. Security services for tourists in some areas of Pakistan.

Sustainable Development Goal No. 9 -Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Moldova has better infrastructure and is cheap to attract international tourists from Pakistan. The costs of hotel stay and food expenses are low in Moldova as compared to Pakistan. The quality of food and hygienic conditions of restaurants are highly questionable in Pakistan. But the food and beverage quality and hygienic conditions of Moldavian restaurants and any Moldavian house kitchen are very good.

Sustainable Development Goal No. 10 -Reduce inequality within and among countries

Government of Moldova can engage the urban and rural communities for the development of international tourism. It will reduce the inequality in Moldavian society and will provide the opportunity for the local people to prosper in their local communities.

Sustainable Development Goal No.11-Make cities and human settlements inclusive, safe, resilient and sustainable

International tourism will contribute to developing the urban and rural communities in tourist places of Moldova and Pakistan. Both countries can protect the natural heritage and cultural heritage under SDG No.11 and generate a large amount of revenue.

Sustainable Development Goal No.12 - Ensure sustainable consumption and production patterns

There are fundamental changes needed to produce and consume goods and services in the Pakistani tourism sector. Polypropylene bags, polyethylene bags, and single-use items are the common issue in Pakistani tourist places. Responsible tourism practices need to be adopted to save biodiversity, water, and forests.

Sustainable Development Goal No.13 - Take urgent action to combat climate change and its impacts

The tourism sector contributes to greenhouse gas emissions. The introduction of hydrogen fuel cell vehicles and electric vehicles is the solution to combat climate change in Moldova and Pakistan.

Sustainable Development Goal No.14 - Conserve and sustainably use the oceans, seas and marine resources for sustainable development

There is a very long coastline of the Arabian Sea in Balochistan province and Sindh province of Pakistan. Coastal tourism and marine tourism have the potential to uplift the blue economy of Pakistan. The Arabian Sea has warm sea water in almost all the year. Pakistan can easily attract millions of international tourists including Moldavian tourists. This kind of tourism can economically benefit the local Baloch people and Sindhi people and will help the government of Pakistan in poverty eradication.

Moldova is a landlocked country but it has abundant water resources including small dams, lakes, rivers, springs, etc. Safe kayaking tours in miscellaneous rivers and staying with local Moldavian families are the point of attraction for Pakistani international tourists.

Sustainable Development Goal No.15 - Protect, restore and promote sustainable use of terrestrial ecosystems and halt biodiversity loss

Moldova is rich in fauna and flora, natural heritage, and biodiversity. Unnecessary road construction practices and the spread of horizontal residential houses are destroying the terrestrial ecosystems in densely populated Pakistan. It also causes biodiversity losses in Pakistan.

Sustainable Development Goal No.16 - Promote peaceful and inclusive societies, provide access to justice for all and build inclusive institutions

Pakistan ranks 129th out of 140 countries while Moldova ranks 68th out of 140 countries as per the World Justice Rule of Law Index. Improvement of rule of law situation attracts international tourism to the country.

SDG 17 – Strengthen the means of implementation and revitalize the global partnership for sustainable development

The tourism sector can engage the local, national, and international stakeholders to jointly work to achieve the United Nation’s sustainable development goals. Both the government of Moldova and the government of Pakistan need to collaborate in the tourism sector to achieve sustainable development goals.

2.3 Mountain Tourism

Pakistan is famous for mountain tourism. Pakistan has the world's second high mountain peak known as K2. It lies in the Gilgit–Baltistan area of Pakistan. The height of K2 is 8611 meters. The world's ninth high mountain peak is known as Nanga Parbat, and is located in the Gilgit–Baltistan area of Pakistan. Height of Nanga Parbat is 8126 meters. There are several mountain peaks 3000 meters to 8000+ meters in Pakistan. Mountain tourism is a costly and dangerous form of tourism. Every year many international tourists visit Pakistan for mountain tourism. This form of tourism provides the opportunity to international tourists to visit local communities and experience flora and fauna.

Balanesti Hill is the highest point in Moldova. Its altitude is 430 meters. Hiking is not dangerous on Balanesti Hill. International tourists from Pakistan and other countries have the opportunity to enjoy the landscape, biodiversity, and local food. There are several paragliding sites in Moldova and Pakistan is available for international tourists.

2.4 Gastronomy tourism

This kind of tourism is also known as culinary tourism or food tourism. The linkage between local and national development and food tourism is obvious. Gastronomy tourism is based on the local culture. Both Moldova and Pakistan have a variety of dishes. Mămăligă is the national dish of Moldova. Nihari is the national dish of Pakistan. Moldavian soups and minced meat-based stuffed cabbage rolls (known in Moldova as sarmale, and in Azerbaijan as dolma) are very delicious. Bread-baking practices in Moldova and Pakistan are different. The people of Punjab province and Sindh province use red chilies and a lot of cooking oil in their dishes. Sohan halwa is a sweet dish and specialty of the people of Dera Ismail Khan. Sobot or painda (in the Pashto language) is also a famous dish in Dera Ismail Khan and other parts of the Khyber Pakhtunkhwa province in Pakistan. Food adulteration is a common issue in Pakistan. It is also a threat to the health security of the people of Pakistan and the international tourists who are visiting Pakistan. Pakneftgaz provides advice to international tourists for a visit which kinds of restaurants, hotels, or shops in miscellaneous areas of Pakistan.

Moldavian cuisine is safe and healthy for international food tourists. The persons of 60 years age group and older consist of 23.8% population of Moldova in 2023. Older Moldavian women are more than 60% share in the ageing population. There is a projection that 33% of Moldavians will be over 60 years age in 2040. As compared to other European nations older persons are poorer in Moldova. These older Moldavians can cook the local dishes and provide bed space or camping tents for international tourists from Pakistan and other countries.

2.5 Religious tourism

Religious tourism is also a big contribution to the country's economy. Religious tourism is also called sacred tourism, spiritual tourism, or faith tourism. Every year, the government of Pakistan contributes to the economies of Saudi Arabia, Iran, Iraq, and India through religious tourism. Similarly, many Muslims, Hindus, and Sikhs visit Pakistan as religious tourists and contribute to the economy of Pakistan. Pakistan is a Muslim country but it has a significant number of Christian minorities. There are old historical churches in many cities of Pakistan. For example, the historical Saint Thomas Church of Dera Ismail Khan City, Khyber Pakhtunkhwa province, Pakistan. Major-General Sir Henry

Marion Durand is buried in the area of Saint Thomas Church. He drew a Durand line between British India (now Pakistan) and Afghanistan in 1893. The Durand line is a historically controversial borderline. Moldova is a Christian country and it has several monasteries and churches. Moldavian monasteries and churches are the source of attraction for Pakistani Christian minorities. There are eight Romanian Orthodox Churches that are listed by UNESCO as World Heritage sites. These include Arbore Church, Humor Monastery, Moldovița Monastery, Church of the Elevation of the Holy Cross, Probota Monastery, Saint John the New Monastery, Voroneț Monastery and Sucevița Monastery.

2.6 Archaeological tourism

Pakistan is rich in archaeological tourism. There are several archeological sites for example, the Buddhist Civilization in Taxila, Badshahi Mosque, Mohenjo Daro, Rohtas Fort, Mazar-e-Quaid (National Mausoleum), etc. The national monument of Minar-e-Pakistan, it was designed by the Russian-born civil engineer and architect Nasreddin Murat Khan. Similarly, Moldova is also rich in archaeological tourism sites. These include Soroca Fort (it is built by Stephen the Great), Mimi Castle, Orhei Fort, Tighina Fortress etc.

Necessary steps to attract Pakistani tourists to Moldova:

- (i)** The government of Moldova needs to open an embassy in Islamabad and similarly the government of Pakistan needs to open a diplomatic mission in Chișinău.
- (ii)** The government of Moldova needs to start a visa-free regime for Pakistani tourists up to ninety days, and the same philosophy needs to follow the government of Pakistan.
- (iii)** Moldavian Airlines needs to start direct flights between Islamabad (the capital of Pakistan) to Chișinău (the Capital of Moldova) and vice versa. Airlines fall in the definition of the tourism value chain as per the United Nations World Tourism Organization (UNWTO). Why Moldavian Airline is necessary because it will stop the export leakage from air travel.

This step will not only boost tourism but also provide access to Moldavian agricultural products, Moldavian traditional woven carpets, and other products to Pakistani markets. Similarly, Pakistan can export its products.

- (iv)** 862,625 Pakistani citizens emigrated in the year 2023 and 832,339 Pakistani citizens emigrated to other countries of the world. Over 6,000 Pakistanis made it illegal to reach European shores in the year 2023.

Emigration from Pakistan continues because of poverty, unemployment, absence of rule of law, economic inequality, etc. Before the arrival of Pakistani tourists at Chișinău airport, the mandatory requirement of a paid return air ticket to Pakistan should be the essential requirement for every individual tourist from Pakistan. This condition will help the government of Moldova in terms of economics and combat the problem of illegal emigration.

- (v)** The Government of Moldova needs to develop a tourism digital portal to rent accommodations in hotels, local houses, tented camps, farmhouses, etc. Accommodation is a tourism value chain as per the definition of the United Nations World Tourism Organization (UNWTO). This digital portal must be in English, Urdu, Romanian, and other languages of the world are required. This digital portal will make it convenient for international tourists from Pakistan or other countries to seek accommodation

in Moldavian urban and rural areas. In addition, the local Moldavian people who want to paste their digital advertisements for bed space, a room, a farmhouse, or camping can economically benefit from this digital portal. In this way, the government of Moldova can engage unemployed young or old people in rural and urban areas, and eradicate poverty in terms of tourism digital portal.

3. Conclusion

(i) Pakistan needs to develop the necessary tourism infrastructure in Balochistan province and Sindh province to attract international tourists for Coastal tourism and marine tourism. In addition, improves its global ranking for the rule of law and needs to promote gender equality in the tourism sector.

(ii) A Pakistan-based company named Pakneftegaz will prepare the Journey Management Plan, arrange transport, arrange security, arrange accommodation facilities, and provide tour guides for Moldavian tourists and other international tourists who are interested in visiting the miscellaneous areas of Pakistan. In addition, the company “Pakneftegaz” will closely work with the Moldavian travel agencies, tour operators, tour guides, the Academy of Economic Studies of Moldova, and Moldavian government authorities to attract international tourism from Pakistan to Moldova and vice versa.

(iii) The government of Pakistan needs to take serious action against food adulteration practices in Pakistan. This step will encourage international gastronomy tourism in Pakistan.

(iv) The government of Moldova can engage its 23.8% population of old age group in food tourism or gastronomy tourism.

(v) The Government of Moldova can easily fall in the first top ten ranking countries of the world in the Travel & Tourism Development Index (TTDI) if make improvements in the international tourism sector and opens new areas of tourism. In this context, Pakneftegaz is ready to work with the government of Moldova. The population of Pakistan is growing and its population is more than half the population of the European Union. The government of Moldova needs to harness this international tourism potential and attract Pakistani tourists.

(vi) International tourism from Pakistan and other countries is the solution to solve issue of emigration of Moldavian nationals from their home country. It will positively impact the Moldovian demographics and discourage the phenomenon of population shrinking, and local young Moldavians will not go abroad to seek employment opportunities.

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EVALUATION OF THE ECONOMIC EFFICIENCY OF INVESTMENT PROJECTS IN INFORMATIZATION THROUGH THE METHOD OF COMPUTER SIMULATION

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Abstract: The economic efficiency of informatization investment projects (i-projects) is a crucial factor in decision-making processes, especially considering the growing complexity and uncertainty in the technological environment. A comprehensive analysis is necessary to select the most effective i-project, and computer simulation plays a vital role in evaluating various scenarios and potential outcomes. The findings emphasize the significance of simulation in addressing the inherent variability of i-project investments, facilitating better-informed decisions and optimizing resource allocation.

Keywords: *mathematical model; investment sources; capital investments; objective function; IT project.*

JEL: M310, M370, M150, C61.

1. Introduction

In today's dynamic economy, assessing the economic efficiency of informatization investment projects (i-projects) is crucial for organizational success. These projects are complex, involving a diverse range of resources, technologies, and interests, requiring thorough efficiency analysis. According to ISO 9000 standards, efficiency is defined as "the ratio between the result achieved and the resources used" [4], emphasizing that project efficiency is influenced by numerous factors and external variables.

The efficiency of an i-project is determined by specific criteria and methods, both of which play a vital role in decision-making. Evaluation methods include gathering and analyzing project data using both quantitative indicators and qualitative interpretations. Criteria, meanwhile, serve as indicators that reflect the system's state and act as the foundation for evaluating outcomes against established objectives [6].

A key element in evaluating the economic efficiency of i-projects is net profit, defined as the difference between the revenues generated and the expenses related to the project's implementation and operation. Net profit can be expressed through cash flow and net cash flow, consisting of two fundamental components: revenues and costs. Calculating these values can be challenging, and simulation emerges as an effective solution in this context.

Simulation enables better management of imprecise and incomplete information when evaluating the economic efficiency of i-projects. It allows decision-makers to analyze multiple project scenarios and select the solution with the highest potential for success. By using simulation, projections based on various assumptions about future conditions can be generated. This method effectively answers critical "what if..." scenarios by adjusting exogenous variables and economic parameters to estimate their impact on i-project efficiency [8].

There are several strong arguments for using simulation in evaluating the economic efficiency of i-projects:

- 1) In many cases, evaluation problems cannot be expressed through standardized mathematical formulas, which necessitates the use of alternative methods such as simulation [7].
- 2) Even when analytical methods are available, their application may require excessive computational effort or lengthy timeframes, which is not always justified in relation to the benefits obtained [10].
- 3) Inaccurate or incomplete data can render precise analytical methods useless, making simulation a more viable option for obtaining relevant results [1].

It should be noted that simulations in an informatization investment project are based on building a model from decision variables, which reflect the mechanism of the analyzed decision-making situation. These simulations allow for identifying the most appropriate option based on a set of predetermined decision criteria. Therefore, simulation not only enhances the evaluation of economic efficiency but also provides the ability to adapt to ongoing market changes.

Basic content

The simulation technique is based on the imitation or reproduction, using models, of the systematic behavior of certain components of the IT project, with the aim of gaining a deep understanding of their functioning so that management decisions can be made based on this knowledge. In general, the simulation is conducted sequentially, as illustrated in Figure 1:

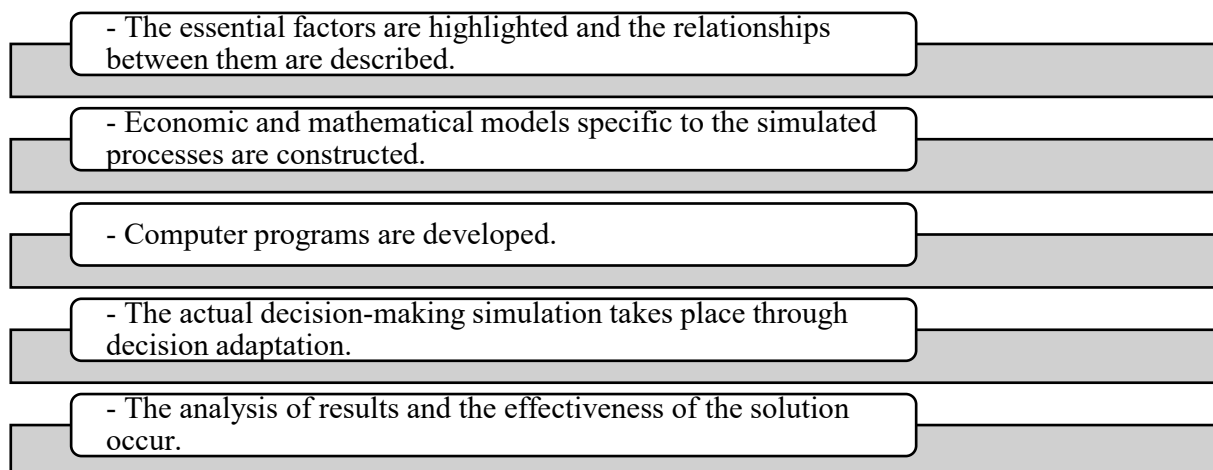


Figure 1. Stages of decision simulation in the analysis of IT project efficiency

Source: developed by author based on the conducted study and scientific research

Since, in the evolution of IT projects, they are influenced by random factors such as unpredictable cost variations, fluctuations in available resources, unexpected changes in requirements, or uncertainties related to technological performance, a procedure for generating statistical selections of these random variables and stochastic processes defined in the problem formulation is utilized with the help of a computer.

Additionally, a characteristic problem of simulation models lies in tracking the dynamics of the simulated system's states—meaning monitoring them through "clock time." By its nature, the simulation model is discrete, successively highlighting the state changes of the system.

In this context, a simulation model includes input and output elements, each defined as variables or parameters. The distinction between a variable and a parameter is given by the possibility of the variable to change its value during the execution of the calculation program—while the parameter

remains constant throughout a calculation sequence. Within the simulation model designed to identify the efficiency of IT projects, we have two types of variables:

✓ *Input variables* can be deterministic (read from the external environment or identified based on strictly determined rules) or stochastic. The generation of stochastic variables depends on certain input parameters. A stage during the execution of the calculation program where the input variables remain constant is called the simulation step.

✓ *Output variables* depend on the input variables through a specific mechanism (which describes the logical conditions and types of mathematical processing that can be applied). This dependence is determined by the internal logical structure of the theoretical model considered. The value of an output variable is the result of executing a step of the calculation program associated with the model. If at least one of the input variables is stochastic, then at least one of the output variables is also stochastic.

At the same time, it should be noted that any structure of a simulation model intended for evaluating the efficiency of an IT project contains the following basic elements:

- a. *Decision-making rule* – this influences how the intermediate and final results of the project are obtained;
- b. *Entities* – the variables to which different numerical values (quantitative variables) and/or logical values (qualitative variables) are assigned, relevant to the informatization process;
- c. *Linkage relationships* – which describe the interconnections between the quantities involved in the informatization project;
- d. *State of the system* – any informatized system is described in a certain state that can be either static (in the case of certain Markov processes) or dynamic (through various state equations);
- e. *Exogenous events* – events that may occur independently of the state of the system at a given moment, thereby influencing the project's efficiency;
- f. *Feedback links (or feedback relationships)* – through which the output magnitudes (final results or responses) adjust, according to certain rules, the input variables in the model;
- g. *Simulation stopping criteria* – to delineate the time horizon, accuracy, and “fineness” of the model, ensuring the relevance and accuracy of the evaluation of the informatization project's efficiency.

After constructing the simulation model, the process involves modifying the values for various system characteristics, such as input variables or parameters, and deducing the mechanism through which the output variable values are generated. This adjustment is essential for evaluating the efficiency of investment projects in informatization, highlighting the impact of calculations on other components of the system and allowing for the identification of the most effective implementation strategies. By testing and modifying the variables, one can analyze how each efficiency criterion influences the final outcomes. This provides a solid foundation for identifying the most efficient strategies for each IT project.

In the process of analyzing the efficiency of IT projects, a series of relevant indices are utilized, such as the discounted payback period, *economic return on investments (ERI)*, *net present value (NPV)*, *internal rate of return (IRR)*, *profitability index (PI)*, *adjusted expenses (AE)*, and *total cost of ownership (TCO)*. Evaluating these indices through simulation facilitates the identification of successful projects and provides a better understanding of the critical factors influencing the outcomes

of an IT project, while also allowing for the assessment of various scenarios and the selection of the most efficient option.

Thus, computer simulation not only aids in evaluating the performance of IT projects but also contributes to optimizing the decision-making process, evaluating the economic efficiency of investment projects, analyzing multiple possible project alternatives, and choosing the one that yields the greatest effect.

Based on the research conducted, it was found that two types of models are used for studying the efficiency of investment projects in informatization, as presented in Figure 2:

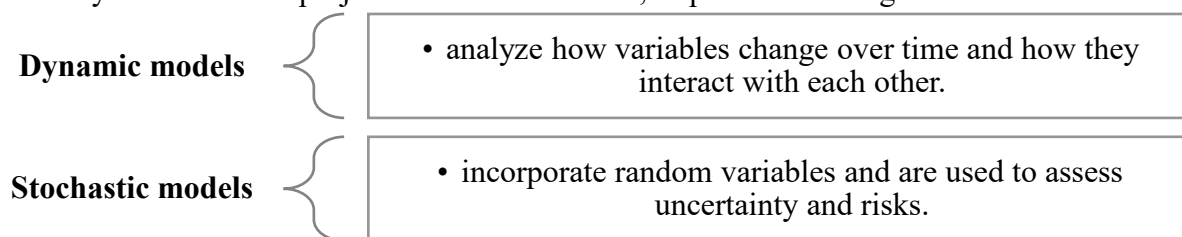


Figure 2: Types of models used in the analysis of the efficiency of IT investment projects

Source: developed by author based on the conducted study and scientific research

According to the information presented in Figure 2, dynamic models are useful for simulating the evolution of complex systems and for understanding the impact of changes on investment project outcomes. In contrast, stochastic models allow for the simulation of various scenarios, taking into account external fluctuations that may influence project efficiency.

The models for simulating IT projects are designed to quantify the impact of certain variables (products, demand volume, etc.) on net revenues over a period of time. One of the most general methods for analyzing phenomena that occur in systems characterized by a large number of variables, parameters, complex relationships between components, and disturbing factors is considered to be Monte Carlo simulation. The Monte Carlo simulation model is useful for comparing the indices of IT projects as it can provide an accurate estimate of the results, accounting for the variation and uncertainty associated with them.

The Monte Carlo method is essential for assessing the risks and uncertainties associated with investment projects in informatization, providing a stochastic approach for the comparative analysis of efficiency indices such as NPV, IRR, and PI. This method allows for the simulation of multiple possible scenarios based on probabilistic distributions of critical variables, such as costs, implementation duration, and project returns.

By utilizing the Monte Carlo method in informatization projects, various scenarios can be simulated where the values of input variables, such as available resources or budgets, are randomly altered. The results of these simulations provide a probabilistic perspective on project performance, allowing for the analysis of the impact of each efficiency criterion on the final outcomes. Thus, the method becomes a tool for the comparative evaluation of projects aimed at identifying optimal solutions and mitigating risks.

In [9] and [3], Monte Carlo simulation has been used to assess financial risks and determine the likelihood that the project's duration and costs will exceed initial estimates. Similarly, in informatization projects, this method aids in identifying potential deviations from initial plans, contributing to a more accurate estimate of the economic efficiency of the investment. Additionally,

the proposed risk scale in [3] can be adapted for classifying risks in IT projects, providing a clear view of potential losses.

The application of the Monte Carlo method in analyzing the efficiency of informatization projects involves generating random variables for each project and calculating efficiency indices for each scenario. This can be achieved through simulation algorithms that generate random variables X_i and calculate performance indicators such as NPV, IRR, and PI, which are computed according to established formulas:

1) **Net Present Value (NPV)** expresses the surplus value that returns to the investor by the end of the investment's lifespan and is determined as the difference between the discounted future cash inflows and the amount of capital invested [2, 11]:

$$NPV = \sum_{t=1}^L \frac{CF_t}{(1+d)^t}, \quad (1)$$

where d is the discount rate (which may also be dependent on t), and L – is the duration of the project implementation, τ is the investment absorption duration, D – is the useful life of the product, and, and $L = \tau + D$ is the total duration of the project. The coefficient d_n is determined according to the formula [2] $d_n = (1+d)^n$, where d is the *discount rate*. Thus, the indices can be static (which do not take the time factor into account) and dynamic (which do consider the time factor). Static indices are usually used for estimating the efficiency of investment projects with a duration of up to one year, while dynamic indices are used in other cases.

If we analyze the NPV's dependence on the discount rate, it is obvious that the profit from the project will decrease with the increase of the discount rate (see Figure 3).

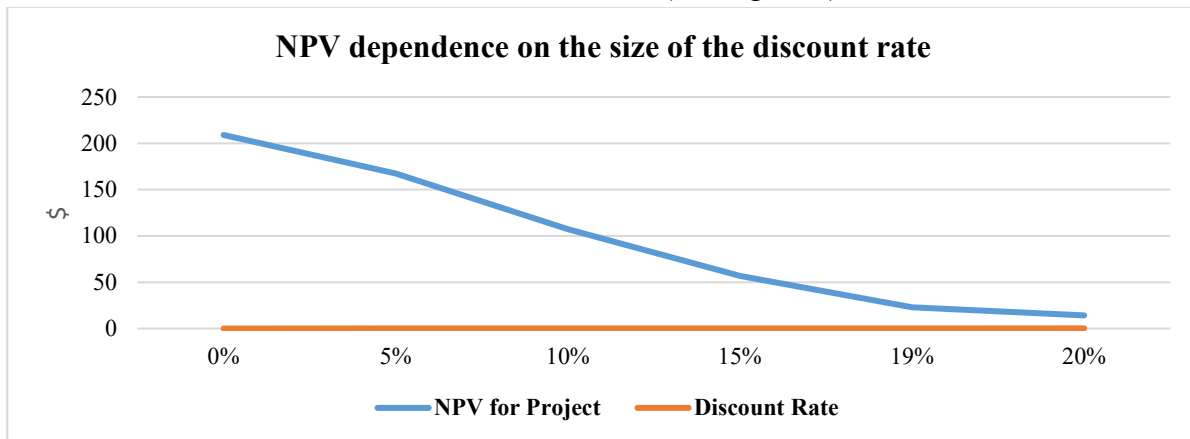


Figure 3. Dependence between NPV and discount rate

Source: developed by author based on the conducted study and scientific research

For the case when a project is fully financed by a bank loan, and the average risk-free bank interest rate is 12%, then it can be said that the i-project is beneficial.

2) **Internal Rate of Return (IRR)** represents the discount rate for which the NPV index has a value of zero, meaning it is determined from the equation:

$$-\sum_{t=1}^r \frac{I_t^C}{(1+IRR)^t} + \sum_{t=r+1}^L \frac{P_t + AA_t}{(1+IRR)^t} = 0, \quad (2)$$

Knowing the value of IRR, it can be stated that if $IRR < d$, then NPV will have a negative value, meaning that the project is not efficient. Conversely, if $IRR > d$, then $NPV > 0$, and the project, based on the NPV index, can be considered acceptable. The IRR index, in fact, determines the interest rate from the project implementation, and then compares this rate with the risk-adjusted repayment rate. If the repayment exceeds the risk-adjusted recovery, then the investments make sense.

Unlike NPV, IRR is an absolute measure that allows not only decisions to be made on i-projects, but also to compare projects with completely different levels of funding and completely different budgets [3].

3) **The Profitability Index (PI)** expresses the relative profitability over the project's lifespan [11] and, taking into account (2), is determined as follows:

$$IP = \frac{1}{I^c} \sum_{t=r+1}^L \frac{CF_t}{(1+d)^t} = \frac{NPV + I^c}{I^c} = 1 + \frac{NPV}{I^c}, \quad (3)$$

It specifies the size of the discounted profit that corresponds to one unit of invested capital. The value d may also depend on t . According to this index, the project that ensures the highest value of the Profitability Index (PI) is accepted.

Based on the information presented, Monte Carlo simulation proves to be a valuable tool in the decision-making process for IT projects, providing a detailed analysis of their performance and contributing to the effective foundation of investment strategies. This stochastic method allows for addressing complex problems through the modeling of random variables, facilitating the simulation of an artificial random process that reflects the essential characteristics of the studied system.

By utilizing the Monte Carlo technique, virtual experiments can be conducted, replacing real conditions with simulations that generate random numbers with a distribution similar to the behavior of the real phenomenon. The practical value of the method lies in its ability to determine, through repeated experiments, the probabilities and average values of the variables of interest. This approach proves useful in evaluating the risks and uncertainties associated with IT projects, providing a solid basis for the comparative analysis of efficiency indices such as NPV, IRR, and PI.

Modeling through Monte Carlo simulation involves identifying the cumulative frequency function for a specific sample, which can be extrapolated to reflect the real behavior of the system. Thus, if certain values of the random variable correlate with the expected outcomes, these values can be used to anticipate the performance of the projects.

To ensure the validity of the calculations and the relevance of the conclusions, the associated stochastic process must accurately reflect the initial problem. This means that the arithmetic and logical operations used for the generated variables must conform to the established relationships, so that the obtained results are representative of the problem-solving objectives. The results are expressed in the form of statistical sequences, including means and variances, which, according to the law of large numbers, approximate the solution to the studied problem, providing a solid foundation for making informed decisions in the field of IT investment.

2. Conclusions

The article presents an analysis of the economic evaluation of informatization projects, highlighting the application of computer simulation methods as an essential tool in managing uncertainties and risks. The use of Monte Carlo simulation proves to be particularly effective in optimizing the

decision-making process, providing relevant results that can enhance current approaches to IT project evaluation.

Based on the findings of this study, future research could expand the application of comparative analysis of efficiency indices for each project individually. By simulating various scenarios, decision-makers can anticipate the impact of critical variables on economic outcomes, thus facilitating informed decision-making. Therefore, the integration of Monte Carlo simulation and comparative analysis in the evaluation of informatization projects contributes to more efficient and strategic management of investments in information technologies.

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THE INFLUENCE OF EDUCATION 4.0 TECHNOLOGIES ON DIGITAL TRANSFORMATION OF HIGHER EDUCATION INSTITUTIONS

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Abstract: *Higher education institutions are facing the influence of an ongoing digital transformation, which influences all aspects of a modern study process. This paper aims to address this gap by examining how specific Education 4.0 technologies contribute to different levels of digital transformation in higher education institutions through the lens of the SAMR (Substitution, Augmentation, Modification, Redefinition) model. Based on the results of analysis, we summarize a list of observations followed by the main transformational processes associated with the introduction of these technologies in higher educational context. The study focuses on a broader landscape, assessing the main categories discussed in academic literature.*

Key words: *digital transformation, education 4.0, SAMR model, transformation management*

JEL: I23, O33, O32

1. Introduction

The higher education landscape is undergoing constant transformation driven by the latest advancements and integration of emerging technologies. Education 4.0 is one of the latest trends reshaping the traditional paradigms of teaching and learning. Today, higher education institutions are influenced by an ongoing digital transformation in all aspects of the study process. This presents both valuable opportunities and significant challenges for higher education institutions worldwide.

Despite a growing body of research on Education 4.0 and digital transformation in higher education, there remains a paucity of comprehensive frameworks that illustrate the complex interaction between specific technologies and ongoing transformational processes. This paper aims to address this gap by examining the influence of Education 4.0 technologies on the digital transformation of higher education institutions through the lens of the SAMR (Substitution, Augmentation, Modification, Redefinition) model.

The primary objectives of the study are to analyze how specific Education 4.0 technologies contribute to different levels of digital transformation in higher education and to provide practical insights for guiding the digital transformation of higher education institutions.

2. Literature review.

The concept of Education 4.0 has emerged from increasing digitization as a response to the demands of the Fourth Industrial Revolution, also known as Industry 4.0. Originating in Germany in 2011, the goal of the Industry 4.0 model was to promote the country's manufacturing sector as part of a broader high-tech strategy for 2020. Its defining characteristics are a growing number of autonomous cyber-physical systems using sensors to optimize manufacturing processes and reliance on novel technologies such as data analysis, artificial intelligence, and machine learning (Gabriela Pereira Carvalho and Walimir Cazarini 2020). Industry 4.0 relies on the digitization of manufacturing and

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management processes, leading to a growing number of information technology systems with increased complexity.

While the concept of Education 4.0 has been widely discussed by a number of academics and practitioners, one of the most prominent figures in its popularization was futurist Peter Fisk. According to Fisk’s vision, Education 4.0 is meant to respond to the needs of Industry 4.0 while taking advantage of the latest technological advancements to promote open, continuous learning and develop skills relevant in the new environment (Fisk 2017).

In an Education 4.0 environment, higher education institutions inevitably face the need to manage transformational processes associated with it. In this context, digital transformation (DT) refers to the integration of digital technologies to enhance various aspects of higher education institutions' operations. It aims to address the challenges posed by rapid technological advancements and changing market demands, leading to a more responsive and effective educational system (Bisri, Putri, and Rosmansyah 2023).

Education 4.0 encompasses several innovative technologies driving digital transformation. In this study, we focus on the following core technologies and their influence on the digital transformation of higher education institutions:

- *Virtual and Augmented Reality* assist teachers in creating immersive, interactive learning experiences that allow students to visualize complex concepts and perform virtual experiments without associated risks. This is especially effective in fields such as medicine, engineering, and design (Paszkiwicz et al. 2021; Salah et al. 2019).
- *Artificial Intelligence* has a wide array of applications for higher education, from personalization of study paths to automating assessments, providing real-time feedback, and augmenting day-to-day activities of both students and teachers (Hemachandran et al. 2022; Okagbue et al. 2023).
- *Internet of Things* technologies’ unique feature is their ability to be deeply integrated in the information systems of the institution. They can be used for campus management and security, automating attendance, assisting distance learning, and as part of digital labs (Kesuma, Kesuma, and Taher 2024).
- *Learning analytics* involve the collection and analysis of data related to student learning behaviors and outcomes. This allows educators to gain a deeper understanding of student needs, make data-driven decisions, and identify at-risk students through automated early-warning systems (Mokhtar, Alshboul, and Shahin 2019).
- *Blockchain* allows developing systems with several main properties: immutability, transparency, and traceability. This makes it suitable for such applications as issuing cryptographically signed digital diplomas or certificates, credentials management, and authorship tracking among others (Lutfiani et al. 2021).

3. Theoretical framework.

We use the SAMR framework to assess the impact of transformation technologies described in the previous section. This approach enables a structured overview of the potential of these technologies at different levels of influence and provides a basis for reasoning when considering their introduction into higher education contexts.

SAMR (Substitution, Augmentation, Modification, Redefinition) is a model designed to help educators efficiently integrate technologies into teaching process by “moving up” through the four

levels of teaching with technology. At *Substitution* level, a new technology substitutes the previous one with no functional change (using word processor instead of pen and paper). At *Augmentation* level, the technology provides some functional improvements (using spell checker in a word processor to enhance the essay writing). At *Modification* level, integrating the technology requires a significant redesign of the task (instead of writing individual essays, students collaborate in a shared online document). At *Redefinition* level, the technology leads to the creation of new activities that were not possible before (students making a multimedia presentation to convey their understanding of a topic) (Hamilton, Rosenberg, and Akcaoglu 2016).

4. Analysis and findings.

In our analysis, we evaluate each technology through the lens of SAMR model, considering its application at each individual level. This section presents results of the analysis along with the summary of our findings and their implications for higher education institutions.

Table 1. Summary of the analysis of Education 4.0 technologies using SAMR model

Technology	Substitution	Augmentation	Modification	Redefinition
VR/AR	Replace traditional 2D images and videos with interactive 3D simulations	Use interactive 3D environments to allow students to explore concepts more deeply	Virtual field trips to visit historical sites or dangerous environments safely	New forms of learning experiences through developing collaborative virtual environments
AI	Replace course or program FAQ with a chatbot	Intelligent tutoring system providing personalized feedback and guidance	Adaptive learning platform with adjustable difficulty	Dynamic course contents generated according to student's profile
IoT	Smart ID cards to enter the premises	Automated attendance systems	Automated occupancy tracking for classrooms and study spaces	Smart campuses
Learning analytics	Digital grade books	Interactive course progress dashboards	Collaborative learning analytics	Predictive and early warning systems for identifying at-risk students
Blockchain	Moving digital diplomas to on-chain storage	On-chain course certificates micro-credentials	Automatic credential issuance based on smart contracts	Decentralized Autonomous Universities (DAUs)

Source: Produced by author

Based on the results of evaluation, we make the following observations:

1. At the Redefinition level, VR/AR and AI technologies show the most potential due to their ability to create new learning modes that are otherwise impossible.
2. IoT and learning analytics have significant potential at the Modification and Redefinition levels. This influence can be further enhanced through their combination, creating responsive learning environments and data-driven experiences.
3. The main transformative potential of blockchain technology lies in applications related to how academic credentials are recorded, stored, and verified. Although DAUs present an interesting opportunity at the Redefinition level, implementing this approach in practice may prove to be challenging.
4. Outlined technologies show significant potential when used in combination. For example, data obtained from IoT sensors can be used in learning analytics systems, which, in turn, can employ AI technologies for a more in-depth analysis.
5. Moving towards the Redefinition level, all technologies except blockchain demonstrate significant capabilities for personalizing different aspects of the study process, which is one of the key trends of Education 4.0.

6. The Redefinition stage for all outlined technologies closely aligns with the goals of Education 4.0, emphasizing personalized, flexible, and data-driven learning experiences. Obtained results highlight a major paradigm shift, indicating an alignment between Redefinition stage of these technologies and the core principles of Education 4.0 paradigm, which presents a number of challenges for higher education institutions.

HEIs need to adapt and reimagine their educational framework to accommodate personalized, flexible, and data-driven experiences, appropriately responding to the changing needs driven by the Industry 4.0 environment. Below is a list of the main processes associated with implementing Education 4.0 digital technologies for higher education institutions:

1. Adapting curricula and study programs to accommodate the growing demand for a more modular, adaptable, and practical study process, including interdisciplinary programs, micro-credentials, nanodegrees, and competency-based models.
2. Increasing investments in technological infrastructure, hardware, and software to support the growing complexity of institutions' IT systems are driven by the digitization associated with the introduction of Education 4.0 technologies.
3. The need for professional development for faculty staff to bridge the digital skill gap allows teachers to efficiently and safely use new technologies as part of the study process. Moreover, this may involve the creation of new roles at the intersection of education and technology.
4. Stronger emphasis on cybersecurity, data governance, and compliance with data protection regulations stems from the increasing volumes of data being stored and processed.

Digital transformation is a complex process that requires a holistic approach. By considering these processes when planning the adoption of Education 4.0 technologies in study contexts, higher education institutions can leverage their advantages while reasonably addressing potential pitfalls.

5. Conclusions.

In this study, we present our findings on the influence of Education 4.0 technologies on the digital transformation of higher education institutions. Providing an introduction to the main technologies

within the Education 4.0 paradigm and laying the theoretical foundation, we assess each through the lens of the SAMR model, outlining their influence on each of the four levels: Substitution, Augmentation, Modification, and Redefinition. Based on the results of the analysis, we summarize a list of observations followed by the main transformational processes associated with the introduction of these technologies in a higher education context. These findings may help us understand the specific implications of digital transformation amid the Education 4.0 paradigm.

The study focuses on a broader landscape of Education 4.0 technologies, assessing the main categories discussed in academic literature. Further research can be conducted to evaluate specific examples or technologies in greater depth, such as large language models, autograders, deep learning, and distributed ledger technology. By applying the same methodology for understanding the influence of specific technologies on the study process, it is possible to develop practical insights and know-hows that can be applied to particular cases, such as introducing a new technology within a course or a study program.

Moreover, the study does not consider intersections between evaluated technologies. As noted in the observations, many of these technologies may provide more value when used in combination. We suggest that deeper research in this direction may produce interesting and valuable results.

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THE EMPLOYEE MOTIVATION AND ITS ROLE IN IMPROVING THE EFFICIENCY OF THE ORGANIZATION

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Abstract.

Through this study, we have proposed to analyze the motivation of employees from the point of view of their job satisfaction, to explain the connection between satisfaction, motivation, involvement in work and the efficiency of the organization. We analyzed several bibliographic sources where it was published the researches of experts from different countries, to convince us and bring arguments that there is a direct correlation between the motivation of employees, their job satisfaction and the impact on improving the efficiency of the organization. We demonstrate that motivation is a dynamic process, because the needs of employees change, depending on the factors of the work environment work. If the employer wish to have as much as possible involvement of his employees, must constantly monitor this process and implement motivation strategies, according to the real needs. I have highlighted two significant circumstances changed the nature of the work and which determined changes in the concrete methods of motivating employees. We are referring to the Covid-19 pandemic and the post-pandemic effects for employees, as well as the digitization of processes and the use of artificial intelligence, which have a significant impact on the character of the employee's work, transforming the way they do their work. We formulated some conclusions and recommendations for the managers of the organizations, which would contribute to a better connection between the employees of the organization and its performance..

Key words: *employee motivation, organizational efficiency, organizational performance, nature of work.*

JEL: *M12, M50.*

1. Introduction

One of the essential challenge in the field of management in the 21st century is the efficiency of the human resources management and the stimulation of the employee motivation, which is a fundamental aspect of the personnel management system. The current theories in human resource management emphasize the increasing importance of the employees' personality, the need to understand their motivational attitudes, as well as the ability to influence and guide them in accordance with the challenges of the company.

Motivation is one of the fundamental functions of the modern management, its main objective is to grow the efficiency of human resources of the company. Although the subject of motivation has always been a point of interest in the field of human resources management, the current solutions do not respond to the contemporary requirements, this discrepancy being attributed not only to the inherent complexity of the motivational process, but also to the continuous changes of the work relationship, in the context of business in general and management in particular. In this context, the motivation of the employees requires a distinctive strategy, considering the specifics of each organization and the personality of each employee. It should be considered that the employee represents the organization's strategic resource, significantly influencing the performance of the

company. This fact requires not only the knowledge of general models of motivation, but also a pertinent analysis of the particularities of the company, the profile of its employees, the available resources, as well as the context on the labor market.

Currently, there are substantial changes in the way the work is performed, and this means that workers have to adapt to a workplace that requires different skills, a different organization, where the previous habits may no longer be valid. In this context, the relevance of the human resources motivation in ensuring the efficiency of company becomes more and more necessary. It is also determined by the dynamic of the work, the digitization of processes, the increase in the level of education and social expectations of employees, as well as the globalization and the competition.

The purpose of this study is to analyze the relationship between employee motivation and organizational performance, identifying the factors that contribute to increased professional engagement and enhanced efficiency within companies. The research aims to explore the methods and strategies of motivation employed by organizations, assess their impact on employee productivity and satisfaction, and provide practical recommendations for creating a work environment that fosters both individual and collective performance.

To achieve the objectives of this study, we adopted a documentary research approach, focusing on the analysis of relevant bibliographic sources that reflect the current situation and trends in the field under investigation. We examined a variety of scientific sources centered on human resources, their motivation, the transformation of the nature of work, as well as the effects that motivation has on organizational efficiency.

2. CORE CONTENT

2.1. Synthesizing Previous Research on Motivation and the Link Between Motivation and Organizational Efficiency

In the context of professional activity, motivation can be defined as the level of employees' availability to actively involve in their tasks and make a consistent effort to achieve objectives, whether individual or organizational. Motivation is a fundamental aspect of the managerial process, being considered an essential component alongside planning, organizing, coordinating, and evaluation-control. It relies on harmonizing the individual interests and needs of employees with the purpose and requirements of the organization.

Motivation is not a new concept. However, most contemporary motivation theories were formulated in the second half of the 20th century. Many sources studying the concept classify these theories in various ways, the most used classification being based on two main categories: (i) cognitive or content theories and (ii) process theories. The first category focuses on the cognitive and emotional aspects (in the sense of understanding) associated with the internal factors of the individual that influence the energy, the direction, sustaining, and inhibiting of human behavior. In contrast, the second category analyzes how behavior is stimulated, coordinated, sustained, and stopped (Table 1).

Table 1. Systematization of Classic Motivational Theories

Category	Characteristics	Theory	Examples
Content theories	The theory analyzes the factors that stimulate or set off motivated behavior.	1. Hierarchy of needs theory 2. Theory of dual factors 3. The theory of success 4. ERG theory 5. Theory X and Y	Motivation for money, social status and personal satisfaction
Process theories	The theory analyzes the factors that influence the behavior	1. Theory of expected performances 2. Equity theory 3. Theory of objectives	Motivation that comes from within of each person to work, to perform and to gain recognition.
Reinforcement theories	The theory analyzes the factors that repeat a behavior	Conditioning theory	Motivation by rewarding the behavior

Source: Islam N. (1999). A Few Aspect of Motivation.

Among the theories in the first group, i.e., content theories, are: (i) Maslow's hierarchy of needs theory, (ii) Herzberg's two-factor theory, (iii) Alderfer's ERG model, and (iv) McClelland's learned needs theory. Conversely, process theories of motivation include (i) the expectancy theory, (ii) the equity theory, and (iii) the goal-setting theory. A third group included in Table 1 is Skinner's reinforcement theory (1953, 1969), which affirm that behaviors of the employees that give positive results will be repeated, while that behaviors resulting in negative results won't be repeated. Managers should encourage employee behaviors which generate positive results by providing bonus. At the same time, it is important to discourage behaviors which not give are scouted results, through performance feedback and, when necessary, by applying sanctions. Skinner (Skinner B., 2013) based on external environment, affirming that human behavior can be influenced by modifying its consequences, entirely ignoring internal motivational factors and focusing exclusively on external environmental factors.

We have concluded that only a motivational method is efficient for all the employees. The use of a theory depends on the context, environment, period, and typology of the individuals involved. Based on the definitions provided, motivation can be described as a physical and mental force that makes

easier the execution or the implementation of the tasks, with the purpose to satisfy human needs, desires, expectations, and aspirations (Islam N., 1999).

One research direction in employee motivation is the analysis of “bonus” (Alier R., 2022) at the work, considered essential factors for improving performance. Organizations have implemented various combinations of employee benefits, such as healthcare assurances, life insurances, profit-sharing, employee stocks, sport facilities, meals tickets, childcare options, company vehicles and more, in an effort to maintain high levels of employee satisfaction based on the idea that satisfied employees are motivated employees. However, many contemporary theorists suggest that the motivation of employee depends less on financial benefits and more on aspects of the work environment. The researches from 1950s shows that highly segmented and simplified jobs reduced performance of the employees. The negative effects of reduced motivation are absenteeism and fluctuation of employees, both of which have significant financial implications for any organization.

Motivation can be both positive and negative. Examples of negative motivations include afraid of losing job, salary and bonus degree, job demotions. Today, positive motivation is more applied than negative motivation. Positive motivation utilizes both financial and non-financial bonus.

Financial motivation is an important and efficient technique that grow up employee performance. This can be made with a good salary or other benefits such as bonuses insurances, etc. The increased financial benefits also improves the employee performance. By the other side, if financial benefits decrease, the employee performance will be reduced. This perspective is promoted by the managers. They use financial benefits at the top of the motivation scale (Bernstein and Pollock, 1985). Researchers that study behavioral science, replace this perspective on the lower scale. We believe that neither concept is entirely correct in its pure form. Money is undoubtedly important for basic needs of individuals and their families. Once these needs are met, job satisfaction is accomplished. However, money is not always an efficient motivational technique. It is an important motivational tool only when the social and familial status of individuals are reduced. Studies have shown that salary, as a method of motivation, does not grow long-term productivity and does not significantly improve performance (Whitley, 2002).

Moreover, focusing only on this aspect could damage employee attitudes, as they could be focused only by financial benefits. Also, many studies show that rewards gain the job satisfaction, which positively influences employee performance. Additionally, rewards are among the most efficient management tools when trying to influence individual or group behavior to improve organizational performance. (Dobre O.I., 2013).

Our subject of interest is not only motivation itself, but the relationship between motivation and organizational performance, a subject that has long been studied by scientific and also practical discourse. It is crucial for organizational management to understand how motivation influences employee performance, considering the needs of organizations to improve their results. Our theoretical review, based on specialized literature and available theories to clarify fundamental concepts and mechanisms governing this interdependence, confirmed that motivation is a basic psychological concept that make individuals to initiate, maintain, and direct their behaviors toward achieving specific objectives (Akerele O.O., 2023).

In the organizational context, employee motivation is crucial for determining their performance, which influences the organization performance (Bîrcă A., 2018). Various theories have been

formulated to elucidate the complex mechanisms by which motivation contributes to organizational performance.

Many empirical studies show the positive connection between motivation and organizational performance. Intrinsic motivation, provided from the inside and satisfaction associated with the job activity, has a significant impact on activity results. When employees feel satisfied and accomplished at work, they demonstrate creativity, innovation, and performance. This type of motivation drives employees to exceed their job tasks, contributing to improve productivity and organizational success. Extrinsic motivation, based on external rewards such as financial bonuses, promotions, and recognition, also have an important role to improve organizational performance. These external factors improve performance, and facilitate the attraction and maintaining of valuable profesionist in organization.

Some studies (Akerle O.O., 2023) emphasize the circular interdependence between performance, satisfaction, and motivation.

When employees achieve outstanding results, they experience intrinsic satisfaction, which is reflected in their behavior and amplifies their motivation. This intrinsic satisfaction acts as a driver for long-term performance, contributing to the overall improvement of organizational performance. Additionally, establishing clear criteria during the hiring process can lead to superior results. If organizational performance improves, employees could gain additional benefits that grow their motivation.



Figure 1. Correlation between employee motivation, job satisfaction and employee performance.

Source: developed by author based on Akerle O.O., 2023)

In the same time, we point out that the work activity and organizational culture are important factors in determining the type of motivation. So, financial benefits may be efficient for the companies acting in commercial field, where intrinsic motivators may be more relevant in creative fields.

2.2. The Changing Role of Work and Motivation

In recent period, organizations have experienced significant processes that have led to essential changes in the nature of employee work (Cotelnic, 2023). Notably, the digitalization of processes and the use of artificial intelligence (AI) have had a substantial impact on the character of work, transforming the way employees perform their tasks.

These technologies automate routine and repetitive tasks, freeing employees from mechanical duties and allowing them to focus on more creative and strategic activities. Digital technologies also facilitate remote work, providing employees with greater flexibility regarding work schedules and locations. However, these changes can also lead to an increased demand for constant availability, variable work schedules, blurred boundaries between professional and personal life, and the emergence of unstable work types.

Digitalization offers employees quick access to information and resources essential for completing their tasks. This enhances efficiency and can make more informed decisions. Digital platforms support collaboration among employees regardless of their location. Online communication and collaboration help employees and teams to work and the exchange their ideas. Through digital technologies, employees can access online courses, webinars, and educational resources to develop their skills, encouraging continuous learning and adaptation to industry changes.

However, these significant shifts can also have less favorable effects on employees, leading to discomfort and anxiety. Digital tools enable closer performance monitoring. Mobile, wearable, or embedded digital monitoring technologies (in clothing or on the body) are used to track workers in real-time. While real-time feedback can improve performance, it can also create pressure and stress. The European Agency for Safety and Health at Work (EU-OSHA, 2021 research program) warns that AI-assisted digital monitoring technologies can facilitate invasive monitoring that negatively impacts employees' mental health.

Employees may feel a loss of control over their work content, pace, and schedule, as well as how they complete tasks. They might also experience difficulties in social interactions or taking breaks as needed, feeling intruded upon in their personal lives. For instance, the use of data for rewarding, penalizing, or even excluding employees can foster feelings of insecurity and stress. To avoid these effects, transparency in data collection and use is essential.

Additionally, with the implementation of AI, some roles are changing, requiring employees to redefine their skills and adapt to new responsibilities, such as managing automated systems or interpreting AI-generated data.

In conclusion, the digitalization of processes and artificial intelligence are profoundly transforming the nature of work, influencing not only how employees perform their duties but also their satisfaction and development within a continuously changing work environment. Adaptability and digital skills are becoming increasingly crucial for professional success.

Another significant factor that has impacted the nature of work and employees is the COVID-19 pandemic, which began at the end of 2019 and especially in early 2020. It created more complex and challenging work environments for both employees and managers (Cotelnic & Scarlat, 2020).

For almost two years, organizations were not sufficiently prepared to manage this crisis. As a result, many companies operated through remote work, forcing employees to work from home. Numerous studies show the benefits of working from home, such as personal comfort, flexible working hours,

not needing to move till the job office, managing domestic duties, and taking care of family while working (Wheatley D, 2017). These aspects were seen as benefits, resulting in greater satisfaction before the pandemic as employees enjoyed flexible working hours. However, COVID-19 changed this due to strict and prolonged lockdowns. Employees were forced to work in isolated environments, separated from their colleagues, feeling isolated, and losing social life. These consequences led to negative effects mentioned by most employees, such as the blurring of the line between work and personal life (Anupama A., Vasanti T., 2023).

Some employees worried about missed career growth opportunities, loss of benefits, bonus, and positive performance evaluations due to working from home and extended lockdowns. This resulted in depression, decreased morale, and reduced motivation. The role of managers is to create virtual teams to ensure business continuity and try to minimize the consequences of social exclusion caused by the shift to remote work. Physical distancing measures and the lack of workplace culture have become key points for increasing employees' feelings of loneliness.

Another challenge for organizations and their employees came during the post-pandemic period when, in many cases, in-person work resumed. Employees needed to readapt to already changed realities. In this context, employees' needs and aspirations for productive work were no longer the same as before the pandemic. This reconfirms that ensuring productive work with a positive impact on organizational performance requires continuous study of employee needs, the factors that bring job satisfaction, and what makes them more efficient.

3.CONCLUSIONS

The research we conducted allowed us to have several conclusions regarding employee motivation and its impact on organizational performance.

Employee motivation consists of the set of factors that drive individuals to act in a specific way to achieve their objectives. The key to understanding motivation lies in the relationships between needs, stimulents and purpose. When people are inspired to reach their full potential, their results are remarkable.

Over time, researchers have developed various theories related to the concept of motivation. Understanding these theories is essential for employers to better comprehend what actions are necessary for employees to perform optimally and contribute to the organization's success. However, it must be considered that concrete motivational methods depend on the industry in which the business operates, the organizational culture, the nature of the work, the characteristics of the period, and other factors. This underscores the need for a personalized approach to employee motivation and the adaptation of motivational strategies to specific contexts. To implement this personalized approach and make the necessary adjustments to meet the evolving needs of employees, it is important for organizations to continuously assess these needs and maintain ongoing feedback.

Beyond financial motivation, non-financial methods are gaining increased importance. These include promoting a positive work environment by appreciating and recognizing employee contributions, encouraging open communication, collaboration, and trust within the organization; providing opportunities for skill development, career advancement, and personal growth.

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POSSIBILITIES OF APPLYING ARTIFICIAL INTELLIGENCE IN NEUROMARKETING RESEARCH TO IMPROVE THE EFFICIENCY OF PROMOTING BANKING PRODUCTS

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Abstract: *This article aims to identify and analyze the possibilities of applying artificial intelligence in neuromarketing research, remarkably increasing the effectiveness of promoting banking products and services. Nowadays, artificial intelligence is used in many industries, including neuromarketing. This is facilitated by the unique capabilities of artificial intelligence, such as analyzing large amounts of data, searching for patterns, drawing conclusions, and making predictions. The market for banking products and services is characterized by great competition, innovation, and, as a rule, large marketing budgets. Marketing of banking services has its peculiarities, which are related to the characteristics of banking services and the fears of consumers related to money. Neuromarketing helps financial institutions understand their consumers better and learn their behavior and preferences to prepare an effective marketing strategy to promote banking products and services and attract new customers. The combination of neuromarketing and artificial intelligence makes it possible to deeply understand the consumer and predict their behavior depending on certain factors. This unique information allows banks to create personalized content and make advertising more effective. Websites are one of the most important channels of communication with consumers. On banks' websites, consumers get helpful information, learn about offers, and find solutions to meet their needs. A competently designed website allows banks to promote their products and services, generate consumer confidence, and motivate them to request further cooperation. To demonstrate the possibility of using AI-driven neuromarketing technology, I have analyzed the websites of four commercial banks of the Republic of Moldova. This study confirmed the feasibility of using artificial intelligence in combination with neuromarketing to more effectively promote banking products and services.*

Key words: *artificial intelligence, neuromarketing, neuromarketing research, ai driven techniques, promotion, banking products*

JEL: M31

1. Introduction

The banking services market is highly competitive, which motivates financial companies to seek new innovative approaches to meet customers' needs better and improve the efficiency of promoting their products and services to attract customers. In this case, neuromarketing opens up opportunities for a deeper understanding of customers and using the obtained information to achieve established goals.

Martin Lindstrom notes that without the use of neuroscience research, all marketing, advertising, and branding strategies are like playing the lottery, and all successful moves are nothing more than ordinary luck because 90% of the time the customer makes a choice unconsciously (M. Lindstrom, 2010)

In the digital age, the emergence of artificial intelligence, which can analyze large amounts of data, identify patterns, and make predictions, has provided new opportunities for the practical application of neuromarketing.

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Combining neuromarketing and artificial intelligence opens up new opportunities to increase promotion effectiveness in many areas, including the banking sector. Banking products and services have peculiarities related to their characteristics and consumer perception, so AI-driven neuromarketing techniques help better understand the target audience and develop profitable advertising campaigns based on a smart approach and personalized content.

2. The essence of neuromarketing

Neuromarketing is an interdisciplinary field that combines neuroscience research and marketing to understand how the human brain responds to marketing stimuli and the biological basis of consumer behavior. It uses neurobiological and psychological methods to analyze the brain's response to advertising, products, or other elements of marketing (N. Lee, L. Chamberlain, A. J. Broderick, 2007; H. Plassmann, 2012). This new field solves the same problems as most marketing research, namely how a company should improve its product and increase the effectiveness of promotion and sales (Stephen J. Genco, 2013).

Neuromarketing research provides professionals with unique data to study customer responses to marketing stimuli at sensorimotor, cognitive, and emotional levels. The researchers use methods that are based on the study of body and brain responses.

1) Physiological tools

Physiologic instruments show changes in the autonomous nervous system over which the person has no direct or conscious control (blood circulation, blood pressure, heart rate, sweating, respiratory rate).

2) Neurophysiologic instruments

Neurophysiologic instruments directly measure the brain activity of consumers. They can be divided into two categories: those that measure the electrical activity and those that measure the metabolic activity of the brain.

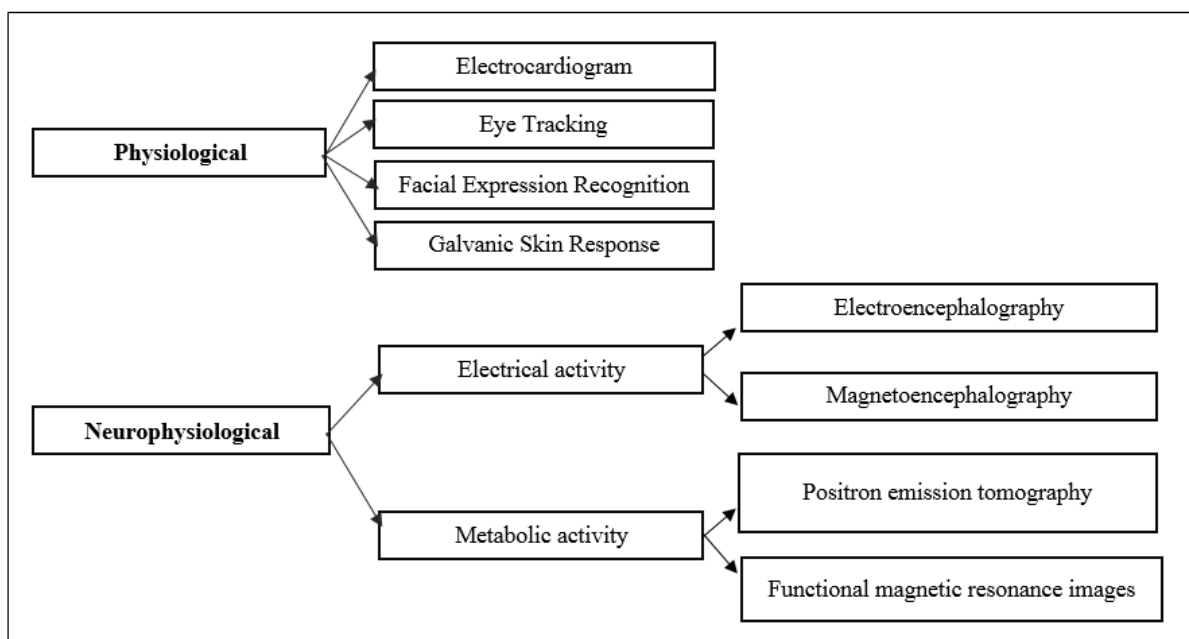


Figure 1. Methods used to conduct neuromarketing research

3. Features of marketing of banking services and the use of neuromarketing for their promotion

Banking products and services encompass a wide range of financial tools and offerings banks provide to meet the diverse needs of individuals, businesses, and organizations.

According to experts, banking services marketing is characterized by a highly competitive environment, challenging, expensive, and dynamic (Dr. Vivek Agrawal, 2023). Therefore, leading banks always look for innovative ways to attract and retain customers.

To develop a successful marketing strategy and build communication with customers, it is necessary to consider the characteristics of banking services and their perceptions by the consumer.

Features of banking services

- **Intangibility.** Banking services have no physical form; they cannot be seen, shown, or tasted before purchase.

- **Perishability.** Banking services are perishable; they cannot be stored or inventoried to sell when demand is high.

- **Variability.** The quality of banking services can vary significantly depending on who provides the service and when it is provided.

- **Inseparability.** Banking services are first sold and then produced and consumed simultaneously.

- **Fiduciary responsibility.** The responsibility that banks have to the customers who have used their services. Banking services can be difficult to understand for many consumers who don't have specialized skills. Therefore, when they go to the bank, they trust it as a professional to help them fulfill their needs.

It is also important to note that finance and money are sensitive subjects for everybody. According to the research, losing money activates the same part of the brain that is activated by physical pain (Wellcome Trust, 2007).

From this, financial decisions are not entirely rational, as people are pretty emotional about money.

Often, people don't say what they think, so neuromarketing research provides reliable information about a consumer's decision-making process.

Neuromarketing opens up attractive opportunities for effectively promoting banking products and services and attracting new customers.

1. Understanding consumer behavior through in-depth analysis using neuromarketing techniques.
2. Personalization of marketing efforts based on more objective information about consumer behavior.
3. Increasing memorability and engagement in advertising campaigns.
4. Testing and improving marketing strategies based on qualitative data
5. Optimizing content for short and long attention spans.
6. Improving the user experience when visiting a website or app
7. Creating a visible competitive advantage over other banks

4. Artificial intelligence and its application in neuromarketing

Artificial Intelligence (abbreviated as AI) is a field of computer science that involves the development of computer systems capable of performing tasks that typically require human intelligence. It includes machine learning, natural language processing, pattern recognition,

and decision-making (Kai-Fu Lee, 2018; S. Russell, P. Norvig, 2021)

With the ability to process large amounts of data, recognize patterns in brain activity and emotional responses, and make predictions, artificial intelligence is giving new opportunities for the development of neuromarketing.

The combination of neuromarketing and artificial intelligence represents a powerful tool for profoundly understanding consumer behavior and needs, improving product development, optimizing marketing strategies, making advertising more efficient, and creating personalized content.

The benefits of using artificial intelligence in neuromarketing:

- Deeper Consumer Insights. Understanding consumer behavior, decision-making, preferences, and emotions allows you to develop effective marketing strategies.
- Enhanced Personalization. Artificial intelligence's ability to analyze neuromarketing data enables the creation of more personalized marketing content that drives deeper consumer engagement and improves the effectiveness of advertising campaigns.
- Predictive Analytics. Predicting consumer reactions and behavior allows companies to anticipate changes in the market and adapt their strategies to meet new consumer preferences.
- Improved Product Development. Marketers can refine product design, features, and packaging using AI-enabled neuromarketing research data.
- Efficient Advertising. With personalized content and a better understanding of the target audience, companies can choose more effective marketing channels for promotion and create more impactful marketing campaigns.
- Improved Customer Retention: Personalized marketing campaigns increase customer loyalty and strengthen customer relationship

Artificial intelligence is already actively used in neuromarketing research methods such as facial recognition and emotion analysis, eye-tracking, electroencephalography, functional magnetic resonance imaging, and galvanic skin response.

5. Analyzing bank websites using ai driven neuromarketing technology

To show in practice the unique opportunities offered by the combination of neuromarketing and artificial intelligence, the websites of 4 banks from the Republic of Moldova were analyzed using EyeQuant's patented technology. The technology generates a visual simulation of how users perceive a commercial bank's website within 3-5 seconds of their visit.

Table 1. List of commercial banks and their websites that were analyzed during the study

Name of the commercial bank	Website
Banca Comerciala „MOLDOVA - AGROINDBANK” S.A.	www.maib.md
Banca Comerciala „Moldindconbank” S.A	www.moldindconbank.com
Banca Comerciala „EuroCreditBank” S.A	www.ecb.md
OTP Bank S.A	www.otpbank.md

Source: <https://www.bnm.md/>

The website is one of the important channels of communication with consumers. The effective website design ensures higher engagement and draws attention to specific products and phrases depending on the marketing objectives. Therefore, the task of the study was using artificial intelligence to predict which areas of the site attract the consumer's attention. This will allow us to determine the aspects of the website design that could be changed to improve the potential customer's perception of the information.

The analysis focused on the following indicators - cluttering the site design and distribution of attention. During the study, I analyzed the desktop versions of the sites.

1. Cluttering the site design

The clarity map comparative analysis showed how easily the considered banks' websites were perceived. The indicator was a scale from 0 to 100 (where 0 meant a very congested site, 100 was the best clarity, and 50 represented the average of the pages on the web). The results showed that Eurocreditbank's site is the most overloaded (its scores are below the average of the sites' online pages). Moldindconbank and OTP Bank websites are the clearest.

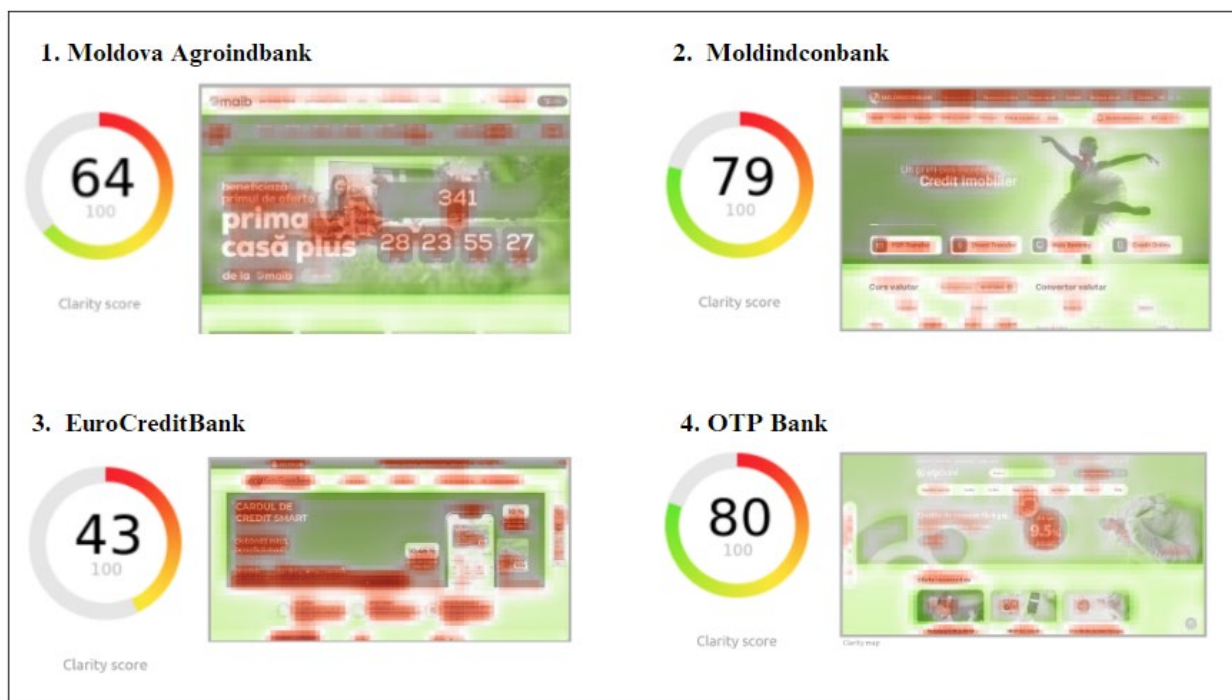


Figure 2. Cluttering the site design

Source: <https://www.eyequant.com/>

2. Distribution of attention & order of fixation frequency

- Distribution of attention. Perception Map shows what users will see on your website within the first few seconds of opening the page.

- The order of fixation frequency. With this analysis you can see the order of fixation frequency on your design. The size of each hotspot corresponds to the probability of fixation in this particular area. The larger the circles, the longer the time spent looking at it.



Figure 3. Distribution of attention

Source: <https://www.eyequant.com/>

Based on the obtained data, it is possible to summarize the banks' websites.

Moldova Agroindbank: the areas that the visitor will pay attention to in the first 3 seconds are the logo on the top hat, as well as the area including people (a woman with a child), the call to action, the name of the product and the first digits in the countdown counter, which showed how long the offer

would still be valid. The most visible areas are the top logo, people, and call to action. The visitors' attention is completely drawn to the left side of the site.

Moldinconbank: the areas to which the visitor will pay attention are the logo and part of the smaller one in the top hat of the site, partly the name of the advertised product on the banner, as well as the names of other products of the bank with links to the pages. The areas with the logo, menu, and product name P2P transfer will attract the most attention. The analysis shows that advertising the product displayed on the banner is ineffective, as its attention is drawn to other products shown on the banner below.

Eurocreditbank: the case study shows that the upper part of the banner is overloaded with information elements. The visitors' attention is scattered between the left and right parts of the site.

OTP Bank: The most attention visitors are attracted by the area, which has a symbol of money and a commission amount. Also, the product names “Deservire curentă”, “Credite” and “Oferte recomandate” attract a lot of attention.

6. Conclusions

Artificial intelligence and neuromarketing significantly increase the effectiveness of promoting banking products and services. More profound research will enable us to understand the target audience better and learn its behavior, fears, and preferences, which allows financial companies to focus their marketing efforts on a personalized approach and to create their advertising campaigns in such a way as to get the desired reactions from consumers.

Understanding the consumer's sensory perception of advertising enables companies to develop effective designs of marketing materials and websites that will attract attention, be memorable, and create a desire to use the banking service.

Also, thanks to the possibility of analyzing big data and hidden consumer behavior patterns, financial companies have powerful tools for effective targeting, personalizing content in advertising, and working with hidden objections.

Predictive analytics and innovations in advertising strategies improve the quality of communication with the consumer and reduce marketing costs.

Thus, using artificial intelligence combined with neuromarketing helps increase financial companies' competitiveness in the market and improves the efficiency of promoting banking products and services.

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FROM TEXT TO INSIGHT: A COMPARATIVE ANALYSIS OF SENTIMENTS AND EMOTIONS IN RURAL AND URBAN TOURISM EXPERIENCES IN SPAIN

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Abstract: *In an era where the digital environment plays a pivotal role in shaping consumer choices, sentiment analysis emerges as a crucial tool for unravelling tourists experiences. This study employs sentiment and emotion analyses to delve into tourist reviews in rural and urban areas in Spain. Employing advanced text mining techniques with Python programming, we scrap 173,369 reviews from rural areas and 347,040 reviews in urban areas from the website TripAdvisor from the period 2012-2022. Results show significant differences in sentiments and emotions by area and by review category (environmental, social, economic, technological, and cultural), offering valuable insights for destination management and strategic tourism development.*

Key words: *Sentiment analysis, emotion analysis, tourism, sustainability, engagement, text mining.*

JEL: M14 Corporate Culture • Diversity • Social Responsibility.

1. Introduction

User-generated content (UGC) in the field of tourism has emerged as an essential component to understand and improve travel experiences. This type of content, created spontaneously by travelers themselves, offers an authentic and valuable perspective on destinations, accommodation, and activities. The UGC is considered an effective tool that travelers use to obtain essential information when making travel decisions (Ukpabi & Karjaluoto, 2017). Given the intangible nature and experiential approach of tourism, the UGC diminishes the uncertainty of travelers (Kim & Kim, 2020) and can be fostered by the desire to help others (altruistic concern) or as social interaction from a virtual community (Chen et al., 2011; Tian, 2013).

Some studies confirm the relationship between user ratings and the performance of a product or service (Dellarocas et al., 2007; Geetha et al., 2017; Sharma & Aggarwal, 2021; Zhang et al., 2010). The online popularity of an establishment can benefit significantly by increasing the number of positive reviews and high scores. The study by Tsao et al., (2015) showed that around 80% of travelers read hotel reviews before starting a trip, and 53% say they will avoid booking a hotel without comments. Both companies and academics analyze the UGC to understand social phenomena and passenger behavior (Mehra, 2023), which allows them to improve marketing strategies, develop competitive advantages and useful models for decision-making.

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Understanding the differences in perception between tourists in rural and urban destinations can have important implications for tourism professionals and government policymakers. While, in rural regions, tourism can be an essential driving force in combating poverty and preserving local culture, in urban areas, tourism is seen as one of several social and economic influences. Understanding these differences allows us to develop specific strategies that adapt to the needs and characteristics of each environment, ensuring sustainable and equitable development in the tourism industry in all its manifestations.

This study focuses on analyzing the feelings and emotions associated with tourist attractions in rural and urban areas of Spain, to understand the complexity of visitors' experiences from the perspective of sustainability and technology. First, a review of the literature is done. Then, the research objective and questions are set. The methodology used and the results are detailed. Finally, the conclusions are presented.

2. Literature Review and research questions

UGC analysis can include text analysis methods, sentiment evaluation and spatial analysis (Mirzaalian & Halpenny, 2019). Some previous research has focused on understanding the impact of positive experiences and emotions on behavioral intentions (Hosany & Gilbert, 2009; Lee & Kyle, 2011). From psychology there are two approaches to examine emotions: 1) Dimensional: Based on valence, which conceptualizes emotions using few dimensions (positive, neutral, and negative). 2) Categorical: Emotions are conceived as a series of unique and personalized affective states, such as joy, anger, sadness, and surprise (idiosyncratic affective states). Previous studies in the field of tourism show that: 1) emotions and their intensity vary depending on the products and stages of the trip. 2) emotions influence the satisfaction of tourist experiences and behavioral intentions 3) tourist experiences remembered by travelers are associated with positive emotions (Prayag et al., 2017).

Tourists have a favorable attitude towards sustainable options during the trip, but a gap is evident between those positive feelings and the desire of the tourist to experience a pleasant and high quality holiday (Budeanu, 2007; Dolnicar, 2020; Dolnicar & Grün, 2009). Some research in tourism has begun to analyze sustainability and corporate social responsibility (CSR) from the UGC (Brazyté et al., 2016; D'Acunto et al., 2020; Ettinger et al., 2018; Väisänen et al., 2023). The study by Väisänen et al. (2023) proposes as a future line of research to carry out these analyses comparing data from rural and urban destinations. From sustainability (economic, social, environmental and cultural) can be identified notable differences between rural and urban tourist areas (Rasoolimanesh et al., 2017). Rural tourism is seen as an essential tool to combat poverty, preserve the natural environment and promote local culture (Ryan & Huimin, 2009). On the contrary, in the urban context the contribution of tourism can be considered as part of a broader and diversified panorama of forces that shape the life and economy of the city (Edwards et al., 2008). On the other hand, it is essential to examine the way in which tourists use and appreciate technologies within industry, as digitization and technological innovations are transforming travelers' behavior, which poses new challenges for businesses and destinations.

In this way, the main objective of this study is: "Analyze the feelings and emotions of rural and urban areas of the tourist destination of Spain from a sustainable and technological perspective". The following research questions are asked:

Q1: What are the perceptions and themes that tourists reflect in the comments of the TripAdvisor platform in rural and urban areas?

Q2: Has the sustainable and technological perspective of tourists changed over time in rural and urban areas?

Q3: Do the dimensional and categorical emotions of tourists vary in rural and urban areas from a sustainable and technological perspective?

3. Research methodology

Research objectives are addressed through an inductive approach, analyzing the perception of tourists in attractions in urban and rural areas. To do this, the classification between rural and urban areas has been carried out according to Law 45/2007 on Sustainable Development of the Rural Environment in Spain, which consider a rural municipality as one with less than 100 inhabitants per km². In total, 554 rural municipalities and 400 urban municipalities have been considered.

Data collection, pre-processing and analysis of data are executed using the Python programming language, taking advantage of its capabilities and libraries for efficient handling of large datasets. The implementation of advanced techniques in natural language processing and machine learning contribute to a comprehensive understanding of tourist sentiments, opinions, and preferences, enhancing the rigor and depth of the study. Tourists' reviews have been sourced from the TripAdvisor website, chosen for its comprehensive coverage and widespread use among both users and businesses in the tourism sector. Data collection occurred from April to June 2023, employing web scraping techniques to extract reviews and comments from key tourist attractions across the 17 Autonomous Communities of Spain. The sample comprises 173,369 reviews from rural areas and 347,040 reviews from urban areas, spanning the period from 2012 to 2022.

Data pre-processing tasks are essential to enhance the quality of the data. This phase involves data cleaning (i.e., handling missing data, correcting errors and duplicities), normalization and tokenization (breaking down text into smaller units or tokens).

Data analysis is carried out in three stages. First, topic modelling in tourists' perceptions is carried out with BERTopic (Grootendorst, 2021) topic modelling machine learning technique, which can capture the semantic context of the text. To do this, Spanish reviews were translated into English for superior performance. Secondly, with the aim of exploring tourists' perceptions by area, sentiment analysis and emotion analysis are carried out. Opinion mining is the process of determining the sentiment or attitude expressed in a piece of text, so that the goal is to identify whether the expressed sentiment is positive, negative, or neutral. Emotion analysis goes beyond sentiment analysis by identifying specific emotions such as anger, disgust, fear, joy, sadness, or surprise. In order to investigate potential differences in sentiments and emotions across areas and dimensions, mean difference tests are conducted. Initially we examine the normal distribution of the groups using Kolmogorov-Smirnov and Anderson-Darling tests. Given that normal distributions were not observed, non-parametric test are employed to assess significant differences: the Wilcoxon test for comparisons between two groups (rural/urban) and the Kruskal-Wallis test for comparisons involving three or more groups (dimensions).

4. Results

The evolution of tourists' perceptions in rural and urban areas is shown in Figure 1. Using text mining methodologies, reviews were first classified into five dimensions (environmental, social, cultural, economic, and technological), associating keywords with each of them and assigning the review to

the most relevant dimension. The technological dimension is the least highlighted by the reviews in both areas, while the cultural dimension is the most notable, for the entire period considered. While in the rural environment the social dimension has taken on more relevance since 2020, although without surpassing the environmental dimension, in the urban area the social and environmental dimensions become less relevant than the economic one. The importance of these dimensions is consistent to the topics identified in each area. In the rural area, the five main topics identified by BERTopic (which considers both the relevance and frequency of topics) are heritage and culture, exploring villages, routes, nature, coasts and beaches, and oenology and gastronomy. In the urban area, main topics are heritage and culture, exploring cities, coasts and beaches, oenology and gastronomy, parks and routes, and entertainment (i.e., escape rooms).

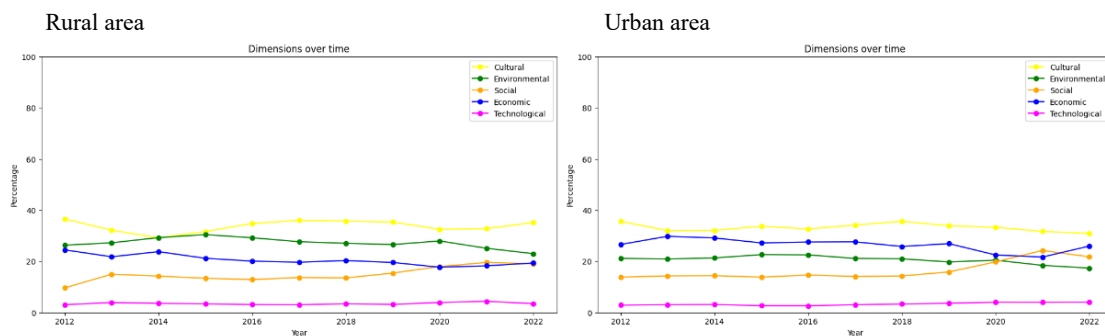


Figure 1. Evolution of reviews by dimension and by area. Period 2012-2022.

Source: Authors.

Reviews' sentiments are mostly positive, across all dimensions and in both rural and urban areas (Figure 2). While the differences are subtle, statistical significance is observed in sentiment between rural and urban areas, encompassing all reviews. When considering reviews based on dimensions, significant differences are also observed among all groups (Table 1).

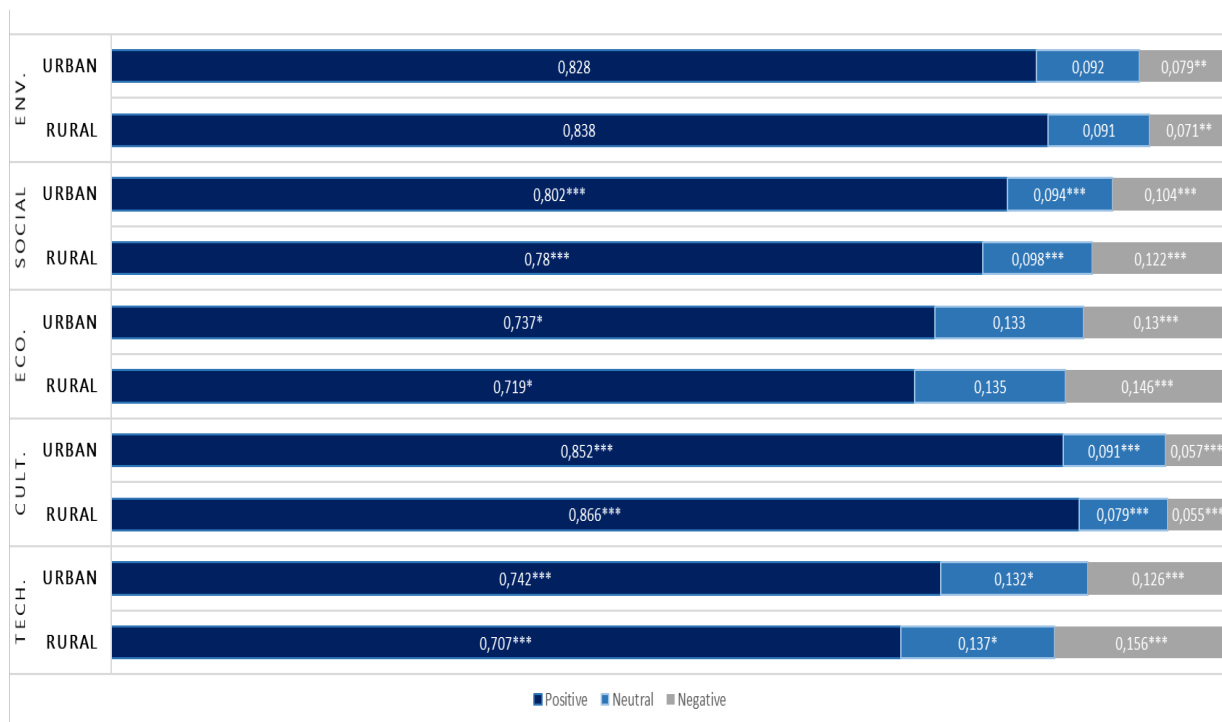
Table 1. Averages of sentiment scores by area and by dimension.

Area/Dimension	Positive	Neutral	Negative
Total	0,816853	0,101005	0,082142
Rural	0,8153301	0,09918843	0,085481143
Urban	0,8176057	0,10190195	0,0804924
p-value ^{1,3}	***	***	***
Cultural	0,8555247	0,08723674	0,05723860
Economic	0,7382728	0,13393691	0,12779027
Environmental	0,7990192	0,10392839	0,09705236
Social	0,7658777	0,10701800	0,12620435
Technological	0,7293921	0,13388624	0,13672170
NA	0,8394791	0,09439431	0,06612657
p-value ^{2,3}	***	***	***

Source: Authors.

Notes: ¹Wilcoxon test (for non-normal distributions). ²Kruskal-Wallis test (for non-normal distributions). ³Significance levels are denoted as *** for p-value < 0,01, ** for p-value < 0,05, and * for p-value < 0,1.

Differences between areas (urban/rural) in each dimension are shown in Figure 2. Reviews categorized as social, economic, and technological are statistically more positive in urban areas. This may be due to better technological infrastructures in urban areas, so that tourists value access to digital services. The wide range of economic activities (i.e., shopping, dining, leisure...) and entertainment options can explain the positivity in the economic dimension. The positivity in the social dimension could be due to the cosmopolitan atmosphere and exposure to different cultures and diversity. However, reviews categorized as cultural are statistically more positive in rural areas (as are environmental, but not statistically significant). Limitations of nature-based activities in urban areas and their environmental challenges (such as traffic or pollution) mean that positivity is somewhat lower than in rural environments.



Note: Given the non-normal distributions, the Wilcoxon test was employed to test differences between areas for each dimension. Significance levels are denoted as *** for p -value $< 0,01$, ** for p -value $< 0,05$, and * for p -value $< 0,1$.

Figure 2. Distribution of sentiments (positive, neutral, negative) by dimension and by area.
 Source: Authors.

Figure 3 graphically represents the value of negative reviews by area and dimension at a national level, showing darker colors the more negative the reviews are in that autonomous community. The reviews are slightly more negative in the social, economic, and technological dimensions, with higher values in rural areas.

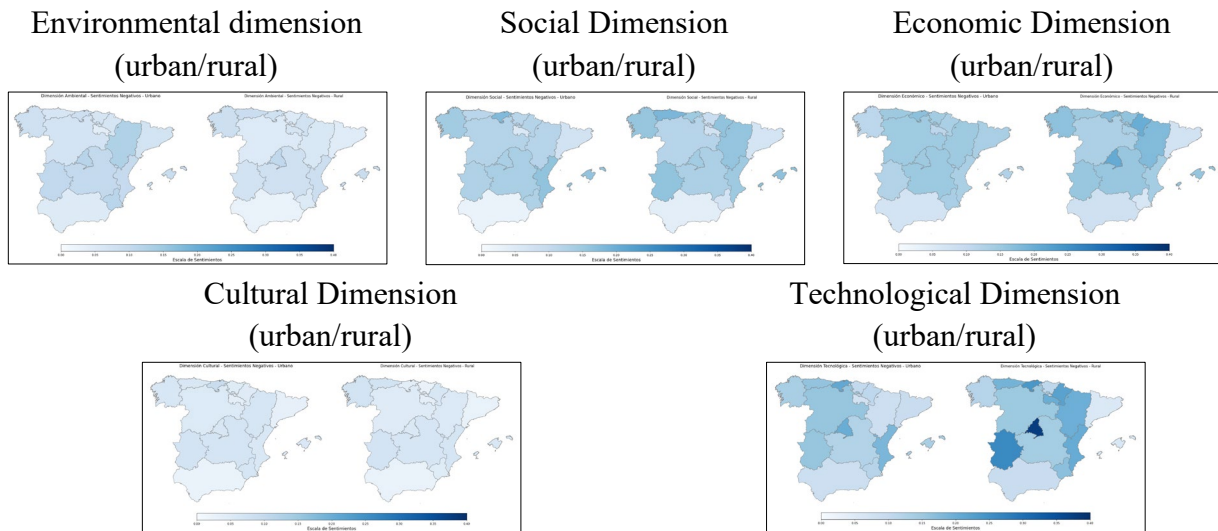


Figure 3. Distribution map of negative sentiments by dimension and by area.

Source: Authors.

Emotions are statistically different across dimensions and areas (Table 2). In rural areas, the predominant emotion is joy, followed by neutral emotions. Conversely, in urban areas, the prevalence of joy is lower than in rural counterparts, with neutral emotions and surprise following closely. Notably, urban areas experience higher levels of anger, disgust, and surprise in their reviews compared to rural areas, whereas joy and sadness are more prevalent in rural environments. The stress or faster pace of urban areas can lead to more visceral emotions, whereas a more leisurely pace might lead to the highlighting of joy in rural settings (Korpela et al., 2002).

Within rural areas, reviews categorized as economic are associated with higher levels of anger, disgust, and sadness, which may be due to greater difficulties in obtaining resources or the state of certain infrastructures. Fear is more pronounced in reviews categorized as cultural, and surprise is higher in reviews categorized as technological, explained by the fact that it is an emotion linked to the experimental aspect (Luo and Tang, 2019). In urban areas, anger is more prevalent in cultural and environmental dimensions, explained perhaps by environmental challenges or cultural clashes, while joy is heightened in reviews categorized as social. Reviews categorized as technological exhibit neutrality, and sadness and surprise are equally prevalent.

Table 2. Average of emotions by dimension and by area.

Dimension	Anger	Disgust	Fear	Joy	Neutral	Sadness	Surprise	
Rural	0,02450517	0,00334560	0,00186997	0,5997364	0,2876212	0,0719468	0,01097492	
Urban	0,01880265	0,04511802	0,04143998	0,4522577	0,2878526	0,02920524	0,12532381	
p-value ^{1,3}	***	***	***	***	***	***	***	
Rural areas	Cultural	0,01001603	0,0020316	0,001156141	0,6476772	0,2516732	0,0792711	0,00817973
	Economic	0,06105162	0,00657664	0,001480065	0,4863087	0,3480369	0,08781419	0,00873194
	Environmental	0,03252017	0,00430677	0,002476473	0,5744618	0,2910572	0,08489994	0,01117757
	Social	0,04900918	0,00481837	0,00167626	0,5735614	0,2750448	0,00887172	0,00717278
	Technological	0,05156777	0,00438185	0,001992264	0,4629426	0,3809871	0,08663185	0,01149657
	NA	0,01296009	0,00240001	0,001974231	0,627846	0,2829568	0,05909843	0,01276449
p-value ^{2,3}	***	***	***	***	***	***	***	

Urban areas	Cultural	0,1681707	0,04164329	0,03828950	0,4230990	0,3120873	0,02645610	0,14160774
	Economic	0,02492892	0,05562108	0,03063869	0,3898931	0,3334170	0,03534864	0,13015247
	Environmental	0,1925329	0,06208555	0,04299324	0,4382652	0,3119718	0,03087387	0,09445714
	Social	0,02311569	0,05696678	0,04367805	0,4574377	0,2828742	0,02880065	0,10712701
	Technological	0,02113305	0,04897505	0,03678569	0,3469241	0,3488814	0,04018720	0,15711351
	NA	0,01706061	0,03813584	0,04396839	0,4767569	0,2669100	0,02791849	0,12924879
	p-value ^{2,3}	***	***	***	***	***	***	***

Source: Authors.

Notes: ¹Wilcoxon test (for non-normal distributions). ²Kruskal-Wallis test (for non-normal distributions). ³Significance levels are denoted as *** for $p\text{-value} < 0,01$, ** for $p\text{-value} < 0,05$, and * for $p\text{-value} < 0,1$.

5. Conclusion and discussion

This research contributes to explain the sustainable and technological perceptions of tourists of Spain's tourist destinations, analyzing the similitudes and differences between urban and rural areas. Considering TripAdvisor reviews along 10 years, more than 500,000 tourist reviews of rural and urban destinations were analyzed. The cultural dimension was the most notable in both rural and urban samples, whereas the technological dimension was the least highlighted by the reviews in both areas. The principal difference between rural and urban areas is related to the environmental and economic dimensions. The environmental dimension was more frequently mentioned in the comments in the rural area, while the economic dimension became more relevant in the urban context. Secondly, the results point out several differences between rural and urban areas in the level of sentiments and emotions across the sustainable and technological perceptions. On the one hand, reviews categorized as cultural and environmental are more positive in rural areas. In contrast, the social, economic, and technological dimensions are strongly associated with urban areas. On the other hand, emotions are quite different between the two analyzed contexts. Higher levels of anger, disgust, and surprise are associated to urban context, while joy and sadness are more relevant in rural environments.

From a managerial perspective, the mentioned results could be useful to destination managers in urban and rural areas. Depending on the context, destinations could match their key competitive features in terms of sentiments and emotions and their relationship with a specific dimension analyzed (cultural, environmental, social, economic, or technological). Moreover, knowing the perceptions of tourists in rural and urban areas allow companies and institutions to manage the expectations of users, to make effective investments that respond to real perceptions and to plan more effective communication campaigns.

Finally, this research has some limitations which deserve future venues. Related to the Spanish context, it is only used reviews for urban and rural attractions in Spain. Future research could amplify the range and compare the results with other competitive country destinations, such as France, Italy, or Greece. Another limitation is linked to the overall rating made in the review, not analyzed in this research. The consideration of the review rating as a variable to be explained would substantially enrich this research and, therefore, it would make it possible to analyses the effect of sentiments and emotions between urban and rural areas.

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FASHION'S ENVIRONMENTAL IMPACT AND THE ROLE OF SUSTAINABLE PRACTICES AND MARKETING: AN OVERVIEW

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Abstract: *Fashion is one of the largest global industries, with a significant cultural impact, allowing individuals to convey their emotions and personality traits. However, due to consumerism, inefficient production methods, and unsustainable materials, fashion has become one of the most polluting sectors, harming both the environment and society. The rapid increase in these negative effects has created an urgent need for more sustainable practices in the production and post-production of garments. Companies must now adopt sustainable business models that transform how clothes are designed, produced, sold and consumed. Sustainability is no longer optional; it is a necessity. Consumers, alongside companies, must also shift their behaviors toward responsible consumption. Currently, consumer education is the biggest challenge, as they must be encouraged to make wiser, eco-friendly choices. This can be achieved through targeted marketing strategies that emphasize green practices, positioning sustainability as the new norm in fashion. Ultimately, this paper aims to explore how transforming the fashion industry's current model can allow individuals to enjoy fashion's beauty without compromising the natural environment.*

Key words: *fashion industry; sustainable fashion; green marketing.*

JEL: M31 Marketing

1. Introduction

Fashion can be seen as an art, which gives individuals the opportunity to express their feelings and personality traits (Barnard, 2020). This allows each person, regardless of the category they belong to, to reflect their deepest feelings and present themselves in one way or another to society.

Also, fashion is essential to contemporary cultural identity and can ensure satisfaction of our needs: pleasure, new experiences, identity and status through clothes (Fletcher, 2008). The prevailing experience of buying and consuming fashion items is focused on a cycle of self-justification, thus becoming both dominant and credible (Fletcher, 2008). Clothes can be perceived as historical documents because once imbued with personal histories and identities, they contain a depth of personal narrative that can easily be lost in history (Hall, 2017). This industry consists of two parts: the status and identity that connect fashion individuals through a cultural and emotional approach, and the production process and natural resources that present the practical part of the system (Pucci et al., 2022).

Today, fashion is at the forefront of economies around the world on a micro and macro scale, from a multitude of craft producers in the developing world to industrial fashion manufacturers and retailers (Gwilt & Rissanen, 2011). As of 2024, the global fashion industry is valued at 2.4 trillion USD and it contributes to the global economy with around 2 trillion USD (Worldmetrics.org, 2024). Even though the fashion industry has an important role in global economic development, unfortunately,

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due to consumerism, production methods and materials used, it has become one of the most polluting in the world. At the moment, the fashion industry is, after fossil fuels and agriculture, the third most polluting sector in the world (Climate Trade, 2023), releasing significant amounts of toxic chemicals, which harm the natural environment and gradually decrease the quality of life for each of us. Given these challenges, there is an immediate need for a different approach, which means the whole industry should encapsulate sustainable practices into daily activity. This paper aims to explore the environmental impact of the fashion industry and how sustainable practices, and marketing strategies should be integrated in order to address these issues.

2. The Hidden Costs of Fashion

The fashion industry is responsible for a large amount of carbon emissions, water and soil pollution. Globally, it is estimated that textile production accounts for 20% of clean water pollution, as a result of the dyeing and finishing processes, and as a result of washing synthetic clothes are obtained 35% of the primary microplastics released into the environment (European Parliament, 2023). In addition, the fashion industry is estimated to be responsible for 10% of global carbon emissions (more than maritime transport and international flights combined). Statista (2023a) estimates that in 2021, the fashion industry emitted approximately 897 million metric tons of carbon dioxide into the atmosphere, and this amount is expected to increase to nearly 1.3 billion metric tons by 2030, if no action is taken. Also, the production process in the fashion industry uses large amounts of water, in 2015 a total of 79 billion cubic meters were used, GFA and BCG estimate that it will reach 118 billion cubic meters by 2030, representing an increase by +50% (Global Fashion Agenda & The Boston Consulting Group, 2017). Most of the global water consumption used in clothing production is associated with cotton cultivation and wet treatment processes such as bleaching, dyeing, printing, finishing (Niinimäki et al., 2020).

Another element that this industry has a negative influence on is the labor force, because globally a large proportion of workers experience harsh working conditions and low wages. An example that outlines the injustice faced by workers in the fashion industry is the disaster in India, namely the Rana Plaza collapse that occurred in Bangladesh in 2012, where around 1135 people were killed and 2500 injured, most of them being women (Chowdhury, 2017). This disaster comes as a result of the fact that, although the building's structural failure had been noticed before the collapse, the building's owner forced the workers to continue the production for 31 Western multinational corporations. After this incident, overall worker safety improved and nearly 250 brands and retailers worldwide joined either the Accord on Fire and Building Safety in Bangladesh or the Alliance for Bangladesh Worker Safety (Barrett et al., 2018). Out of a total of 69 million people representing the labor force in India, approximately 4 million workers are in the garment sector (International Labor Organization, 2023), the size of this segment highlighting the fact that many workers are subjected to unsafe working conditions on a daily basis and benefit from low wages. In 2018, it was estimated that 60.5% of garment workers in India are women, a concrete example of the fact that within one of the world's largest industrial segments, gender inequality is rife.

Over time, clothing production has moved to low-wage countries, mainly in Asia (European Parliament, 2020), because there is a high demand for low-priced fast-fashion garments and companies need to maintain reduced production costs. Victims of these precarious working conditions

work long hours and earn wages that barely allow them to live. Decent work has become a priority for the United Nations, the International Labor Organization and other international organisations, with the EU also supporting decent work through international trade agreements.

The 2030 Agenda for Sustainable Development formulated by the United Nations, to which several countries from around the world have joined in September 2015 (United Nations, 2023), includes 17 sustainable development goals. Among them, objectives 1, 5, 8, 10 and 17 refer to the eradication of poverty, gender equality and a positive working environment, principles on which all companies must be based when formulating their labor policies.

Since the final cost of fashion items depends a lot on labor costs, companies will keep these costs low in order to obtain final products marketed at low prices, accessible to all categories of consumers. Increased consumer demand, low costs and rapid changes within the fashion industry have resulted in the production of ever-increasing quantities of clothing. From 2000 to 2015, the production of clothes doubled, reaching 100 billion clothes annually, and the average number of wears decreased by 36% (Ellen MacArthur, 2017). This is due to a growing middle class and per capita sales in mature economies.

3. Sustainable Development of the Fashion Industry

3.1. A Brief Introduction

Because the fashion industry is in a continuous process of change at high speed, thus causing devastating damage to the environment, much of these negative effects can be reduced with the help of sustainable fashion and the circular economy. The concept of sustainable development was first introduced in the Brundtland Report (WCED, 1987) entitled "Our Common Future" and was defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". The definitions around which the concept of sustainability revolves include 3 dimensions: environmental quality, social justice and economic prosperity (Elkington, 1997) or environment, people and economy, also called the "triple bottom line". The interest in sustainability has grown over the past decades because of the awareness of environmental issues. Currently, the sustainable fashion industry is worth over USD 6.5 billion, estimated to reach USD 10.1 billion by 2025 and USD 15 billion by 2030, with an annual growth rate of 8.3%, potentially reaching 9.7% per year by 2030 (TheRoundUp, 2023). The growth of this segment in recent years is largely driven by shoppers from younger generations, for example Millennials and Generation Z, who account for 68% of sustainable sales in the United States in 2022 (Statista, 2023b).

3.2. Sustainable Fashion: A Path Forward

Sustainable fashion is part of the slow fashion movement, developed in the last decades and used together with the terms eco-, green-, ecological-fashion (Henninger et al., 2016). Slow fashion, however, focuses entirely on the connection between human needs, responsibility and awareness. Slow fashion represents a different world view, promoting the variety of production and celebrating the cultural significance of fashion. The term slow fashion was introduced in 2007 by Fletcher to denote the transition in the production and consumption of fashion pieces, from quantity to quality and from volume to value (Fletcher, 2007). Slow fashion also includes design, production, consumption and the idea of living better, and designers, buyers, retailers and consumers are

increasingly aware of the impact of products on communities, workers and the natural environment (Fletcher, 2007). The main concern of the slow fashion segment is extending the life of clothes, which also allows reducing the consumption of natural resources and energy waste. Slow fashion encourages people to buy less frequently, higher quality clothes that last.

To create durable clothing, we must address the root issue of the fashion industry: it's predominantly linear business model. And to contribute to the United Nations (2023) Sustainable Development Goals and improve the quality of the natural environment, we must adopt a circular business model. Ellen MacArthur (2017) states that transforming the fashion industry requires systemic changes, outlining four key steps to improve economic, environmental and societal outcomes: (1) phasing out harmful substances and microfibers that pollute oceans; (2) redesigning, selling, and using clothing to extend product lifespans; (3) enhancing recycling through improvements in design, collection and reprocessing; (4) maximizing resource efficiency and shifting to renewable energy.

The last 30 years have seen a considerable increase in awareness of environmental issues. A recent study conducted in the United States of America shows that 66% of those interviewed are concerned about global warming (Leiserowitz et al., 2023). Another study conducted between November 2023 and January 2022 shows that, globally, 90% of Gen Z and Millennials are making efforts to reduce their impact on the environment (Deloitte, 2022). Also, according to the results obtained from a national survey conducted in the USA, it is observed that 69% of millennials expressed their interest in the environment, while a large part of them show a lack of personal involvement in activities related to responsible behavior (Naderi & Van Steenburg, 2018). Due to the awareness of the effects that the fashion industry has on the environment, several companies have adopted sustainable initiatives, changing their production model to reduce their ecological footprint. Patagonia (2024) is known as a sustainable pioneer, this being shown by the fact that from 1985, the company has donated over 89 million USD to environmental groups, as part of the initiative 1% for the Planet.

Besides the changes that need to be made in the production process, the biggest challenge to achieving a sustainable fashion industry is the consumer. Fashion consumers feel the need to buy clothes constantly, and low prices, trendy models and an engaging shopping experience increase the frequency of purchase (Gwilt & Rissanen, 2011). Consumers must be educated and guided towards responsible and sustainable consumption. Through the right and carefully formulated marketing strategies, companies can get consumers to buy timeless and environmentally friendly pieces.

4. Green Marketing: Transforming Fashion

As mentioned before, developing sustainable products is crucial to reducing the environmental impact of the fashion industry. In this process, marketing plays a very important role, as it is essential in the development of new products, starting from the concept and design stage. Furthermore, if the product remains only at the development stage, without being spread to the market and bought, the efforts to improve the quality of the environment would be in vain. Rex and Baumann (2007) say that in this process marketing has an essential role, being called the interface between consumption and production, and the acceptance of products by the general public can be achieved through communication and educating consumers about the characteristics of sustainable products and the benefits they bring.

Since the 1970s, many scientists have promoted the use of consumer persuasion and understanding as marketing tools, to increase the adoption of sustainable consumption (Olson, 2022). However, their efforts have not had the expected effect, because per capita resource use and greenhouse gas emissions have seen only a small decline in most developed countries (Olson, 2022).

4.1. The Evolution of Green Marketing

Green promotion refers to marketing products that are environmentally friendly, with the goal of influencing consumers to choose sustainable options (Elmanadily & El-Deeb, 2022). Green marketing gained momentum in the late 1980s, early 1990s, following its introduction by the American Marketing Association (AMA) as early as 1975, during the first workshop on "Green Marketing". A year later, Hennion & Kinnear (1976) published the first book on "Ecological Marketing", marking the beginning of the “First Age” of green marketing, defining it as "concerned with all marketing activities that have served to help cause environmental problems and that may serve to provide a remedy for environmental problems." This phase primarily addressed specific environmental problems, such as air pollution and resource depletion, and promoted “end-of-pipe” improvements-targeting pollution reduction at the end of the production process.

Polansky (1994) explained the concept of green marketing to include "all activities designed to generate and facilitate any exchange intended to satisfy human needs or wants, such that the satisfaction of these needs and wants occurs, with minimal detrimental impact on the natural environment". As environmental issues became more prominent in the late 1980s, the “Second Age” of green marketing, also known as the Environmental stage, emerged. This era shifted the focus from pollution control to “clean technology,” allowing companies to use environmental concerns as a competitive advantage. Peattie (2001) emphasized that during this period, green marketing was increasingly seen as a “win-win” solution for both economic and environmental benefits.

At the same time, sustainability concerns broadened to encompass a wider range of issues, ecosystem destruction, climate change and poverty (Peattie, 2001). Fuller (1999) defined Green Marketing as "the process of planning, implementing, and controlling the development, pricing, promotion, and distribution of products in a manner that satisfies three criteria: (1) customer needs are met, (2) organizational goals are attained, and (3) the process is compatible with ecosystems." During this period, new markets for green products and services began to emerge across various industries (Peattie, 2001). Although the logic of "Win-Win" strategies was attractive, in practice, companies developing green products found it quite difficult to maintain competitive advantage (Peattie, 2001). The challenge lay in producing environmentally friendly products that were both technically and cost competitive. Several factors contributed to this difficulty, including:

- “The Green Product Controversy” – it remains difficult to determine which products are truly the most ecological. In some cases, product substitution may solve one environmental issue, but create unforeseen harms in the other areas due to factors not considered during the design process;
- “The Corporate Green Wall” – many companies achieved initial success by implementing projects that saved energy or reduced waste disposal costs. However, when these companies attempted to go further and scale sustainable practices, they encountered resistance from entrenched business practices, corporate culture, and existing strategies.

▪ “The Green Consumer Mystery” – relates to the discrepancy between the level of concern expressed towards the environment and the degree of change in consumer buying behaviour. Marketers explained that this is due to consumers' "social over-reporting" of environmental concerns. These challenges gave rise to the Third Age of Green Marketing, known as the "Sustainable Age", which began in the early 2000s. This period saw a shift towards greater normalization of eco-sustainability in business practices. The earlier “backlash described by Crane (2000) as the widespread reluctance that hindered the full adoption of ecological products, began to fade. As a result, eco-friendly practices became more common, representing a key focus for the future.

4.2. Characteristics of Failed vs. Successful Marketing

King (1985), in his article "Has marketing failed or was it never really tried?", argued that marketing failures, particularly in the 1980s, were due to “false marketing” – efforts that did not adhere to core marketing principles and philosophy. Several factors he identified, which also impacted green marketing, include:

- "Thrust marketing": King criticized this sales-based approach, where companies used environmental claims as promotional tools without genuinely considering the environmental impact of their products.
- "Marketing department marketing": this refers to a lack of integration between marketing and other departments. In green marketing, this issue arose when companies limited their environmental initiatives to specific departments, like production or marketing, rather than taking a holistic approach.
- "Accountant's marketing" refers to the focus on short-term profitability, rather than long-term brand building. In green marketing, this was seen in companies reducing packaging or energy use but not investing in more sustainable product development.
- "Formula marketing": King used this term to describe reliance on tried-and-tested methods over innovation. In many cases, companies made only minor adjustments, such as reducing packaging, without fundamentally transforming production processes.

Peattie and Crane (2005) emphasized that many factors hampering general marketing, also impeded the development of green marketing, leading to its slowed progress. They identified several failed manifestations of green marketing, including:

- “Green spinning”- companies used PR campaigns to improve their environmental image without making real ecological improvements to their products.
- “Green selling” – following 1990s studies showing environmental concern among consumers, companies modified promotional campaigns to highlight the “green” aspects of existing product, often without any meaningful contributions to sustainability.
- “Green harvesting” – short-term cost-cutting measures, such as reducing packaging and energy consumption, were adopted by some businesses without any strategic green investments, making long-term sustainability less appealing.
- “Enviropreneur marketing” – many companies producing green products failed to succeed because they didn't conduct research specific to their products or adequately educate consumers on the benefits, resulting in low acceptance.

- “Compliance marketing” – businesses made minor environmental adjustments solely to meet regulatory standards, promoting these efforts without pursuing sustainability initiatives.

In contrast, Peattie and Crane (2005) outlined four characteristics of “real marketing” that also apply to green marketing: a foundation in market research, a long-term perspective, use of all company resources, and focus on innovation. Lee (2008) further noted that growing environmental concerns, regulations, and technological advancements have fostered green business progress. However, challenges like “Greenwashing”, defined as “a superficial display of concern for the environment” (Collins English Dictionary), persist. Grant (2007) also pointed out the issue of “greenophobia”, where consumers perceive green products as costly, inefficient, inconvenient, presenting no other benefits than the one of “virtue” and are intended for “weird” people.

5. Sustainability Strategies for Business Success

As sustainability becomes a fundamental business requirement, companies must recognize that it is no longer optional but essential (Charter et al., 2002). The concept of sustainability refers to meeting the needs of future generations, and marketing strategies must be formulated so that consumer needs are met after maintaining ecology, public interests, and profitability (Kumar et al., 2012). However, achieving this balance is challenging because marketing often drives increased consumption, while sustainability encourages resource conservation.

Kumar et al. (2012) also emphasize the difficulty in aligning sustainable principles with marketing strategies, which traditionally focus on boosting sales and production. They argue for finding a middle ground where companies can thrive financially without causing harm to society or the environment. This involves a shift toward sustainable marketing, including better product design, promotion, and distribution based on environmental criteria.

Prothero et al. (2010) note that sustainability has become trendy, often termed “the new black,” as more consumers become aware of the environment impacts of their purchases. Wymer and Polonsky (2015) highlighted that it does not matter how we achieve a sustainable environment, but rather the fact that we achieve it, the end results being what matter. Also, according to these authors, marketing alone does not have the ability to solve all environmental problems, consumers and governments playing an important role in this endeavour. Government interventions, manifested through social marketing or legislation, are tools that facilitate the achievement of a sustainable environment.

Charter et al. (2002) differentiate between “greener” marketing, which focuses on minimizing environmental damage, and “sustainable” marketing, with a focus on the “triple bottom line”, which incorporated broader goals like creating products that meet both consumer and stakeholder needs without harming natural systems. Sustainable marketing goes beyond environmental issues, addressing human wellbeing through long-term solutions.

For companies to stand out, they must appear in the consumer's mind as more sustainable, and a different positioning from competitors can be based on functional attributes and emotional benefits (Hartmann et al., 2005). A positioning strategy based on the functional attributes of the products includes the environmental advantages of the products compared to those of the competition (Peattie, 1995). As a strategic alternative, companies can turn to emotional positioning, based on three emotional benefits offered by the brand and discussed by Hartmann et al., (2005) in their work, as following: a feeling of well-being (“warm glow”) that is associated with altruistic actions, the

possibility of self-expression (in society) through the consumption of sustainable brands and the benefits obtained from the sensations and feelings experienced as a result of contact with nature. Hartmann et al. (2005) identified the fact that in green marketing, both functional and emotional positioning have a positive effect on attitudes towards the brand, but most benefits are obtained through strategies that combine these two elements.

6. Conclusions

From those previously listed regarding the sustainable marketing mix, we conclude that companies need to utilize a comprehensive set of tools to create sustainable products, launch them successfully, create sustainable communication campaigns and care about the environmental and social well-being throughout the entire products' lifecycle. The most important component, in addition to the changes that must be made at each stage, from creation to the product's market exit, remains the consumer, who must be educated and incentivized to understand the gravity of existing issues and the personal role one can play in improving the quality of the natural environment. In addition to the contribution of sustainable marketing to the overall well-being of society and to the natural environment, companies must also consider their role within the financial dimension of the firm and the obtained competitive advantage.

To get consumers to stop buying clothes on impulse, which eventually end up in the landfill after just a few wears, marketers must convince them of the consequences of their actions. And because in the era of consumerism people began to satisfy their non-material needs by consuming material things, losing their identity through the pile of clothes bought unconsciously, they must be faced with the process of rediscovering themselves through actions that involve personalization, the importance of sustainable behavior and the role of sustainable actions on one's own life and personal perception.

Since low price is currently one of the main attributes perceived by consumers and which dictates unhealthy consumption behaviour, companies need to launch marketing campaigns that demonstrate how each additional unit spent can contribute to the socio-ecological well-being of the environment and to the fulfilment of each individual. The leap that every participant in the industry must make, from designers to users, should be based on transitioning from quantity to quality, and consumers must understand that the value of clothing comes from its usage rather than its purchase, and the longer and more carefully an item is worn, the greater its value, regardless of its cost. Designers also need to become much more aware of their role in transforming consumption habits and therefore need to shift their focus from the pieces they create to those who will wear them. To meet consumers' needs, they need to create clothing that fits their customers, providing them with an extraordinary experience that will encourage them to continue the same kind of purchase behaviour, a sustainable one. Starting with a sustainable product that has been designed to be produced and used in a conscious and healthy way, sustainable companies must communicate their entire sustainable approach, addressing all elements of the marketing mix and ensuring that these elements have been approached from a beneficial socio-ecological perspective.

We all need to embrace sustainable consumption and become more responsible with resources, whether we're talking about the raw materials used to build a textile piece, or the clothes we own, which we should learn to manage properly throughout the entire product lifecycle.

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CYBERSECURITY AS A PART OF OPERATIONAL RISK MANAGEMENT

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Abstract: *In today's environment, operational risk management is a key component of organizational risk management. Given the potential impact of risks on business operations, effective management is an essential part of an organization's development strategy. With the rapid advancement of information technology and the digitalization of businesses, the need for robust cybersecurity systems is becoming increasingly apparent. Achieving a balance between adapting to the digital world and effectively managing cybersecurity is crucial for maintaining competitiveness and customer trust. Additionally, cyber threats can result in not only financial losses but also heightened reputational and compliance risks, as organizations must adhere to various regulatory requirements. It is also important to note that cyber risks are interconnected with business processes and infrastructure, integrating into the broader operational risk management framework.*

Key words: *operational risk, technologies, cybersecurity, digitalization, risk mitigation, business continuity.*

JEL: G32

1. Introduction

To enhance organizational competitiveness and adapt to modern business conditions, digitalization has become a key component of development strategies. However, as organizations increasingly rely on digital technologies, cybersecurity has emerged as a critical aspect of operational risk management. Ensuring compliance with cybersecurity standards not only mitigates potential threats but also optimizes business processes and safeguards profitability. Consequently, there has been a notable global increase in spending on cybersecurity technologies and services. Figure 1 illustrates the dynamics of technology spending, including cybersecurity investments, from 2017 to 2027 (forecast).

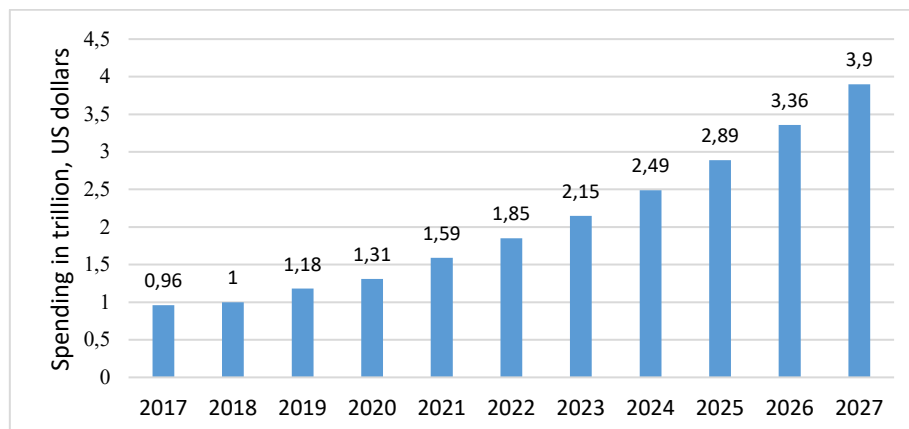


Figure 1. Spending on digital transformation technologies and services worldwide from 2017 to 2027

Source: <https://www.statista.com/statistics/870924/worldwide-digital-transformation-market-size/>

With the rapid development of information technology and the global integration of digital systems, managing operational risks has become increasingly complex, requiring a holistic approach. In today's organizations, cybersecurity is an essential component of operational risk management, demanding focused attention. It is crucial to recognize that cybersecurity threats, such as data breaches, system failures, and cyberattacks, can not only lead to financial losses but also disrupt business continuity and significantly heighten reputational risks, potentially resulting in a loss of customer trust.

While cyber risks were initially regarded as a specialized IT domain, they are now deeply integrated into all facets of operational activities, influencing business processes and the performance of products and services. Given this broad impact, a systematic approach to management is essential, as building a robust cybersecurity framework extends beyond technical issues and must be reflected in the organization's overall development strategy. Operational risk management must address the prevention of technical failures, protection of sensitive data, and ensuring the continuity of business processes—further emphasizing cybersecurity's pivotal role within the operational risk management system.

Operational risk is a type of risk that organizations face across all industries. According to the Basel Committee on Banking Supervision, operational risks are driven by the following risk factors:

- ✓ People;
- ✓ Systems;
- ✓ External events;
- ✓ Processes.

These factors encompass a wide range of potential threats, including IT system failures, fraud, industrial disasters, or human error. At the same time, with the advancement of digital transformation, operational risks are increasingly taking on a digital dimension. Today, conducting business is inherently linked to the use of information systems, the shift to electronic management systems, and the growth in the volume of data being processed. Consequently, attacks on these systems can result in operational disruptions or critical events with significant impact. This underscores the importance of building a robust cybersecurity framework as part of operational risk management.

The purpose of this article is to examine the relationship between cybersecurity and operational risk management and to explore contemporary approaches and tools that effectively counter cyber threats. This will involve identifying the main types of cyber risks, assessing their potential impact on organizational operations, and providing practical recommendations for strengthening information security systems in organizations.

2. Fundamentals of operational risk management

Since operational risks are related to a company's daily activities and arise from ineffective processes, human errors, or other factors, managing these risks is crucial for maintaining business resilience. Figure 2 illustrates the risk management process according to its stages.

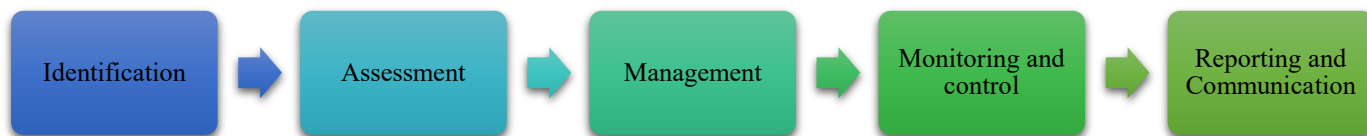


Figure 2. Stages of operational risk management

Source: Developed by the author

The first stage in managing operational risks is risk identification. This process involves identifying not only existing risks (which have materialized) but also potential threats that could affect the organization's activities. By developing a risk identification system, it is possible to detect potential threats in a timely manner and prepare strategies to mitigate them. The main tools used by organizations for risk identification are:

A) Risk and control self-assessment (RCSA). This method allows employees from various departments to assess risks and control measures directly. Involving staff who are directly involved in specific business processes ensures an assessment of each stage of the department's activities. By filling out various questionnaires or self-assessment reports, departments identify risks in their areas of responsibility.

B) Process mapping. This tool helps visualize the process by creating a business flow diagram or process flowchart. The methodology allows understanding at which stage of the analyzed process risks might arise or where the process can be improved.

C) Business impact analysis (BIA). To determine critical processes and resources, an assessment of the consequences for the business in the event of risk occurrence is conducted. Through filling out questionnaires, interviewing key staff, and analyzing business operations, the management body identifies critical processes for the organization. Subsequently, a continuity plan is developed to ensure the organization's operations in light of critical processes.

At the same time, a risk assessment matrix is often used to evaluate and manage operational risks directly. This method helps assess both the likelihood and potential impact of each risk and is commonly presented as a color-coded matrix (Figure 3).

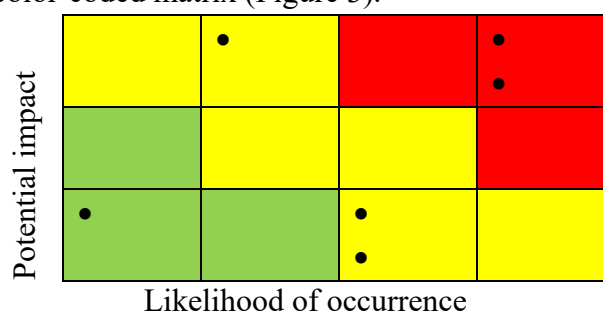


Figure 3. Visualization of risk categories

Source: developed by author

It is important to establish thresholds for each level based on the business process being examined and its significance to the organization, as well as the acceptable level of risk.

Additionally, the *FMEA (Failure Modes and Effects Analysis)* method is also used for risk analysis. The aim of this tool is to reduce the likelihood and impact of system failures through timely improvements. To achieve this, potential failure modes in a process or product are identified, and the consequences of each failure for the system are analyzed. Then, the causes contributing to the failure and its impact are determined to prioritize actions.

Thus, in managing operational risks, various aspects of the organization's activities and impact factors, including information technology, are assessed. This, in turn, confirms the integration of cybersecurity into operational risk management.

3. Methods for managing cyber threats in the context of operational risk management

To ensure the security and stability of businesses amidst the constant threat of cyberattacks, it is essential to develop an operational risk management system and advance technology. At the same time, cyber threats have become one of the most pressing issues for organizations globally, across various sectors. Figure 4 illustrates the distribution of cyberattacks by industry worldwide in 2023.

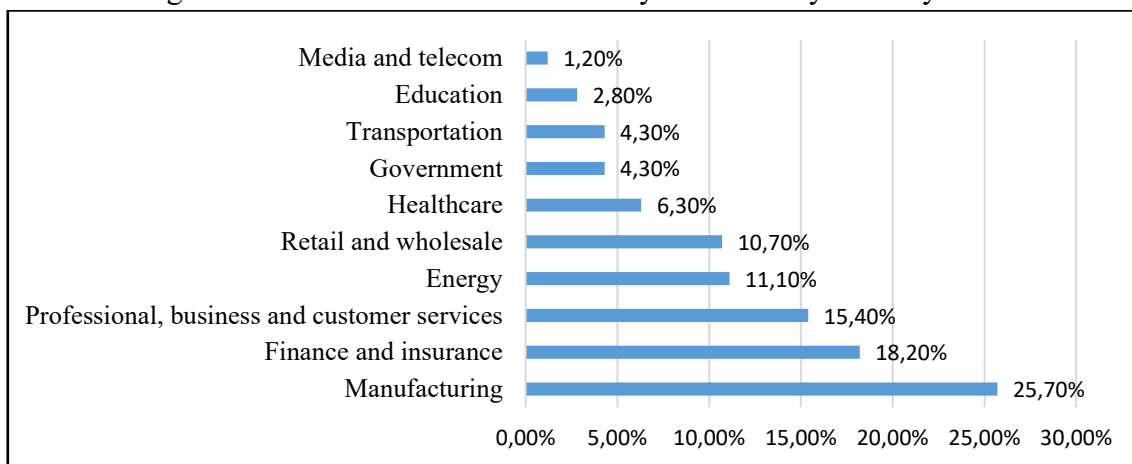


Figure 4. Distribution of cyberattacks across worldwide industries in 2023

Source: <https://www.statista.com/statistics/1315805/cyber-attacks-top-industries-worldwide/>

To understand how cybersecurity integrates into the operational risk management system, it is essential to analyze the main types of cyber threats.

Viruses and Worms Viruses are malicious programs that embed themselves in files and spread through email, data exchanges, and downloaded files. They can damage or destroy data and disrupt system operations. Worms, unlike viruses, are self-replicating malicious programs that spread through networks and do not require user interaction. They can slow down the network and overload the system. In the context of operational risk management, it's important to consider the potential impact of such threats on business processes and develop plans to minimize their consequences.

Spyware collects information about users without their knowledge and can transmit this data to malicious actors. It can lead to the leakage of confidential information such as passwords and credit card details. Managing such risk requires implementing monitoring and data protection mechanisms, as well as developing security policies to prevent leaks.

Ransomware encrypts data on an infected computer and demands a ransom for decryption. This can paralyze a company's operations and lead to significant financial losses. In the context of operational risk management, strategies should be developed for data backup and incident recovery plans.

Phishing is a form of social engineering where attackers spoof emails, messages, or websites to gain access to users' personal information. Effective management of this risk involves training employees to recognize phishing attacks and avoid falling victim to them.

Denial of Service (DoS/DDoS) attacks aim to overwhelm a system or network to take it down. This can disrupt access to crucial resources and services. As part of operational risk management, it is essential to implement protection against such attacks and develop plans for system recovery in case of an attack.

SQL Injection allows attackers to insert malicious SQL queries into a web form to gain unauthorized access to a database and retrieve or alter data. Managing this risk involves implementing web application protection methods and regular vulnerability testing.

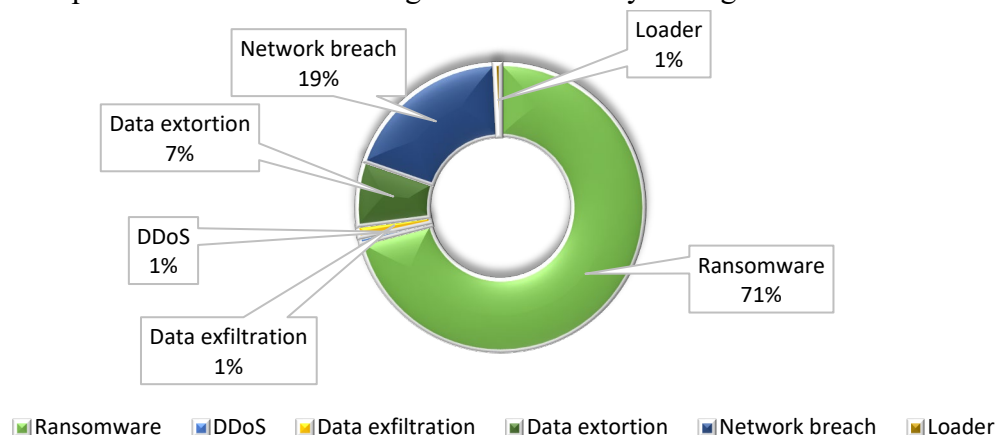


Figure 5. Distribution of detected cyberattacks worldwide in 2023, by type

Source: <https://www.statista.com/statistics/1382266/cyber-attacks-worldwide-by-type/>

Therefore, a wide range of cyber threats can potentially affect an organization's operations. To effectively manage cyber threats, it is essential to develop a comprehensive risk management process. This involves employing various methods and techniques. Regular updates to operating systems, applications, and antivirus software help close vulnerabilities that attackers might exploit. This is a key element of an operational risk management strategy aimed at preventing potential attacks. Also, antivirus software detects and removes malicious software, while firewalls help block unauthorized access to the network. These measures help minimize risks associated with cyberattacks and support overall system security.

It is important to highlight that people play a critical role in preventing cyber threats. Training employees in security basics, such as recognizing phishing emails and using passwords safely, helps prevent many attacks. This is also part of operational risk management, as humans are often the weakest link in security.

Data encryption protects information from unauthorized access, even if data falls into the hands of malicious actors. This is critical for managing operational risks associated with data breaches. Regular data backups enable information recovery in case of an attack, such as ransomware. This is part of an operational risk management strategy, ensuring the ability to quickly recover from incidents. Also, regular security checks, such as penetration testing and system audits, help identify and address vulnerabilities before they can be exploited by attackers. These actions contribute to managing operational risks by preventing potential incidents. Having a clear incident response plan allows for

rapid and effective reaction to cyber incidents, minimizing damage and restoring normal system operations.

Cyber threats pose a serious risk in today's world, and managing them requires a comprehensive approach integrated with operational risk management. Understanding different types of threats and implementing effective protection methods will help safeguard data and systems from potential attacks and minimize risks. Regular updates, training, backups, and system checks are key components of a successful cybersecurity and operational risk management strategy.

4. Conclusions

In conclusion, integrating cybersecurity into operational risk management is a critically important aspect that cannot be ignored in the contemporary digital landscape. research has shown that cyber risks not only significantly increase the overall level of operational risks but also require a comprehensive approach for effective management. Effective management of cyber risks involves not only implementing advanced technologies and practices but also the active involvement of all organizational levels. Risk management strategies should include continuous updates to security policies, regular employee training, and proactive threat identification. It is recommended that organizations develop and implement comprehensive strategies that integrate best practices in cybersecurity and operational risk management. This will not only help minimize potential threats but also enhance the organization's overall resilience to changing external conditions.

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CURRENT TRENDS IN THE CONSTRUCTION SECTOR

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Abstract: *This article discusses and shows one of the biggest economic sectors, construction, which is a lucrative industry for investors as well as a source of revenue and output for the country's economy. Over the years, the construction industry has seen times of uncertain development. But thanks to new trends in the industry (such as creative technological solutions, the growing popularity of modular constructions as an alternative to personal constructions, the sustainability and durability of constructions, and, last but not least, the increased emphasis on creating a safer working environment), the construction industry is undergoing a constant transformation and has succeeded in becoming one of the most competitive economic sectors.*

The Republic of Moldova's construction sector is expanding at the moment and is essential to raising living standards and promoting the expansion of the country's economy. Improving the nation's economic potential and ensuring a stable income for the populace is essential for achieving long-term performance and sustainability in all facets of this industry, since this fuels consumer demand.

Key words: *construction sector, technological solutions, innovations, performance, sustainability, durability*

JEL: L7, O1, O3, O4

1. Introduction

A number of internal structural and administrative flaws that have accumulated over the years, in addition to the consequences of the pandemic and the global economic crisis, are to blame for the current challenging state of the Republic of Moldova's building industry. Significant external shocks have been experienced by the national economy, revealing the system's underlying weaknesses. The Republic of Moldova, which depends mostly on remittances from its residents living outside, has been greatly impacted by regional events, especially the unrest in Russia and Ukraine. The detrimental effects on the nation's economy have been exacerbated by this reliance.

The effects on the populace have been seen in the severe decline in living circumstances brought on by the fast rise in the cost of necessities like food and electricity, which has significantly outpaced growth in income.

2. Basic content

An examination of the Republic of Moldova's overall construction volume from 2019 to 2023 is shown in Figure 1. The following are the key findings:

1. Overall decline from 2019-2023:

Over the course of the time, there was a consistent decrease in the amount of construction work [5]. Beginning in 2019, the construction sector in the Republic of Moldova experienced an annual decrease in the volume of completed works. As a result, there were 1% fewer works produced in 2020 than in 2019 [1]. There was a little decline of 0.2% in 2021 as opposed to 2020. The biggest decline,

of 5%, was noted in 2022 as opposed to 2021. In comparison to 2022, the volume of works decreased by 4.1% in 2023, continuing the downward trend.

2. *Constant fall (2019–2023):*

The number of construction projects in 2023 decreased by more than 10% [3] in comparison to 2019 [4], indicating a persistent pattern of recession in this industry. In summary, between 2019 and 2023, the overall amount of construction projects has decreased significantly and steadily.

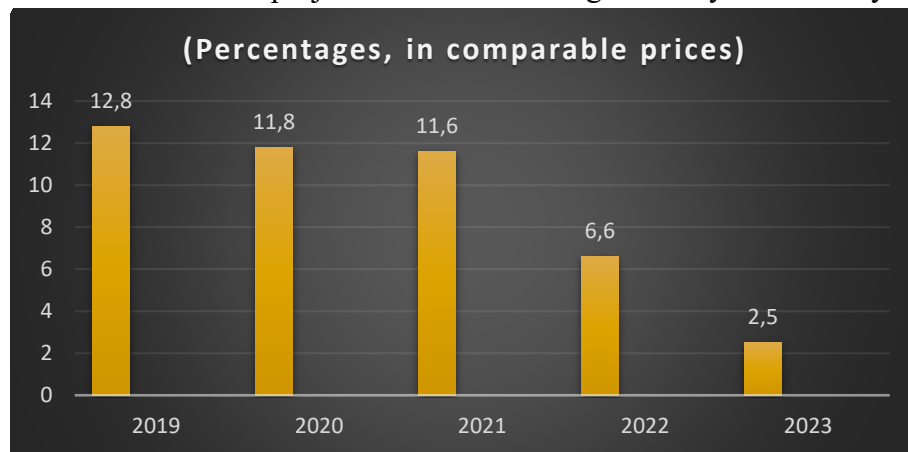


Figure 1. Construction works executed during the period 2019-2023 in the Republic of Moldova (%)

Source: Developed by the author based on [1]

Table 1 highlights the variations in the volume of construction works in the Republic of Moldova for the year 2023, compared to the years 2022 and 2021. The following is the thorough analysis:

The overall amount of construction work: In comparison to 2022, the whole amount of building work represented 97.5% [2] in 2023, a 2.5% decline. With an 86.1% volume of works in 2022 [2], there was a notable decline from 2021 to 2022.

By the works' structural components:

New building: The percentage of new works dropped to 85.8% in 2023 [2], a 14.2% fall from 2022. Nonetheless, the number of new projects decreased by 46.2% in 2022 as opposed to 2021 [2], indicating a significant drop of over 54% from 2021 to 2022.

Capital repairs: The volume of these structures increased by an astonishing 140.4% in 2023 as opposed to a 40.4% growth in the same period in 2022 [2]. The volume of these structures, however, was just 27.5% in 2022 as opposed to 2021, which represents a sharp decline of over 72.5% [2] from the year before.

Current repairs and maintenance: The amount of these works decreased by 12.0% from 2022 to 2023, reaching 88.0%. The volume was just 23.3% in 2022 as opposed to 2021, indicating a notable decline from 2021 to 2022.

Additional works: These works increased by 17.0% in 2023, reaching 117.0% in comparison to 2022 [2]. However, compared to 2021, the amount of other works in 2022 was just 3.0% [3], indicating that these works were mostly ignored in 2022.

By construction objects:

Residential buildings: Compared to 2022, the volume of residential constructions decreased by 16.1% in 2023, reaching nearly 84% [2]. The same situation was observed in 2022 when the volume of these works fell by 20.8% [2] compared to the previous period in 2021.

Non-residential buildings: A considerable increase can be noted in the construction of non-residential buildings in 2023, when the volume of these constructions exceeded 120% [2] compared to 2022, indicating a significant recovery.

Engineering constructions: In 2023, the volume of these works decreased to 90.7% [2] compared to the year 2022, marking a reduction of 9.3%. In 2022, the volume of engineering constructions was reduced by 43.4% [2] compared to 2021, indicating a substantial decline during the reference period.

Other works: The volume of other works increased to 117.0% in 2023 compared to 2022, while in 2022, the volume of these works was only 3.0% compared to 2021 [2], indicating that these types of works had minimal activity in the previous period.

Table 1. Indices of the volume of construction works executed in 2023

	Year 2023 in % compared to		Year 2022 in % compared to:
	year 2022	total	year 2021
Total construction works, of which:	97,5	100,0	86,1
By structural elements of the works:			
new construction	85,8	46,2	88,1
capital repairs	140,4	27,5	66,6
maintenance and current repairs:	88,0	23,3	102,6
other works	117,0	3,0	93,0
By construction objects:			
residential buildings	83,9	20,8	77,0
non-residential buildings	120,3	32,8	88,5
engineering constructions	90,7	43,4	89,8
other works	117,0	3,0	93,0

Source: [2]

Following the analysis of the indices of the volume of construction works executed by structural elements and construction objects, we can observe the following:

1. *Substantial reductions in new and residential constructions:* New construction works and residential constructions experienced significant declines both in 2023 compared to 2022 and in 2022 compared to 2021.

2. *Significant increases in capital repairs and non-residential buildings:* Capital repairs and works on non-residential buildings showed a strong recovery in 2023, indicating the prioritization of these segments.

3. *Recovery of the „other works” segment:* We note that both in the „other works” category and in engineering works, activity in 2023 improved compared to 2022, as the volume of these works in 2022 was extremely low compared to 2021.

This suggests an uneven recovery in the construction sector, with segments experiencing strong recoveries while others continue to decline.

The decline in the volume of construction works in the Republic of Moldova has been influenced by several key factors:

1. *COVID-19 Pandemic*

The pandemic had a severe impact on the construction sector, disrupting supply chains, reducing demand for new projects, and affecting the financial viability of companies in the field. Sanitary restrictions and labor difficulties slowed down project progress and increased operational costs.

2. Labor Shortages

A significant shortage of skilled labor, caused by mass migration and an aging population, has affected the sector's ability to implement large projects. The exodus of young workers to European countries has reduced the availability of specialized labor, thereby increasing recruitment and wage costs.

3. Rising Construction Material Prices

Due in large part to global market imbalances as well as high energy and transportation costs, the cost of building materials has increased significantly. Some projects have been delayed or abandoned as a result of this, which has decreased project profitability and raised the funds required to finish construction.

4. Instability in the Regional Economy

The building industry has been negatively impacted by the conflict between Russia and Ukraine, two nations that Moldova greatly depends on economically. The region's political and economic unrest has made investments unpredictable and decreased the supply of building materials and resources.

5. Anticompetitive behavior and unfair competition

Anticompetitive behaviors in Moldova's construction materials sector limit economic agents' access to equitable resources and opportunities. The sector's robust growth has been hampered by this unfair competition, which has also made businesses in the industry less competitive.

These elements have put a great deal of strain on the Republic of Moldova's construction industry, which has led to a sharp decline in the amount of work completed in recent years.

There are now several tendencies in the growth of Moldova's construction industry that show attempts to adjust to changing social, technological, and economic demands. The future of construction is being shaped by a number of distinct development trajectories, despite the fact that the industry has experienced several difficulties, including the pandemic crisis and regional instability:

1. Use of Innovative and Digital Technologies

Moldovan construction firms have been incorporating more contemporary technology to boost productivity and cut expenses. The use of technologies like virtual reality for project planning, drones for site monitoring, and software for material and logistics management is growing in popularity.

The digitization of processes allows for faster and more accurate execution of works, reducing errors and improving productivity.

1. Increased Interest in Modular and Prefabricated Constructions

A significant trend is the migration towards modular and prefabricated constructions, which offer an efficient and economical solution for housing and infrastructure projects. This type of construction allows for reduced execution time and optimizes costs, especially during a period when construction material prices are volatile.

2. Focus on Sustainability and Durability

More and more companies in Moldova are adjusting their strategies to integrate sustainability principles. This includes the use of recyclable materials, reducing carbon emissions, and improving the energy efficiency of buildings. Furthermore, firms in the sector are investing in solutions that minimize material waste and enhance the energy efficiency of constructions, such as effective thermal insulation and the use of renewable energy sources.

3. *Enhancing Security on Building Sites*

The focus on making workplaces safer for workers is another significant development. Accidents have decreased as a result of improved site safety brought about by new laws and contemporary technology. In this process, technological solutions like intelligent safety gear and building site monitoring systems are essential.

4. *Green infrastructure and urban development*

The creation of green areas and sustainable urban development are becoming more and more important, especially in Moldovan cities. In order to encourage a healthier and more ecologically friendly lifestyle, cities are beginning to implement programs that support eco-friendly structures and pollution reduction. Green infrastructure, such as bike lanes, parks, and energy-efficient structures, is gaining importance.

5. *A rise in investments in housing*

Residential growth is stimulated by the persistently high demand for homes, particularly in metropolitan areas. The goal of more and more real estate developments is to provide high-quality, reasonably priced housing, such as energy-efficient flats that require less upkeep. The requirements of a youthful, energetic population looking for contemporary, cost-effective housing options are the focus of these initiatives.

These trends point to a positive development in the Republic of Moldova's construction industry, emphasizing the growing importance of safety, sustainability, and technical advancements. These elements will significantly influence how this industry develops in the future.

3. Conclusions

Although the Republic of Moldova's construction industry has had challenging times, recent patterns point to a strong recovery built on creativity, sustainability, and the capacity to adjust to shifting market conditions. These elements will significantly influence how this industry develops in the future. However, to progress in a sustainable and competitive manner in the long term, the sector will need to face persistent challenges, such as labor shortages and price fluctuations.

There is a lot of room for expansion, especially in the areas of residential, commercial, and public infrastructure building. The growing need for infrastructure and contemporary housing may spur investments, provide employment, and aid in the expansion of the national economy.

The Republic of Moldova's building industry is undergoing a period of transformation, where economic and social challenges are balanced by the opportunities provided by innovation and sustainability. With a well-defined strategy and government support, this sector can become a driving force for long-term economic development, significantly contributing to the modernization of national infrastructure and the improvement of living standards.

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SECTION 3: FINANCE AND ACCOUNTING

EXPLORING THE INTERACTION BETWEEN ORGANIZATIONAL CULTURE AND ACCOUNTING INFORMATIONAL SYSTEM QUALITY UNDER TECHNOLOGY: AN EMPIRICAL STUDY

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Abstract: *The article illustrates the ways in which the design and operation of information accounting systems (AIS) are reshaped under the action of collective identity and institutional culture. The research is based on a qualitative case study established on theorizing and on empirical data obtained from data semi-structured interviews, given by accounting experts, auditors, university professors, bank managers and pursues the perception of professionals on how organizational culture influences the quality of accounting information as a component of the accounting information system in the digital technology era. The results showed the innovative effect of the organizational culture, through its role as a mediator of the accounting information system' quality and the interactive relationship between this system and accounting information' quality.*

Key words: *organizational culture, accounting information system, accounting information, corporative culture, information quality, information technology*

JEL: M14, M40

1. Introduction

The sustainable development of businesses and the increase of their quality in the short, medium and long term, which has become from a simple desire (WCED, 1987) a condition sine qua non for organizations (Enquist et al., 2007, Epstein, 2008), tends to be increasingly determined by improving the behavioural patterns of the individuals who act within them, so that the objectives and strategies adopted are fully understood, accepted and appropriated by all its members.

Culture is not just a term referring to physical affiliation within an organization, it is a surprisingly broad concept in a continuous development process (Kroeber et al., 1954) which tends to become the element key capable to promote, among members, the sense of belonging and the desire to achieve organizational objectives, but also the certainty that the achievement of these goals determines success and guarantees sustainable performance and which, within the current digital society, develops emerging roots to the online environment (Deuze, 2005).

The driving force that causes individuals to allocate innovation-generating efforts is represented by motivation, and OC (organizational culture) plays a critical role in motivating innovative behaviour

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(Hartman, 2006) and provides the link between members national culture and individual culture, ensuring the interconnectivity of all other organizational elements (Mansour et al., 2022). To meet the management process' needs in having access to comprehensive, coherent, concise, timely and viable information, raw data about the various events must be processed into useful information (Moscove et al., 2002).). By its very nature, accounting information is a component of the information system base, part of a process that produces, collects, stores, processes, and distributes information to stakeholders.

AIS (Accounting informational system), as an intersection point between accounting and information systems (Moscove et al., 2002), combines the information material and immaterial elements and their processing techniques with the aim of providing the accumulation of information related to strategies, performance, perspectives, results and constructed in such a way as to reflect the social, environmental and economic context in which the organization operates, connecting the component elements into a coherent whole. These technical and management tools do not have the necessary capacity to cover the human dimension of information security (Chang & Lin, 2007), an attribute that belongs to the organizational culture. This has the ability to create innovation and high-performing business processes through the effective and well-integrated group environment of individuals' beliefs, values and behaviours (Hartman, 2006). Through its functions, culture drives the organization's identity, facilitates commitments, strengthens its stability, determines individual behaviour (Wagner & Newell, 2006), and, implicitly, the quality of information (Vittola et al., 2018; Priyadarshanie et al., 2021).

The research expands the current discussions regarding the culture emergence in the AIS transformation in general and, more specifically, in the context of the numerous crises that have taken place on a medical, social, political or economic level, addressing the changes in the practices of different organizations. The paper aims to contribute to the enrichment of specialized literature in the field of AIS by addressing the implications that OC has on AIS and identifies, through a qualitative analysis, the capacity of organizational practices to bring substantial changes to the information' quality. It is necessary to know the dynamics of culture as the environment changes to the point where some of the assumptions are no longer valid and to generate some continuous adaptive evolutionary change processes.

The aim of the study is to identify the interaction between the OC, the quality of accounting information and the quality of AIS on sustainable principles and incorporating innovative technologies with the involvement of accounting professionals, based on an empirical research study fundament on semi-structured interviews with financial managers from Romanian companies operating in different fields. The paper identifies a series of links and implications between innovative corporate culture and the quality of accounting information and, implicitly, of the entire AIS.

The main objective of this paper is to explore the way that the influence of collective cultural identity and institutional attitude is perceived on the design, operation and use of AIS and, implicitly, on the information quality that it provides. Accounting information represents both the foundation and the result of AIS, so that the two influence each other and are they are determined by the entire organizational climate quality. Along the stated logical line, we have identified three specific research objectives:

1. To explore the implications of an innovative organizational culture on the accounting information quality.
2. To examine the relationships between innovative organizational culture and the transformations undergone by AIS.
3. To analyse the manner in which the quality of financial and non-financial information interacts with the quality of AIS.

The primary data obtained in semi-structured interviews with professional accountants or managers, were subjected to a critical content analysis. The study addresses the issue of the OC emergence in the AIS operating mechanisms and its contribution to the accounting information quality as an interactive component of the AIS. The second paper section expresses a critical look at the existing literature regarding the studied object, followed by section number three which presented the research methodology but also limited parts and suggestions for future research. Section four describes in detail the results achieved, showing the interdependence between innovative OC and the evolution of AIS and, implicitly, the improvement of accounting information quality. The last of the sections highlights the conclusions and the research implications. The originality of the study consists in the analysis of the new realities regarding the operation of AIS within organizations, using the organizational culture lens.

Literature review

Kroeber et al. (1954) lists more than 164 definitions for OC, giving culture, from an anthropological perspective, the ability to include different types of explicit behaviour patterns or implicit, and Sathe (1983) develops the concept in the managerial sphere, culture simultaneously representing culture as an asset but also a liability of organizational life. The social perspective on culture is defined in Fairchild's Dictionary of Sociology (1960) as a set of acquired and socially transmitted patterns of behaviour, through symbols, with capacities for innovation. Hofstede (1980) calls organizational culture as a collective mental programming that has all the mechanisms necessary for the individualization of a group, the "social glue" that binds different groups (Smircich & Stubbart, 1985) and that can be changed over time (Moraes & Cunha, 2023).

OC is an abstract notion, but the forces of social (Hofstede, 2011) or organizational order that it energizes are extremely strong, and the misunderstanding of this force can cause the organisation failure (Schein, 1985), while knowing the OC determinants - strategy, structure, support mechanisms, innovation and communication- can ensure success (Martins & Terblanche, 2003). Depending on the way in which they act on individual and group behaviour, OC determinants, with a role in creativity and innovation, can either support them or, in the negative form, inhibit them (Martins & Terblanche, 2003). The critical role in motivating the members innovative attitudes as an organizational value, in accepting the norms, receiving feedback, using effective communication channels, using a forceful reward system rewards and stimulation belongs to the OC (Hartman, 2006), simultaneously with the ability to help individuals in identifying and knowing how the organization works (Webster & Watson, 2002). (Chang & Lin, 2007) identifies four characteristics for OC: consistency, innovation, cooperation and effectiveness to which Kwarteng (2018) adds three more: mission, adaptability, and involvement. Cooperation is focused on internal orientation and information exchange, trust and team; compliance with rules, norms and regulations are the basis of consistency focused on internal

guidance and control. Achieving competitiveness and results-oriented objectives is reflected by effectiveness, and external orientation is based on innovation, flexibility, creativity, entrepreneurship, adaptability and dynamism. The effects of innovation-supporting values on efficiency and effectiveness are mediated by layers of OC (values and norms, artifacts and behaviour) (Hogan & Coote, 2014). The increased popularity of digitization in all fields, the use of the Internet and social networks leads to the transition of electronic culture, specific to the 20th Century, towards a digital culture, specific to the 21st Century, which brings together the means by which people interact within the social network, in an interconnected environment, a culture with ramified roots both online and offline - lines and with immediate impact (Deuze, 2005).

The information quality, confidentiality, integrity, availability, relevance and accessibility are affected by the control level, by the culture efficiency and flexibility, by the cooperation and innovation degree at the organizational level (Chang & Lin, 2007). The accounting instrumental capacity to involve the required information dimensions in managerial processes must be reconfigured in a new context, under the subtle influence of OC (Lungu et al., 2009). Located at the logical intersection between accounting and the information system, AIS represents a component of organizations capable to provide to all stakeholders the necessary base to process transactions but also alert information (Monteiro & Cepedea, 2021), gathering, recording, storing and processing financial and non-financial data (Romney et al., 2015), historical data or forecasts (Chapellier et al., 2013) with a determining role in formulating and calculating strategies, in improving the financial control quality (Chenhall, 2003), in the decision-making process, facilitating transactions and evaluating performance (Suzan et al., 2019). The growth and development of organizations is directly dependent on the AIS quality (Pereira et al., 2024), accounting information being fundamental in the stakeholder' decision-making process.

The AIS performance is determined by the information quality which is a measure of the entire organizational system performance (Whitten & Bentley, 2007), whose interconnected elements work in harmony to compile data and information and which define its quality (Sari et al., 2019). The main purpose around which the AIS is built, in all its forms, is to determine financial development and financial and non-financial information (Carey & Tanewski, 2016), to focus on financial performance at the highest level (Fitriati et al., 2022), to ensure the organization's competitiveness and the ability to adapt to the permanent changes in the business environment (Barth, 2022). The AIS represents an absolute and extremely necessary tool at the disposal of managers and decision-makers in the financial-accounting field (Qatawneh, 2023) capable to provide the necessary information support within the various organizational and managerial processes (Arif et al., 2022).

An entire academic community has taken interest in measuring the AIS quality (Delone & McLean, 1992; Seddon, 1997), highlighting a multitude of AIS construction models (Rai & Lang, 2002; Wang & Liao, 2008), through which the quality system is reflected by the information quality (Seddon, 1997; Delone & McLean, 1992; Wang & Lun, 2022), the latter representing an independent component that interacts with the whole system in a positivity relationship (Gorla et al., 2010; Binh et al., 2020). In turn, the accounting information quality is determined by the participation of accounting professionals in AIS design, regardless of their relevance level (Aboagye-Otchere et al., 2023). Marshall & Steinbart (2017) identify three determinants of the AIS: business strategy, information technology development and OC (Marshall et al., 2021).

The role of accounting in business organizations is that to provide information (Beaver, 1968; Hayes, 1977) extremely necessary in all decision-making processes, in fact, the accounting system is the main provider for information to stakeholder, so on their quality depends success or failure in an innovation context (Monteiro et al., 2020; Janka et al., 2020). The usefulness of this information is based on the rational quality (De Silva et al., 2020) of the decision-making process, and strategies are changing with social and political contexts (Wooldridge & Cowden., 2020), to the extent that employees accept the entrepreneurial interest as compatible with the general interest (Jensen & Meckling, 1992).

OC tends to become "visible" (Mansour et al., 2022) through the information quality provided by the AIS, which emphasizes its individualization, communication or identification capacity, on the one hand, and "informational" (Mansour et al., 2023) on the other hand, along with the entire society transformation. Studies in the specialized literature have demonstrated that among the immediate effects of implementing an innovative culture is the increase in AIS performance and the quality of financial and non-financial information (Binh et al., 2022) necessary for stakeholders. But the imposition of ethical values within the organization cannot have positive results on innovation within AIS, it is necessary to carefully manage the ethical culture and establish a solid link between the values of governance, management and the wider employees (Llopis et al., 2007), and without taking into account the cultural factor embedded within the systems and which shapes their organization and operation, the AIS analysis cannot be complete (Licht, 2014).

Organizational culture acts as a complete mediator in the relationship between information and its quality (Chang et al., 2021), generating performance and efficiency. Mission-related dimensions, adaptability and coherence of OC, statistically significantly influence the AIS quality and application, being an essential factor (Binh et al., 2022), but different in intensity on industrial sectors (Kwarteng & Aveh, 2018), while the innovative side of the OC determines an increase in the information amount and its opportunity (Binh et al., 2022), and, at the same time enhances the success of investments in accounting technology and the impact on the accounting information quality is significant (Mulyani et al., 2017). The development and the implementation of an effective AIS are positively related to the need to identify and understand the standards, symbols, values and power of an organization (Van Dung, 2019), culture representing the resistance structure of a perfectly functional AIS (Kwarteng & Aveh, 2018) and organizational changes (Dent, 1991) and understanding cultural differences (Weber & Pliskin, 1996) represent an essential first step in the process of building a forceful AIS (Dent, 1991).

Methodology

In order to fulfil the main objective, namely to investigate how the innovative organizational culture leaves its mark on the design, operation and use of AIS and on the dynamics of these systems as the main source of financial and non-financial information, we focused on obtaining empirical data, through semi-structured interviews (Kokina & Blanchette, 2019; Cooper et al., 2019).

We sent invitations to participate in the interview to a number of 28 top managers, financial managers and university professors, and I received a positive response from thirteen of them, employees of some Romanian companies active in various fields of activity, ensuring thus an optimal level of data saturation (Fugard & Potts, 2014).

Table. 1 Respondent Organization

<i>The organization's activity field</i>	<i>Occupation</i>
Leading Banks	Finance Director
Construction Company	Chief Financial Officer
Telecommunication Company	Chief Accountant
Investment Found	Chief Executive Officer
Small Manufacturing Company	Chief Accountant
Romania Central Bank	Local Finance Officer
Garment Manufacturing Company	Chief Accountant
Leading in Vegetable Oil Industry	Chief Executive Officer
Leading in Vegetable Oil Industry	Chief Financial Officer
Leading Educational Institution	University Professor
Accounting expertise company	Accounting Expert
Agricultural Company	Chief Accountant
Leading Hotel	Chief Accountant

Source: made by authors

The interviewees were informed from the moment the invitations were sent that the participation is voluntary and is not rewarded in any way, that both their personal data and those of the companies are anonymous and only their occupation and activity field will be public. All specialists have a minimum of 15 years of experience in the field of activity. Excluding the person of the university professor and that of one of the chief accountants, the companies in which the interviewed persons work, have more than 100 employees. The interviews took place between November 2023 and January 2024. All the discussions were conducted in Romanian, as their mother language, and notes were taken during the discussions because some of the professionals did not agree with the recording and we wanted to preserve the unitary nature of the entire research process. The average duration of an interview was 53 minutes.

For data processing, we used the inductive method of analysis. After all interviews were completed, the notes collected during the interviews were analysed and core ideas were extracted, which were then coded (Bell et al., 2019). Within the coded data we identified data patterns, the relationships between them and, finally, we determined the research results by interpreting these data.

The main limitation of the present study is the fact that the data come exclusively from companies operating on the Romanian territory and the national culture could influence the results. For the following studies, this aspect will be taken into account to check if the results obtained will be the same.

The OC reflection on the AIS and on the accounting information quality

We built our analysis based on three constructs: innovative OC, system quality and information quality. Related to this research context, the themes of the questions were developed around the emergence of OC in the design, construction, operation and development of accounting systems, and the relationship between system quality and the quality of financial and non-financial accounting information. The first part of the interviews was focused on establishing the independent characteristics of OC (symbols, values, involvement, adaptability, mission, innovation, efficiency) and the second part was focused on identifying the dependent variables, namely the quality of AIS and the quality of accounting information.

To evaluate the organizational culture, we used elements developed in previous studies (Boggs, 2004; Chang & Lin, 2007; Denison et al., 2006), and we identified, in the answers provided, a number of four elements of the OC capable of encouraging innovation, determining the assumption of risks and responding to challenges from the external environment: involvement, (empowerment, team orientation, capability development) consistency (core values, agreement, coordination and integration), adaptability (creating change, customer focus, organizational learning), mission (strategic direction, goals and objectives, vision).

The common organizational elements related to the company's mission refer to the clear strategy, known and assumed by the employees, to the long-term vision and objectives set by the management and acquired by the members "positive work environment, friendly interactions, based on teamwork and collaboration", "each of us has a responsibility to make the world a better place", "I share the same concern for the environment and community as the company I work for", "it is not always easy to find the right language to express the company's mission , which is like a lighthouse that serves everyone involved".

Regarding employee involvement, we identified their right to express their ideas and make proposals that are later analysed in participative meetings "the decision-making process is a participatory one, I feel stimulated when I benefit from autonomy through personal development" , " we don't have stars, we are the kind of team that fights and wins together, without relying on a star", "the team is stronger than an individual", "collaboration generates effective solutions and a pleasant work environment", " although I am general manger, I am aware that it is important to be aware of the strengths, weaknesses or other specific things that employees can notice in relation to themselves, as I am somewhat attached to the business I have built", "every idea can be valuable, no matter how crazy it may sound at first".

Organizational adaptability criteria are found in the rapid ability to adapt to external changes in the business environment, in their ability to understand and anticipate changes in the market and, last but not least, to understand and respond in a timely manner to the present and future customer requirements: "our role is to constantly improve services for the benefit of customers, to facilitate their access to the services offered", "for us the image we create in front of consumers, suppliers and employees is extremely important.", " in to what extent we can change the relationship between the services, the price offered and the existence of the business”.

The consistency of the culture is determined by the organization's ability to identify and share with employees the core values, to integrate general rules of action and to value innovation and individual development in the collective interest "it is important to be interested in evolving as an individual and to we perfect the skills", "continuous professional development brings substantial benefits to the organization", "it is important not to oppose changes but to face challenges", "perseverance is the key", "the whole mechanism determines our individual behaviour", "from my point of view , management policies and practices are aligned with the company's values", "I would not accept to work here again if the company's values were not in line with my own principles", "it takes unconventional thinking to create an innovative product".

IASB (2010) mentions the accounting information qualitative characteristics: relevance, faithful representation, understandability, verifiability, comparability, timeliness that ensure quality for the entire information system. Information is regarded as the sixth organizational resource along with

human resource, technological equipment, capital, nature and management. Information represents the extremely effective binder of the other categories of resources, used both for assistance and for their planning, coordination, direction and control. In this context, the construction, operation and management of the IT system are determinants of the entire activity efficiency.

According to the accounting professionals interviewed, accounting itself is currently perceived as an information system, an information process that collects, stores, processes, analyses and distributes information to stakeholders. They are considered to be the main suppliers of financial statements necessary for the decision-making process of internal management and the data' quality ensures a high reliability for the information system: "information technologies have improved the opportunity for the provided information ", "the information system has determined the cost and the processing time reduction and increased the efficiency and performance level ", "the data provided by the IT system is highly relevant", "human errors in processing and transmission are close to zero now".

Following the discussions with the participants in the interviews, it became obvious that the determining factors in the IT adoption and performance on a large scale within financial and accounting departments are, on the one hand, the legal regulations, and, on the other hand, they are related to corporate culture, competition and customers, professional bodies not being mentioned by the interviewed subjects. Sanctions, coercive measures of regulatory bodies cause companies to quickly align with electronic reporting requirements: "we had to change the information system to adapt to the new tax obligations, to submit all electronic declarations", "e-invoice and others novelties in terms of declarations required the implementation of a new computer program", "the operation costs for the new computer programs and the personnel training are quite high, but the sanctions cannot be ignored", "quick non-compliance with the legislation in the field, would also attract a negative images for the company in front of customers, employees and other partners", "we also have to be very attentive to the customer's needs, and their ability to use digital applications that we make available", "digitalization reduces the costs of personally, but we cannot give up employees, we would lose the direct relationship with customers", "we cannot stand passively by the competing companies action in terms of applications and digital platforms", "it is vital for us to follow the competition activity in order to provide financial and non-financial information", "as members of a corporation, we had to adapt to the digitalization requirements implemented by the other affiliated companies", "we quickly adapted, as a company, to the new technology requirements due to the openness of the staff to these technologies", "I do not consider that information technology can represent a threat to my profession in the future, it is more a support", "artificial intelligence has become part of our life, it can become an enemy only if we will allow it".

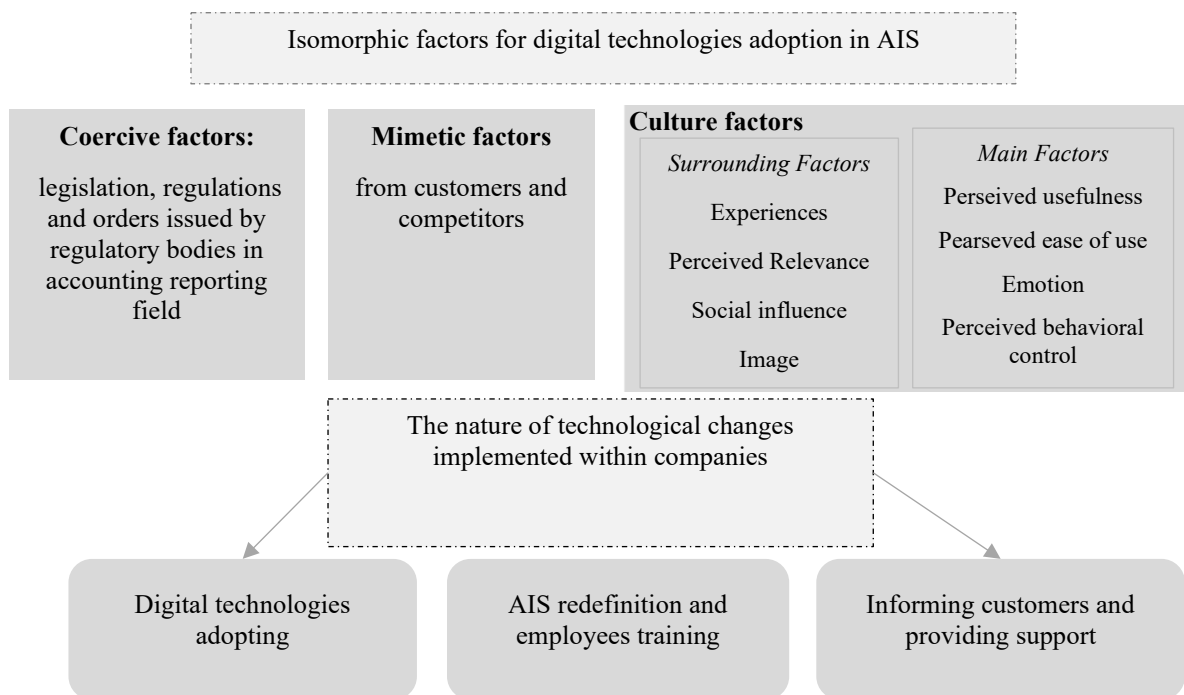


Figure 1. Graphic representation of isomorphic factors for digital technologies adoption in AIS

Source: made by authors

For the interviewed professionals, AIS at the organizational level represents a system capable of producing and distributing different information categories, processing financial and non-financial data, accounting systems are not limited to being only financial systems. Emerging technologies, especially automation, have improved the information quality processed by AIS, Big data represents a valuable resource that, when is used effectively, enhances the information quality and, implicitly, of the entire system. The use of cloud technology also has the effect of reducing waste, time, and costs through improving communication and collaboration between departments, facilitating the generation, access, sharing, analysis, publication, transparency and data quality. Automation generates efficiency by eliminating manual, repetitive and time- and human-resource-consuming work, while significantly reducing human error, and gives professionals the opportunity to focus on strategic tasks that involve creativity, ingenuity, attention to the environment, to change, collaboration. Innovative technologies ensure the raw processing of data in an easily accessible and manageable format and provide well-defined and developed connections between different data sources, ensuring "that something" that people can process and refine towards the optimal result: qualitative information. The mix of innovative technologies empowers human skills and transforms data into high-quality information needed by all stakeholders. These changes are seen as tools capable of enhancing the efficiency of companies, as an opportunity for socio-economic development and not as a threat. The opportunity provided by AIS, the effect on costs, processing time and performance, the relevance are the determinants of the OC. The elements of mission, adaptability, involvement of the culture is significantly related to the entire accounting system quality and to financial and non-financial information performance.

Conclusions

Taking into account the empirical evidence, we can conclude that innovative technologies will make more and more to disappear the cultural barriers from different organizations, technological modernization leads to culture change and partially similar evolutions for different organizations, without erasing the variety of dimensions, the changes taking place in different ways. Since innovation is the "key" to organizational survival, the innovative organizational culture, focused on internal orientation and flexibility, entrepreneurial adaptability, creativity and dynamism, imprints the way AIS works and implicitly the quality of financial and non-financial accounting information. Organizational culture acts as a complete mediator in the relationship between AIS and information quality, which implies the need for companies to move towards strengthening flexible, participative, performance-focused, innovative cultures. Respecting OC' involvement and coherence factor, through skills training programs, motivating staff, promoting teamwork, promoting an innovative environment, gives AIS high performance and efficiency and, implicitly, provides qualitative information. The main contribution of the study was to emphasize the determining role of OC in the adopting qualitative, adaptable, malleable, flexible and responsive processes and information systems, capable in providing opportunities and efficiency.

The study concludes the positive and significant impact that OC has in the financial accounting field, through the prism of the foundations, links and mechanisms of organization and operation at the organizational level, which determines the unity of the results, reduces errors and ensures an optimal level of information and AIS quality, so ensuring the standardization, improvement and perfection of AIS must be a strategic objective of companies.

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THE IMPACT OF CHANGES IN ACCOUNTING POLICIES AND ACCOUNTING ESTIMATES ON FINANCIAL REPORTING

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Abstract: *The evolving landscape of financial reporting necessitates continuous updates and modifications in accounting policies and estimates to ensure the relevance and reliability of financial statements. This article explores the impact of changes in accounting policies and accounting estimates on financial reporting. This study highlights the significance of consistency and transparency in the application of accounting policies and the formulation of estimates by analyzing the International Financial Reporting Standards (IFRS) and Generally Accepted Accounting Principles (GAAP). Modifications in accounting policies, whether due to regulatory updates or management's strategic decisions, can have a substantial impact on how an entity's financial position, performance, and cash flows are presented and understood. Likewise, accounting estimates, which require judgments and assumptions regarding uncertain future events, can influence major financial statement components, including asset valuations, impairment charges, and provisions.*

The article explores the reasons for these changes, the steps required for their implementation, and their impact on various stakeholders such as investors, regulators, and auditors. It underscores the importance of strict disclosure standards to reduce the risk of financial misrepresentation and improve comparability across different reporting periods. The relationship between accounting policies and estimates is examined in depth to assess their combined effect on the quality of financial information. Additionally, the study points out the difficulties entities encounter in adhering to evolving accounting standards while ensuring consistency in their financial reporting.

The evolving landscape of accounting standards requires constant review and adaptation of accounting policies and estimates to uphold the quality and trustworthiness of financial reporting. This paper offers insights into both the theoretical and practical effects of such changes, enhancing comprehension of their significance in financial reporting and their influence on stakeholders' decision-making. It emphasizes the need for continuous research and active discussions among professionals, standard-setters, and scholars to address the challenges linked to modifications in accounting policies and estimates, with the goal of achieving improved precision, relevance, and dependability in financial reporting.

Key words: *accounting policies, accounting estimates, financial performance, financial reporting, Generally Accepted Accounting Principles, International Financial Reporting Standards.*

JEL: M41

1. Introduction

The ongoing evolution of accounting standards and practices necessitates periodic changes in accounting policies and estimates to ensure the accuracy and reliability of financial reporting. This paper investigates the impact of such changes on financial statements, providing a comprehensive analysis of their implications for stakeholders. Accounting policies refer to the particular principles, methods, conventions, rules, and practices that an entity uses in the preparation and presentation of

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its financial statements. These policies are essential for accurately representing the financial position and performance of the entity. In contrast, accounting estimates involve the judgments made by management to determine values for assets, liabilities, income, expenses, and related disclosures, which inherently come with uncertainties.

Adjustments to accounting policies and estimates are typically prompted by the necessity to keep financial reporting aligned with changing business conditions, regulatory mandates, and industry best practices. Standards like the International Financial Reporting Standards (IFRS), along with other regulatory authorities, periodically revise their guidance to improve the transparency, comparability, and reliability of financial reports. Such revisions can significantly affect an entity's financial statements, influencing reported income, asset valuations, liabilities, and equity. Additionally, these changes may alter key financial ratios and metrics, which are essential for stakeholders making well-informed decisions.

This study investigates the processes involved in implementing changes to accounting policies and estimates, differentiating between voluntary and mandatory changes. Voluntary changes are usually driven by management's desire to enhance the relevance or reliability of the financial representation of the company, whereas mandatory changes result from regulatory updates or modifications to accounting standards. The paper discusses the criteria for choosing and applying new accounting policies and explores the methods used for updating accounting estimates. Additionally, it addresses the retrospective and prospective applications of these changes, clarifying when each approach is appropriate and highlighting the potential challenges that may arise with their implementation.

The effects of changes in accounting policies and estimates go beyond mere numerical revisions; they can influence how an entity's financial stability and future outlook are perceived. This paper highlights the critical role of transparency and detailed disclosure in maintaining stakeholders' trust and confidence amid such changes. It advocates for strong governance structures and prudent management decision-making to ensure that these adjustments clarify rather than obscure the entity's actual financial condition.

2. Conceptual Framework

Accounting policies and accounting estimates are essential elements in financial reporting, each fulfilling a unique role in the preparation and presentation of financial statements.

Accounting Policies: These refer to the specific principles, methods, conventions, rules, and procedures that an organization uses in the preparation and presentation of its financial statements. These policies guide how financial transactions and events are recorded, measured, displayed, and disclosed within the financial reports. They play a crucial role in maintaining consistency and facilitating the comparability of financial data over time and among various entities. Examples of such policies include approaches for inventory valuation (e.g., FIFO or LIFO), depreciation techniques (e.g., straight-line or declining balance), and revenue recognition criteria.

Accounting Estimates: These are approximations or judgments made by management regarding the value of certain items or transactions, where precise measurement is not possible due to uncertainty. Accounting estimates are necessary when the outcome of future events cannot be predicted with certainty. Common examples of accounting estimates include the allowance for doubtful accounts, estimated useful lives of fixed assets, provisions for warranties, and estimates of impairment losses.

Unlike accounting policies, which provide a general framework, accounting estimates involve specific judgments about amounts and timing.

Changes in accounting policies and estimates can significantly impact financial reporting. These modifications may alter how financial information is recognized, measured, presented, and disclosed, affecting the comparability, transparency, and relevance of financial statements. It is crucial for stakeholders, such as investors, creditors, regulators, and management, to understand the effects of these changes, as they rely on financial statements to inform their decision-making.

3. The Role of Accounting Policies and Estimates in Financial Reporting

Accounting policies and estimates are essential for ensuring that financial statements accurately reflect an entity's financial condition, performance, and cash flows. They serve to connect the theoretical foundations of accounting with the actual circumstances of business activities.

✓ **Ensuring Consistency:** A key function of accounting policies is to maintain uniformity in financial reporting. By following a specific set of guidelines, organizations can present financial data that is comparable across various reporting periods and different entities. The consistent application of accounting policies aids users of financial statements in recognizing trends and making valid comparisons over time.

✓ **Reflecting Economic Reality:** Accounting estimates play a crucial role in portraying the actual economic conditions of a business's operations. Given that certain elements of financial reporting are inherently uncertain, estimates enable management to offer their most informed judgment regarding future outcomes. This approach ensures that financial statements accurately reflect reality and are not misleadingly precise.

✓ **Facilitating Decision-Making:** Accounting policies and estimates play a vital role in enabling stakeholders to make well-informed decisions. Investors, creditors, and other users of financial reports depend on accurate and trustworthy information for their economic choices. When accounting policies are thoughtfully selected and consistently implemented, along with sound accounting estimates, they provide a solid basis for evaluating an organization's financial condition and potential for future growth.

✓ **Supporting Compliance and Governance:** The use of accounting policies and estimates also aids in meeting regulatory obligations and governance standards. Organizations must adhere to specific accounting frameworks, such as IFRS or GAAP, which require the uniform application of policies and judicious use of estimates. Adhering to these standards ensures that financial reporting meets regulatory expectations and follows best practices, thereby bolstering the credibility and dependability of financial statements.

To provide a clear understanding of accounting policies and estimates, Table 1 presents a comparison of their key features.

Table 1. Comparison of Accounting Policies and Accounting Estimates

Feature	Accounting Policies	Accounting Estimates
Definition	Principles and rules for financial reporting	Approximations based on judgment and assumptions
Nature	General guidelines	Specific to particular transactions or events
Stability	Relatively stable over time	Variable, based on new information or changing circumstances
Impact on Financial Statements	Affects recognition, measurement, and disclosure of transactions	Affects valuation and estimation of items
Change Application	Retrospective, with adjustments to past periods	Prospective, affecting current and future periods only
Disclosure Requirements	Detailed description and justification for any changes	Disclosure of assumptions, methods, and impact of changes

Source: developed by the author based on Schipper (2007)

Table 1 highlights the fundamental differences between accounting policies and accounting estimates, providing a succinct overview for understanding how they each contribute to financial reporting. While both accounting policies and estimates are integral to financial reporting, they differ in several key aspects:

1. Nature and Scope:

- **Accounting Policies** consist of overarching principles that dictate the methods and procedures utilized in the preparation of financial statements. These policies tend to remain consistent over time and establish a framework for recording and reporting financial transactions.
- **Accounting Estimates**, on the other hand, are particular assessments made for specific items within the financial statements. They require the application of assumptions and professional judgment to determine values that are inherently uncertain.

2. Application and Changes:

- **Accounting Policies** tend to remain stable over time; however, they may be modified in response to new regulations, shifts in business operations, or management’s choice to deliver more pertinent information. When accounting policies are changed, disclosure is necessary, and these changes are usually applied retrospectively to maintain comparability between different reporting periods.
- **Accounting Estimates**, by their nature, are subject to variability and can be revised as new information emerges or as the conditions influencing those estimates change. Adjustments to estimates are made on a prospective basis, affecting only the current and future periods without necessitating modifications to prior financial statements.

3. Impact on Financial Statements:

- **Changes in Accounting Policies** can greatly influence the recognition and reporting of financial transactions, potentially modifying critical financial indicators such as revenue, profit, and asset values. For instance, switching from one method of inventory valuation to another can lead to changes in the cost of goods sold and the valuation of inventory.

- **Changes in Accounting Estimates** impact the assessment of particular items in the financial statements, including allowances, provisions, and asset impairments. Such changes can directly affect the financial outcomes of the current period and may also have repercussions for future periods, depending on how these estimates are adjusted over time.

4. **Disclosure Requirements:**

- **Accounting Policies** require disclosure of the principles and methods employed in the preparation of financial statements, including any changes made and their implications. This is crucial for ensuring transparency and assisting users in comprehending the foundation of financial reporting.
- **Accounting Estimates** mandate the disclosure of the nature and magnitude of significant estimates, along with justifications for any changes and the assumptions underlying them. This information aids users in grasping the judgments that have been made and the extent to which financial statements are affected by these judgments.

5. **Role in Risk Management:**

- **Accounting Policies** provide a structured approach to financial reporting, ensuring consistency and minimizing the likelihood of subjective or biased outcomes. By following standardized policies, organizations reduce the risk of financial misrepresentation and improve the dependability of their financial statements.
- **Accounting Estimates** carry inherent risks because they are based on the uncertain nature of future events. The dependability of these estimates is influenced by the accuracy of the assumptions and judgments made by management. Effective risk management requires ongoing monitoring and adjustment of estimates to incorporate new data and evolving conditions.

Grasping the differences and interactions between accounting policies and accounting estimates is crucial for producing accurate and trustworthy financial reports. Accounting policies establish a consistent foundation for financial reporting, promoting comparability across periods and entities. On the other hand, accounting estimates address uncertainties and necessitate judgment to accurately depict the economic realities of business activities. When combined, these elements allow organizations to provide a genuine and fair representation of their financial status and performance, facilitating informed decision-making for diverse stakeholders. As accounting standards continue to develop, it is imperative for regulators, standard-setters, and practitioners to prioritize the maintenance of a clear and robust conceptual framework for these components.

4. **Regulatory Framework**

The regulatory framework that governs accounting policies and estimates plays a critical role in ensuring consistency, transparency, and reliability in financial reporting across various jurisdictions. This section explores the primary regulatory frameworks, with a focus on International Financial Reporting Standards (IFRS) and Generally Accepted Accounting Principles (GAAP), and how they offer guidance on adjustments to accounting policies and estimates. Additionally, it highlights the significance of disclosure requirements in preserving the integrity of financial reporting.

Changes in accounting policies involve modifications to the accounting principles, conventions, rules, or practices used by an entity in the preparation of its financial statements. Regulatory frameworks, such as IFRS and GAAP, establish specific guidelines on when and how these changes should be implemented and communicated.

Under IFRS (IAS 8):

- **Permissible Changes:** Accounting policy changes are permitted only when mandated by a new or updated standard or interpretation, or when the change enhances the reliability and relevance of the financial statements in reflecting the impact of transactions, events, or conditions.
- **Retrospective Application:** When an accounting policy change occurs, it is typically applied retrospectively. This requires the entity to revise the opening balances of relevant assets, liabilities, and equity for the earliest period presented, treating the new policy as if it had been in place from the outset. This method guarantees consistency and comparability of financial statements across periods.
- **Disclosure Requirements:** Entities are required to disclose the nature and rationale for any change in accounting policy, along with the adjustment amounts for each financial statement line item impacted, for both the current and prior periods. Additionally, they must indicate that the change has been applied retrospectively. If retrospective application is not feasible, this must be disclosed along with the reason for the impracticality.

Under GAAP:

- **Permissible Changes:** Similar to IFRS, under GAAP, changes in accounting policies are allowed if required by a new accounting standard or if they result in more reliable and relevant financial information.
- **Retrospective Application:** GAAP typically mandates the retrospective application of changes in accounting policies. This involves adjusting the financial statements for all periods presented, with the cumulative impact of the change on earlier periods reflected in the opening balance of retained earnings for the first period presented.
- **Disclosure Requirements:** GAAP requires entities to disclose the nature of the accounting policy change, the reasoning behind it, the method of implementation, and its effects on the financial statements, including its impact on net income and any adjustments made to previous periods.

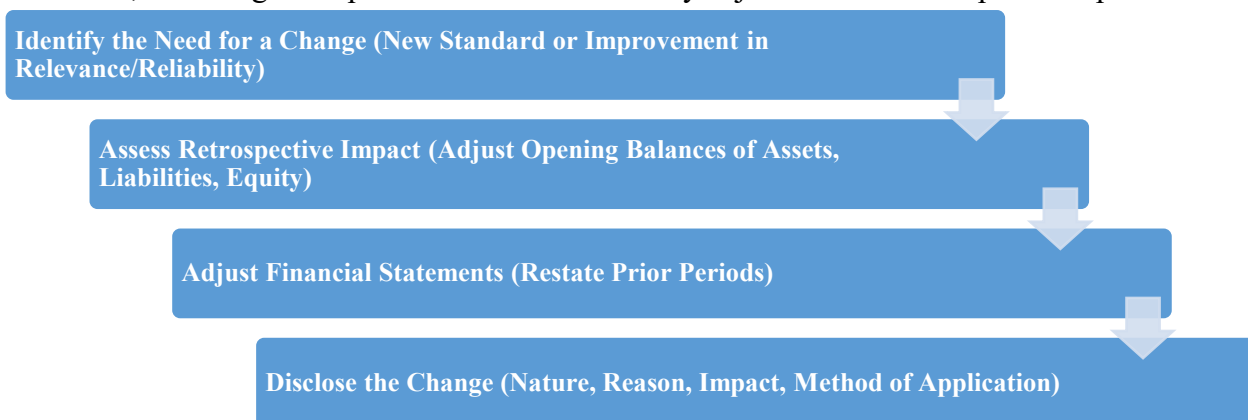


Figure 1. Process for Changing Accounting Policies Under IFRS and GAAP

Source: developed by the author based on Kieso et al. (2020)

Changes in accounting estimates arise from the emergence of new information or developments and involve adjustments to the carrying values of assets and liabilities, as well as associated expenses. In contrast to changes in accounting policies, changes in estimates are applied on a prospective basis.

Table 2. Examples of Impact of Changes in Accounting Policies and Estimates on Financial Statements

Change Type	Example	Impact on Financial Statements
Change in Accounting Policy	Change from FIFO to LIFO for inventory	Affects COGS, gross profit, net income, inventory valuation, and equity
Change in Accounting Estimate	Revision of asset useful life	Alters depreciation expense, net income, and carrying value of the asset
Change in Accounting Policy	New revenue recognition method	Affects revenue, accounts receivable, net income, and retained earnings
Change in Accounting Estimate	Increase in allowance for doubtful accounts	Increases bad debt expense, reduces accounts receivable and net income

Source: developed by the author based on Wahlen et al. (2018)

Modifications in accounting policies can greatly influence financial statements by changing the methods used to record and report financial transactions and events. Such adjustments can have repercussions on essential elements of the financial statements, such as assets, liabilities, equity, revenue, and expenses.

- **Impact on Profit and Loss:** When an organization alters its accounting policy, it may necessitate retrospective adjustments to its income statement. This involves recalculating prior revenues, expenses, and net income in accordance with the new policy. For instance, switching from the First-In, First-Out (FIFO) method to the Last-In, First-Out (LIFO) method for inventory valuation can change the cost of goods sold (COGS), which in turn affects both gross profit and net income. Such alterations can have a significant effect on profitability ratios and earnings per share (EPS), thereby influencing how investors perceive the organization’s performance.
- **Impact on Assets and Liabilities:** Adjustments in accounting policies can also have repercussions for the balance sheet. For example, the adoption of a new revenue recognition policy might lead to the earlier or later recording of accounts receivable and associated revenue. This can change the reported current assets and affect the entity’s liquidity. Additionally, shifts in policies regarding the capitalization or expensing of costs—such as those related to research and development—can influence the total assets and equity reported on the balance sheet.
- **Impact on Equity:** Changes in accounting policies frequently necessitate adjustments to retained earnings. When a policy change is applied retrospectively, modifications are made to the opening balance of retained earnings for the earliest period presented. This can affect the entity’s equity and book value, which are essential metrics for shareholders and potential investors.

Adjustments to accounting estimates are implemented on a prospective basis, meaning they have an immediate impact on the financial statements for the current period as well as for future periods.

- **Impact on Income Statement:** Modifications to accounting estimates, such as adjusting the useful life of a depreciable asset or changing the estimated percentage of uncollectible accounts, can influence the expenses recorded in the income statement. For instance, lengthening the useful life of an asset will lead to a decrease in annual depreciation expense, resulting in an increase in net income

in subsequent periods. On the other hand, raising the allowance for doubtful accounts will result in higher bad debt expenses, which will decrease net income.

- **Impact on Assets and Liabilities:** Estimates concerning asset impairments, provisions, and allowances can have a substantial impact on the balance sheet. For example, if the estimated fair value of a long-lived asset is revised downward due to impairment, the carrying value of that asset will decrease, which affects both total assets and equity. Additionally, adjustments to estimates for provisions, such as warranty liabilities or restructuring costs, will change the reported liabilities and subsequently affect the entity's financial position.
- **Impact on Cash Flows:** Changes in accounting estimates can also indirectly impact the cash flow statement. For instance, modifications to depreciation methods and useful lives can influence non-cash expenses, thus affecting cash flow from operating activities. While the cash flow from operations may not change significantly, the perception of the entity's cash-generating ability could be influenced by how changes in estimates impact reported profitability.

3. Conclusions

Adjustments to accounting policies and estimates are essential for ensuring that financial reporting reflects the changing realities of business and economic conditions. Such changes help ensure that financial statements accurately and faithfully represent an organization's financial situation and performance. Nevertheless, the effects of these modifications are contingent upon the quality of the disclosures made. When implemented effectively, these changes improve the relevance and reliability of financial reports, offering stakeholders clearer insights into the organization's financial well-being.

- **Timely Adjustments:** Adjustments to estimates, including those related to depreciation or provisions, should be initiated in a timely manner to reflect changes in business circumstances or new information. Such proactive adjustments enhance the congruence between financial statements and real economic events.
- **Transparency and Clarity:** It is essential for organizations to provide clear disclosures regarding the nature, rationale, and implications of changes in accounting policies or estimates to maintain stakeholder trust. Organizations should communicate in a straightforward, detailed, and comprehensible manner, enabling stakeholders to accurately assess the effects of these changes.

Adjustments to accounting policies and estimates are crucial for ensuring that financial reporting remains accurate and relevant. Although these modifications can result in considerable alterations to financial statement results, they are necessary to ensure that these statements accurately depict the current state of the business and adhere to changing accounting standards. For stakeholders, grasping the reasons for these changes and their potential effects is vital for making well-informed decisions. Organizations should emphasize the importance of transparency and consistency in their disclosures, making certain that all stakeholders—including investors, creditors, auditors, and regulators—receive the necessary information to accurately evaluate the entity's financial status and performance. As the landscape of financial reporting evolves, these organizations must be adaptable, ensuring that their accounting practices align with regulatory changes and the ever-changing global market conditions.

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THE EFFECTS OF OVERLAPPING CRISES ON ECONOMIC ENTITIES IN ROMANIA

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Abstract: *Any business can at some point face a crisis that can endanger its operation and image. The purpose of this research paper is to survey the representatives of 127 economic entities in Romania in order to present the effects of multiple crises on the basic activity of these companies. The first objective considers the review of specialized literature on the subject of multiple crises, and the second objective is focused on the analysis of the companies in the research sample. The results consist in providing an overview of Romanian companies in the context of the manifestation of the covid-19 pandemic crisis, the energy crisis and the geopolitical crisis generated by the Russian-Ukrainian war, but also a set of solutions for companies that are in difficulty because of these crises. The companies included in the sample belong to all fields of activity (trade, production and services) and were analyzed in the period January 2023-October 2023.*

Key words: *Romanian companies, pandemic crisis, energy crisis, geopolitical crisis*

JEL: M10, M41

1. Introduction

Crisis, in its broadest sense, can include many unwanted manifestations of a thing or phenomenon. As for company crises, they are closely related to those in the state: for example, economic crises often cause company crises; psychological crises can become both the cause and the consequence of company crises, etc. (Valackienė & Virbickaitė, 2011). The concern of administrators and managers is the first form of expression in the context of global crises, but also of legislative, economic and other changes that have affected the core activity of companies (Grosu & Chelba, 2020).

Kajanová and Tóth (2023) argue that the tourism and travel industries have been greatly disrupted by the Covid-19 crisis, with the HoReCa sector suffering significant losses due to reduced travel and social distancing restrictions; to the same extent, retail companies have suffered from lockdowns and social distancing restrictions, with low sales. According to the same authors, the pandemic crisis has also brought disruptions to the global supply chain, leading to shortages of goods in various industries, including healthcare, electronics, automotive and others. As for the energy crisis and the geopolitical crisis caused by the Russian-Ukrainian war, companies have also been affected by these crises Ozili and Ozen (2023) believe that the energy crisis has many causes, including the cessation of oil production due to the Covid-19 crisis and the Russian-Ukrainian war, the lack of fuel reserves due to the decrease in investments in fossil fuels, but also the intentions to reduce carbon emissions. In the opinion of Rabbi et al. (2023) the war between Russia and Ukraine, two significant agricultural

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powers, has numerous serious socio-economic consequences that are currently being felt worldwide and that undermine the functioning of the global food system.

2. Overview of companies from Romania in situation of multiple crises

Literature Review

Over time, according to Bil (2010), crises have brought down many leaders and, with them, the organizations led by them, while others have faced the challenges, proving their mettle. ”The most effective leaders emerge from a crisis victorious because they are both aggressive and courageous when they use challenges to their advantage. In addition, they deeply want to make a difference in the world through their work” (Bill, 2010). The 2020 Covid crisis brought many changes to the economy in an unprecedented, profound and surprising way. The health crisis has left its mark in a strong way on unemployment, the health sector, education, work, lifestyle.

Under the influence of the Covid-19 pandemic, there are many major changes in the economy, which have a strong impact on companies and represent challenges for their management. Among these, we mention the following (Nicolescu & Nicolescu, 2022):

- the notable drop in direct demand for certain products and services (tourism, transport, entertainment, etc.);
- reduction and/or delay in the supply of certain raw materials, spare parts and finished products;
- increased risk of being blocked or delayed with ongoing public or private economic and social projects;
- the decrease in indirect demand (especially industry, services and commerce) for many products and services caused by previous changes;
- noticeable fluctuation of orders and prices for certain types of important products, such as medicines, medical equipment, oil, some raw materials, etc;
- decrease or major change in alternative financing (stock exchange, venture capital, equity funds, business angels, etc.).

Since other industries and economies depend on the energy sector, it is considered one of the most essential sectors (Tarczynska-Luniewska et al., 2022). The energy market suffered a historic decline in 2020, as in just a few dozen days the prices reflecting oil decreased to the lowest level in the last 10 years (Jebabli, Kouaissah and Arouri, 2022). Brosemer et al. (2020) believe that solving the energy crisis is of utmost importance because energy has the ability to satisfy people's most priority needs. According to the authors cited above, the world population has a deficit in terms of paying for energy services, especially in the context of the health crisis. Therefore, other authors (Smal & Wieprow, 2023) have also noticed that there is a large fluctuation and an increase in the price on the electricity market, in recent times, so the SARS-cov-2 crisis, the loss of political stability, the increase in energy prices, as well as the increase in electricity demand are factors that determine an intensification of existing problems.

Still in the recovery period after drastic social distancing measures and temporary closures of some economic activities due to the health crisis, Russia's war against Ukraine occurs, especially in February 2022. Considered an unprecedented event after other major wars in the world, the Russian-Ukrainian war has a negative influence on the global economy (Adekoya et al., 2022).

The economic effects of this war are deeply felt throughout the world, the most pressing being the creation of a global food security crisis. Thus, the food sector is considered to be one of the most affected sectors of activity in this context. In a society already reeling from the economic effects of the coronavirus pandemic, the war has disrupted wheat exports from Ukraine and Russia, and rising inflation has dangerously increased food prices (In the Shadow of War, 2022).

In the opinion of Mardiros (2009) in the conditions of the emergence of a national and global crisis, the solutions that can be taken by companies could be those in Figure 1.

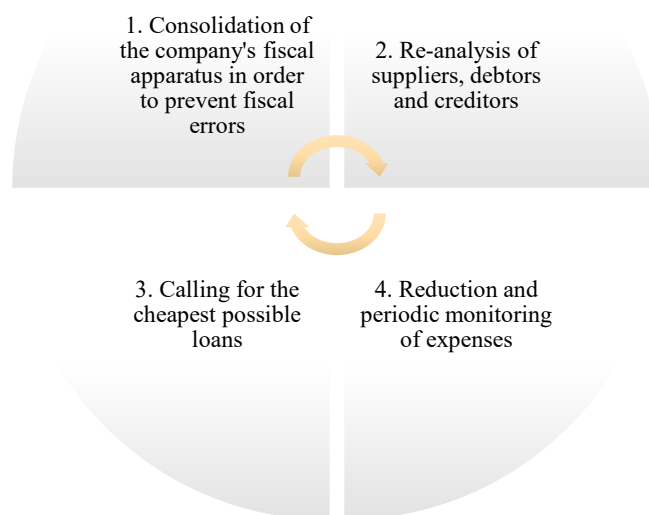


Figure 1. Solutions that can be taken by the company in the event of a national and global crisis

Source: adaptation after Mardiros, 2009, pp. 154-155

The influence of environmental turbulence and hostility on organizations has been widely studied from numerous perspectives, including financial, organizational, and project teams (Ingram, Wiczorek-Kosmala, & Hlaváček, 2023). Shaikh et al. al (2022) demonstrated in their study that there was a positive evolution of the capitalization of renewable energy companies by 150%. On the other hand, Xu et. al (2022) are of the opinion that energy shortages have a significant effect on business in developing countries. According to the previously cited authors, in order to overcome energy crises, such countries adopt different strategies in their industrial sectors. Thus, most governments around the world are making serious efforts to reduce their consumption of fossil fuels in power generation to mitigate climate change and reduce electricity tariffs (Fredes, 2021).

So, the effects of the health, geopolitical and energy crisis were felt at the level of the global economy, but especially at the level of the company; the companies' activities were simply blocked.

Research methodology

The research method used in this paper is the quantitative one by developing a questionnaire applied to 127 economic entities in Romania. The data collection period was between January 2023 and October 2023. The firms included in the sample belong to all fields of activity: trade, production and services. The questionnaire was created using the Google Forms program, and the data were centralized using Microsoft Excel.

Results and discussion

According to the results of the questionnaire, 28 of the companies had their core activity negatively affected by the covid-19 pandemic crisis in a percentage of 10% as shown in Figure 2. In the same vein, 38 of the economic entities analyzed in this study have were affected by the pandemic crisis in a percentage of 20-30%, 22 of the entities were affected in a percentage of 40-60%, 9 entities in a percentage of 70-90% and 3 entities in a percentage of 100%. Only 27 of the companies were not affected at all by the covid-19 pandemic. Therefore, the health crisis affected the economic entities in Romania, forcing some of them to close their activity, and many others to reduce their operations.

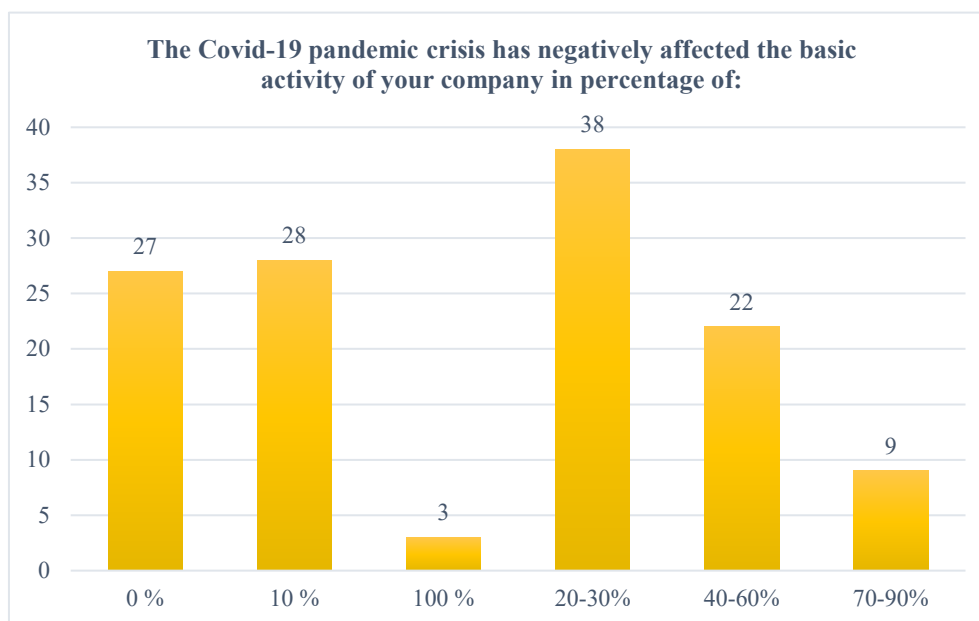


Figure 2. The degree of damage to the core business activity by the covid-19 pandemic crisis for the Romanian economic entities included in the sample

Source: own processing in Microsoft Excel 2024

Regarding the government aid received by the companies included in the sample, it can be seen in Figure 3, that only 47 companies out of the 127 received government aid (tax deferrals, tax exemptions, loan deferrals, wage subsidies etc.). These companies did not feel financial difficulty during the covid-19 pandemic thanks to these aids. In contrast, 73 of the companies did not receive help from the Government.

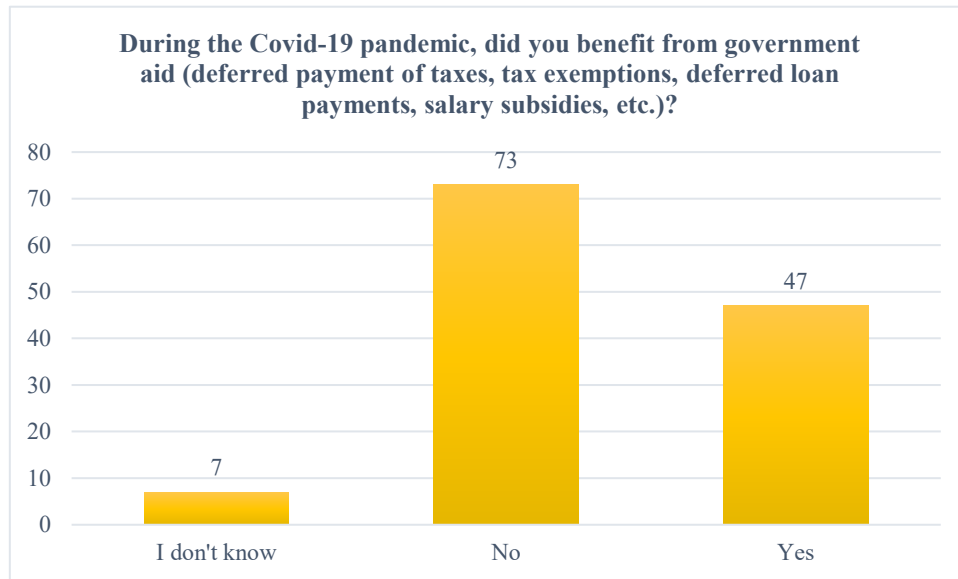


Figure 3. The degree of distribution of government aid during the covid-19 pandemic crisis for the Romanian economic entities included in the sample

Source: own processing in Microsoft Excel 2024

In Figure 4 it can be seen that 30 of the companies had their core activity negatively affected by the energy crisis in a percentage of 10%. Also, 39 of the economic entities analyzed in this study were affected by the pandemic crisis in a percentage of 20-30%, 22 of the entities were affected in a percentage of 40-60%, 6 entities in a percentage of 70-90% and a 100% entity. Only 29 of the companies were not affected at all by the energy crisis.

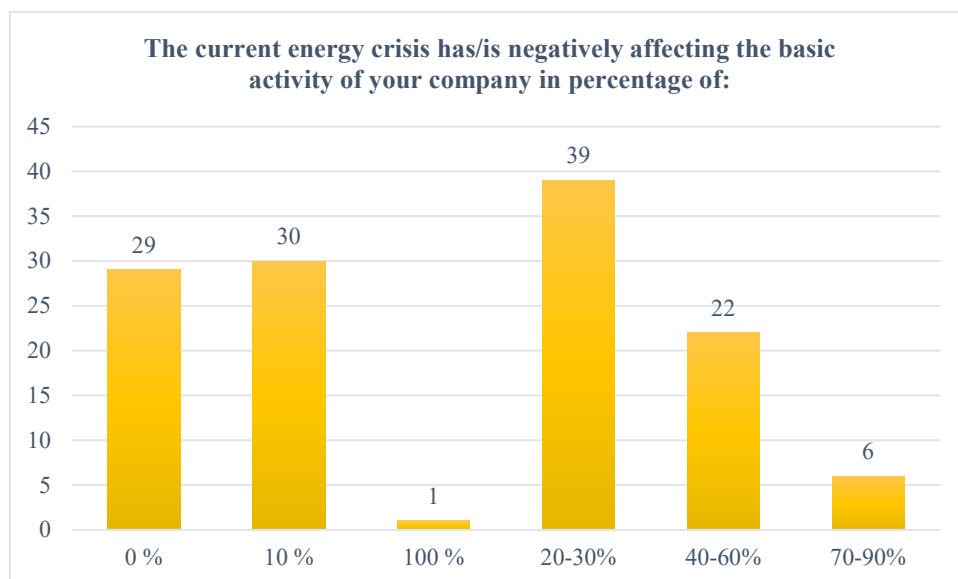


Figure 4. The degree of damage to the core business activity by the energy crisis for the Romanian economic entities included in the sample

Source: own processing in Microsoft Excel 2024

The geopolitical crisis generated by the Russian-Ukrainian war affected the economic entities included in the study in a smaller percentage compared to the health and energy crisis. Thus, 52 companies out of the 127 studied claim that they were not affected at all by the geopolitical crisis.

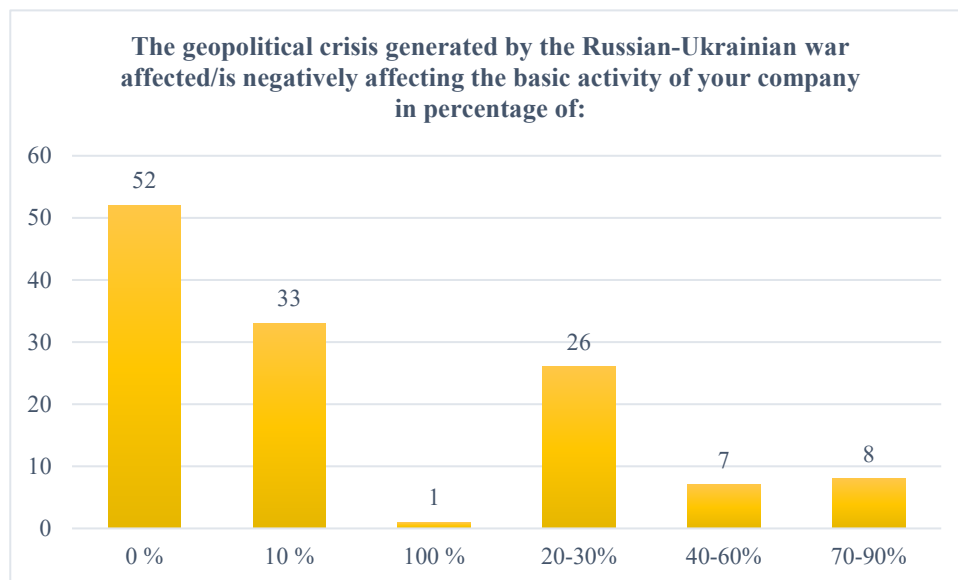


Figure 5. The degree of damage to the basic business activity by the geopolitical crisis for the Romanian economic entities included in the sample

Source: own processing in Microsoft Excel 2024

However, 33 of the companies had their core activity negatively affected by the geopolitical crisis in a percentage of 10% as shown in Figure 5. At the same time, 26 of the economic entities analyzed in this study were affected by the pandemic crisis in a percentage of 20-30%, 7 of the entities were affected in percentage of 40-60%, 8 entities in percentage of 70-90% and one entity in percentage of 100%.

3. Conclusions

The present study demonstrates the fact that in the current economic context, economic entities in Romania are subject to many risks, due to overlapping crises. The solutions in order to reduce these challenges brought by multiple crises could be: turning to the latest generation technologies, aligning the company's activity with the current innovative strategies existing on the market, developing and launching new products/services, orienting towards electricity from sustainable sources (energy wind, solar energy, etc.), reducing the ambient temperature in the premises where the company operates, changing the work schedule, by reducing the ambient temperature in the spaces where the company operates, modifying the work schedule, by reducing working hours in the evening or at night to reduce the level of electricity use, replacing classic equipment and lights with economical ones, choosing sustainable energy and different from that of gas and oil from Russia, involving employees and other partners of the company in voluntary actions to help refugees to strengthen solidarity and optimism among stakeholders. The effects of multiple crises represent a threat to all companies and for this reason the results and solutions brought and offered by this research paper can improve the smooth running of the activity of companies in Romania.

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DISCLOSURE OF INCOME AND EXPENSES IN THE FINANCIAL STATEMENTS OF NON-PROFIT ORGANIZATIONS: PROBLEMS AND SOLUTIONS

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Abstract: *The widespread globalization of economic processes and the involvement of participants from different countries in the activities of non-profit organizations impose special requirements on the content and form of presentation of financial information which is necessary for making correct and timely management decisions. In this regard, information about income and expenses as the fundamental objects that form the organization's net assets is of particular interest. Income reports reflect basic information about the amount of resources raised and expenses incurred by non-commercial organizations.*

The purpose of this study is to study global practices in the disclosure of income and expenses in the financial statements of non-profit organizations, identify problems in domestic practices and explore ways to address these problems

Key words: *income, expenses, financial statements, income statement, non-profit organization*

JEL: M41.

1. Introduction

Organizations of the non-profit sector play a crucial role in the current modern reality providing socially significant services, thereby improving the quality of life in society. Huge financial flows from donors to non-profit organizations (hereinafter referred to as NPOs) require proper accounting and reporting.

Income and expenses accounting in non-profit organizations and their subsequent reflection in financial statements is the most controversial and debated topics worldwide. The widespread globalization of economic processes and the involvement of participants from different countries in the activities of NPOs (as a rule, donors from developed Western countries finance public and charitable events in third world countries) impose special requirements on the content and form of presentation of financial information which is necessary for making accurate and timely management decisions. This creates a need to unify accounting standards.

However, today there are no unified standards for NPOs. Taking into account national characteristics and tax legislation, each country has developed its own regulations governing accounting practices. This significantly complicates international cooperation by placing an additional burden on organizations – the preparation of "other" reports for foreign investors.

Unlike commercial organizations, the activities of NPOs are not aimed at making a profit. Their work is aimed at creating public goods and meeting social needs, often encountering unique situations and economic events. The issues of financial reporting of NPOs have been discussed worldwide for many years. These issues have been raised by academic researchers, standard-setters, stakeholders, and

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members of the NPO community including donors. Calls for standards to be developed specifically for NPOs are becoming increasingly urgent, especially given the diversity of existing NPOs — such as humanitarian aid organizations, educational institutions, healthcare organizations, religious organizations and others.

In this regard, information about income and expenses as fundamental objects that form the organization's net assets is of particular interest. The purpose of this study is to examine global practices in the disclosure of income and expenses in the financial statements of NPOs, identify problems in the practice of the Republic of Moldova (hereinafter-RM) and explore ways to address these problems.

Literature review

The presentation of high-quality, reliable and transparent information on income and expenses in the financial statements of NPOs largely determines the attractiveness of NPOs for donors and public confidence.

In this regard, an experiment conducted by Linda M. Parsons (2007) is very illustrative. In order to determine which information is crucial for donors' when making a decision to donate to NPOs, fundraising appeals containing various amounts of financial and non-financial information were sent to potential donors through the direct mail campaign. Logistic regression has shown that financial reporting can reduce the perceived uncertainty regarding the operating activities of NPOs, while disclosure of non-financial information has little influence on donation decisions.

Chinese researcher J. Chen (2021) emphasizes that financial reporting is the only way for NPOs to provide the public with information about their activities. People's willingness to donate directly depends on the reliability of these reports. As the quality of accounting information improves, trust in the organization and its transparency increases, which is important for the long-term development of charitable organizations.

Economist G. G. Yagudina (2012) notes that the absence of unified standards for NPOs forces donors to develop information submission forms and instructions for their completion independently, which do not contain clear guidelines. For this reason, these "unofficial" reports are most often falsified or presented with intentional or unintentional errors and inaccuracies.

In their work, Cordery, Belal, & Thomson (2019) consider financial statements as a significant accounting tool for NPOs which discloses information about the funds raised and the activities carried out. Their research revealed a contradiction between the regulated need to apply national financial reporting standards and the opinion of most users on the need to use international financial reporting standards. The analysis based on institutional logic shows that the existing financial statements are not sufficiently unified to meet the requirements of all interested parties

I. N. Mukhanova (2020) believes that in order to unify reporting for NPOs, it is worth paying attention to the American accounting standards for NPOs, the so-called FASB (Financial Accounting Standards Board), which has been developing and improving existing standards for more than 40 years. The concept of finance accounting is based on the works of American scientists such as A. Rn (1980) and his opponents E. Herzlinger and David H. Sherman (1980), who tried to explain the reasons for the collapse of many NPOs during the financial crisis in the 70s and find the best way to reflect economic events in financial statements.

A number of other scientists believe that "consideration of the financial accounting system in developed countries makes sense not only from the perspective of borrowing techniques, but also in order to avoid those mistakes that have already been made in the process of establishing accounting" (Хамидулина, Гусарова & Ягудина, 2008, p.6).

Moldavian economist A. Nederitsa (2015) notes that it is necessary to abandon the standardized form of income and expense reports and give each NPO the right to independently establish the structure of key positions in accordance with the information needs of users.

2. Basic content.

In accordance with the Law on Accounting and Financial Reporting No. 287/2017 (art.5, 2017), all subjects of the RM are required to submit financial reports. The general provisions for financial statements are outlined in the same Law (art.20, Law on Accounting and Financial Reporting No. 287/2017). Thus, financial statements prepared by entities of all organizational and legal forms in the RM must accurately present information about the financial position of the organization and the financial result of its activities. The information must be relevant, complete, unbiased, and error-free. In addition, financial statements should have the following qualitative characteristics that increase their usefulness: comparability, verifiability, timeliness and clarity.

According to the same Law (p.5 art. 5 Law on Accounting and Financial Reporting No. 287/2017), NPOs maintain double-entry accounting records and submit financial reports in accordance with the requirements outlined in the methodological guidelines on the specific accounting practices for NPOs developed by the Ministry of Finance (hereinafter referred to as the Methodological guidelines).

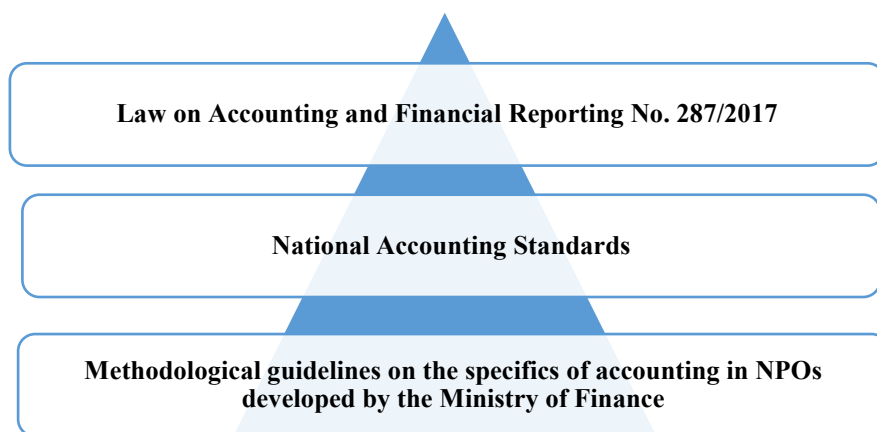


Figure 1. Regulatory framework governing the requirements for financial statements

Source: Compiled by the author

Methodological guidelines (p.81 Methodological guidelines, 2014), in turn, define the forms of financial statements, such as: the balance sheet, the income and expense statement, the statement of changes in sources of financing, and the explanatory note to financial statements.

Indicators of the income and expense statement are calculated based on the turnover of synthetic accounts for accounting for income (616, 617, and 618) and expenses (716, 717, 718, and 731) of NPOs (Недерица, 2024).

The income and expense statement, based on the Methodological guidelines, consists of the following elements:

- information on income;
- information on expenses.
- results of the NGO's statutory activities.

It is compiled according to the standard form provided in Appendix 2 to the Methodological guidelines and contains the following indicators:

Table 1. Income and Expense Statement indicators

Indicators	Page Code	Content
income related to targeted funds	010	amount of income recognized when using and writing off targeted funds
expenses related to targeted funds	020	amount of expenditure from targeted funds
surplus (deficit) related to targeted funds (p. 010 – p. 020)	030	surplus (deficit) may occur in the following cases: <ul style="list-style-type: none"> • when receiving valuables from writing off long-term tangible assets acquired/created from special targeted funds; • when recognizing expenses on disposal of long-term assets previously acquired/created from special targeted funds; • when reflecting the sale value of realized long-term assets related to the long-term asset fund
Other income (except for income from economic activities)	040	Amount of income from statutory activities, except for economic activities that do not relate to income from targeted funds
Other expenses (except for income from economic activities)	050	Amount of expenses in the course of statutory activities, other than economic activities that do not relate to expenditures from targeted funds
Surplus (deficit) related to other activities (p. 040 – p. 050)	060	Difference between other income and expenses (except for those received from economic activities)
Income from economic activities	070	Amount of income from economic activities
Expenses from economic activities	080	Amount of expenses from economic activities
Result: profit (loss) from economic activities (p. 070 – p. 080)	090	Difference between income and expenses from economic activities
Income tax expenses	100	Amount of income tax on taxable income determined according to the rules of tax legislation
Net surplus (net deficit) reporting period (p. 030+p. 060+p. 090–p. 100)	110	Result of the reporting period from the statutory activity of an NPO

Source: Compiled by the author based on sources (Methodological guidelines, 2014)

In accordance with Methodological guidelines (p.136, 2014), the amount of income related to target funds, is equal to or close in value to the amount of expenses incurred at the expense of these funds. A surplus(deficit) can only occur in certain situations. A report where income equals expenses is not informative. In this regard, users will be interested in a report on changes in funding sources which contains information on the balances and changes in target funds, non-target funds, deposits of founders and members, funds and other means of financing. In the practice of Western countries, this

report is combined with a report on income and expenses, which, in our opinion, is more practical and easier to understand.

The difficulty for accountants of NPOs that have concluded cooperation agreements with international organizations and others is that in addition to the officially approved form, it is necessary to prepare reports in accordance with the forms established by donors, grantees and other interested users of the income and expenses report. And here lies an important question: if NPOs in Moldova should adapt the existing forms to the requirements set by donors, or if it is still necessary to study world practices and propose a substantially new form, that would correspond, according to the Law, to the qualitative characteristic of financial information-comprehensibility, in other words, information should be classified, characterized and presented in an understandable form (Nederița, & Popovici, 2015).

"Reporting information in terms of content and form should be structured so that users can understand its nature and meaning. It is necessary that the form of reporting, document headings, names of indicators and concepts, accepted assumptions, classifications and groupings clearly reflect the essence of the issues, exclude possible ambiguous interpretations and do not contain unnecessary details" (Хамидулина et al., 2008, p.25).

Financial reporting in different countries has both common and specific characteristics. This is due to the national legal peculiarities of the country as well as the informational needs of users of such reports. For this reason, the form of presentation of these financial statements, its details and whether it reflects various aspects of the organization's activities are also different. Thus, the annual financial report may be considered satisfactory from the point of view of its full compliance with regulatory acts, but incomplete from the point of view of interested users.

The table below shows the forms of financial statements and the content of the income statement presented in the regulations of different countries.

Table 2. Financial reporting forms and content of income and expense statements

Regulatory act, year of adoption, withtran	Financial reporting Forms	Contents of the income and expense
Methodological Guidelines, 2014, RM	1) Balance sheet; 2) Income and Expense Statement; 3) Statement of Changes in sources of financing; 4) Explanatory note to financial statements	Income and expenses are reflected depending on the source of financing. The purpose of funds is defined: targeted, non-targeted, from economic activity.
SFAS 117, Financial Statements of Not-for-Profit Organizations, 1993, USA	1) Statement of Financial Position; 2) Statement of Activities; 3) Statement of Cash Flows	A statement of financial position provided by a not-for-profit organization shall report the amounts for each of three classes of net assets: permanently restricted net assets, temporarily restricted net assets, and unrestricted net assets - based on the existence or absence of donor-imposed restrictions.
ASU-2016-14, Accounting Standards Update, 2016, USA	1) Statement of Financial Position; 1) Statement of Activities; 2) Statement of Cash Flows	Three types of assets are replaced by two: Net Assets with Donor Restrictions and Net Assets without

		Donor Restrictions. The requirement to present expenses by function and type of expenses has been introduced.
SORP, Statements of Recommended Practice, United Kingdom	1) Statement of Financial Activities (SoFA); 2) Balance Sheet; 3) Statement of Cash Flows; 4) Statement explanatory note	The statement of financial activities (SoFA) is a single accounting statement that includes all income, gains, expenditure and losses recognised for the reporting period.
ANSPO, Accounting Standards for Non-for-Profit organization) Canada	1) Statement of Financial Position; 2) Statement of Operations; 3) Statement of Changes in Net Assets; 4) Statement of Cash Flows; 5) Notes	Income is recorded according to its type and limitations (limited, unlimited, and charitable contribution). Expenses are grouped into significant categories and can be classified by nature, by function, or program implemented.
IFR4NPOs (Draft International Financial Reporting Framework for NPOs)	1) Statement of Financial Position; 2) Statement of Income and Expenses; 3) Statement of Changes in Net Assets; 4) Statement of Cash Flows; 5) Notes to the Financial Statements	There is a recommendation that a NPO should produce a Statement on Income and Expenses, which leads to a surplus or deficit. The terms surplus/deficit appear instead of profit/loss.

Source: Compiled by the author based on sources

A study of scientific and specific legislation in a number of countries leads to the conclusion that financial statements contain various forms including the form in which information about income and expenses is presented. Based on the information provided, the following conclusions can be drawn:

1. Currently, the RM uses basically the same basic reporting forms as in international practice and consists of information on the financial position (balance sheet), a statement of economic activity (income and expense statement), and an explanatory note to financial statements. The report on changes in sources of financing is usually included in the report on the financial activities of an organization in the world practice, since it is impossible to reflect information on the attracted and used resources without information on the sources of targeted financing.

2. In the RM, the Methodological guidelines do not explicitly specify the composition of the income and expenditure groups of NPOs. According to the Methodological guidelines, the income statement provides information on the results of targeted, non-targeted, and economic activities. In the United States, the requirements for NPO reporting are set out in SFAS 117 with the ASU 2016-14 update. According to the American model, the ASU Activity Report 2016-14 provides data on how NPOs use their resources to implement various targeted programs related to their statutory activities. The greatest interest in forming such a report is caused by the requirements for disclosure of expenses. SFAS 117 requires the presentation of expenses by classifying them by functional value and dividing them into program and support activities. Updated ASUS 2016-14 require additional disclosure of expenditure and nature. NPOs independently choose which of the cost classifications to include in accounting" (Mukhanova, 2020, p.176). In comparison with Western forms of disclosure of information on income and expenses, the form presented in accordance with the Methodological guidelines, is not very informative.

3. In none of the standards presented above are the results of an organization's economic activity identified as a separate item. This is due to the fact that the resources attracted from economic activity are related to resources of a targeted or non-targeted (limited or unlimited) nature, depending on the decision made by the responsible persons. The presence of the result of economic activity in the Income Statement according to the Methodological Guidelines is due to the application of various standards for targeted (non-targeted) activities and economic activities, and the economic activities of NPOs in the RM are accounted for in accounting accounts in accordance with the generally established practice for commercial enterprises.

4. A distinctive feature of the income and expense statement, according to the Methodological Guidelines, is its strictly established form. In accounting practice in Western countries, there is usually no strictly defined form of activity report. Only the general structure and order of articles are defined. Therefore, the composition and structure of financial statements in Western countries is extremely diverse. They differ not only between companies from different countries, but also between enterprises in the same industry. However, despite this diversity, the fundamental understanding of financial reporting remains the same, and from this point of view, we can talk about some "general" forms of financial reporting (Хамидулина et al., 2008).

5. The strictly regulated form of financial reporting is a distinctive feature of financial reporting in the post-Soviet countries, since it is focused on meeting the information needs of state structures, especially in relation to taxation. In this regard, it should be mentioned that in addition to the financial statements in the RM, NPOs fill out an income tax Return for NPOs (Form ONG17), which was approved by the Order of the Ministry of Finance No. 08/2018. The ONG17 report provides for the adjustment of income and expenses received and used for other purposes, i.e. not in accordance with the statutory goals (Присакар, 2018). So with the announcement of Tax Code (art. 52 h.(2), 1997). NPOs of the RM are exempt from paying income tax, if special-purpose funds, other funds and income from statutory activities, property of the organization are used for the purposes provided for in the charter, regulations or other constituent document and do not use them in the interests of the founder or other interested person.

One of the functions of the Committee on International Financial Reporting Standards is to smooth out national differences by identifying the golden mean between the requirements of different countries legal systems, accounting standards and procedures related to the preparation and presentation of financial statements. To find the golden mean, IFR4NPO (International Financial Reporting Project for NPOs) highlights the following questions, the answer to which can help in developing the form and content of an activity report, that is useful for making management decisions:

1. *Reporting framework*: The format and content of financial statements, including income and expense information, are fundamental to how information is presented to stakeholders: The presentation form is especially important when revenue is restricted or can only be used for certain purposes.

Questions: How should financial statements be presented so that the user can understand the activities of NPOs? Should significant categories of income and expenses and / or operations be disclosed? How should unrestricted and restricted resources, which can be used for specific NGO purposes, be presented in the main financial reports and notes (including reserves)? How does this align with donor-imposed reporting requirements?

2. Classification of expenses: by functional value or by nature. NPOs can reflect information about expenditures by both nature, and functional significance.

Questions: Should there be a standardized format, and if so, what should be the primary headers? Should the primary cost analysis be based on functional significance or nature? (IFR4NPO, 2023).

3. Conclusions.

In conclusion, it is important to note that the problems of disclosing information about income and expenses are of concern to users of financial statements around the world. The world accounting practice has not yet presented unified solutions to these problems that would satisfy all participants in relationships within the framework of NPO's activities. The issue of the form and content of the income and expenditure report in the financial statements of NPOs is the main problem of the world scientific community. At this stage, the uniform form of financial reporting in the RM makes it difficult for donors and NPOs to communicate, making it more difficult for the latter to work. We believe that abandoning the standardized form of income and expense reports as well as the entire reporting process and giving NPOs the right to independently set the structure and composition of income and expense reports in accordance with the information needs of interested users will help solve this problem.

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INTELLECTUAL CAPITAL AND THE DIGITAL ECONOMY

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Abstract. *Changes in today's economy are the subject of many international conferences and debates. On the one hand the benefits of digitization are being discussed, but on the other hand there is a growing appreciation of genuine ideas, innovation and creativity. Consumers in all sectors tend to make increasing use of the internet and the information available on various websites. Markets are selling more and more diverse products and services, and customers seem to be increasingly interested in novelty. It is very difficult to reap the benefits of the digitization of the economy at the same time. Awareness of the challenges related to intellectual capital and technology will help to better manage the internet, the opportunities offered by artificial intelligence because it is absolutely necessary to put the human interest at the forefront of all actions. We set out to highlight the main factors that have contributed to the development of the digital economy, as well as the challenges of intellectual capital in the context of the digital economy.*

Keywords: *intellectual capital (IC), artificial intelligence (AI), disadvantages, intangibles, drivers, digital economy.*

JEL Classifications: M41

1. Introduction

In recent years there has been more and more discussion about digital platforms, online websites, taxation of the digital economy and regulatory adaptation. It is perfectly normal for society to evolve and for companies offering services or products to try to respond as quickly and appropriately as possible to customer needs, but it is very important that any activity does not limit the development of intellectual capital or human resources in general. The digital economy offers a wide range of opportunities, but these cannot be fully realized unless efforts are made to improve the education system and the development of digital skills. The traditional economy relied heavily on physical assets, whereas now there is a great emphasis on intellectual property, customer and investor relations, employee skills. We can consider intellectual capital a central intangible of the digital economy. Knowledge is being applied to find new methods, algorithms to lower costs and increase efficiency. Technology is a timely method of distributing information, exchanging ideas, promoting new products and services, analyzing large volumes of data, using innovative strategies. More than half a

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billion people use machines that contain as much information as many libraries, music or videos (Ayres & Williams, 2004).

If we were to refer to the common points of the two concepts, intellectual capital and digital economy, then we could refer to products, new services, evolution and competitiveness: in both cases development is the right method for progress, human capital needs information and experiences to develop its skills and abilities and here we refer not only to the human need for integration, employment, but also to his financial needs and advancement in social steps.

2. Basic content.

Today, participants in the world's markets are interacting according to new rules, also resulting from the need for entrepreneurs to respond to customer demands. In their journey to maintain competitive advantage, organizations have always been looking for new solutions and ideas that can secure them leading positions and numerous customers. The Internet has changed the way we do business, both because of the opportunities it offers: the speed with which products or services arrive at the customer's door, electronic payment methods, but also because of the challenges: companies must take certain security measures to ensure the safety of payments, data protection. Se presupune că noii algoritmi vor monitoriza mult mai detaliat tranzacțiile, procesele economice, iar astfel nivelul corupției, al utilizării banilor nefiscalizați va scădea considerabil.

Figure 1 illustrates the most important aspects that have contributed to the development of the digital economy which have provided a new way of organizing activities for both managers.

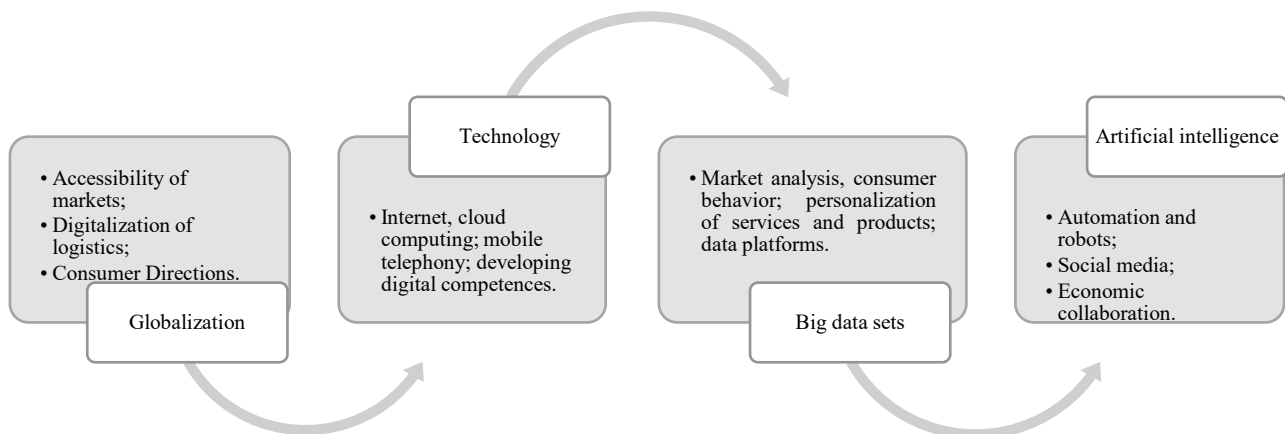


Figure 1. Factors driving the digital economy

Source: authors processing

We ask what is the role of intellectual capital in the digital economy and whether the digital economy is the underlying factor behind the evolution of intellectual capital or vice versa? Economic value is the product of the application of knowledge held by a person, part of a company, whose creativity can contribute to the optimization of activities for profit. Because the economy in all its forms is all about the human factor, we could say that it is the first concept, that of human capital, which is one of the driving forces of the digital economy.

It is true that we can access a large set of databases, of information, but they could not be of real use to us if we did not know how exactly to use them, so basically without knowing why exactly we are looking for information, how we should apply it to our activity so that it creates more value to our

activity, if we did not have a filtering culture with the help of the brain we would not know how valuable the results found are or how insignificant they are for the activity carried out. We should not forget that the algorithms, the software available were also created by human beings, improved with the help of technology, so that in the end they still correspond to human needs.

Global collaboration and exchange of information are a great advantage, for example in the field of medicine it improves the quality of customer service, prevents medical errors, increases investment in R&D for the development of new devices or drugs. It is undoubtedly a stage of the economy when physical assets are so dependent on non-physical assets.

From another point of view, in the context of the digital economy, intellectual capital also entails disadvantages or challenges illustrated in Table 1, among which we highlight the difficulty in the quantification process, the possibility of copying, costs, high costs of attracting and retaining highly qualified staff. We are also talking about a high pressure that is human resource oriented, and the dependence on technology can increase the degree of sedentarism and influence the quality of professional skills. Cyber-attacks are a threat as well as the dependence of companies on the Internet because many of them use servers, software programs where a considerable amount of data is uploaded, the inability to access them even for a short period of time can affect the activity of the ethnos.

Table 1. The disadvantages of intellectual capital in the digital economy

Disadvantages	Explanations
Complexity of assessment and quantification	Intangible assets are a category for which there are still no clear valuation rules. Its quantification must be done with great caution because it can significantly influence the total value of the firm.
Company dependence on the skills of certain employees.	A company can depend on the skills of its employees, in activities such as medicine, football, fashion, they can add value to the brand. In addition, some knowledge cannot be learned by new employees from virtual data storage alone. Training and education of a key employee requires long periods of time.
Cyber attacks	Companies store business plans, customer information or algorithms on electronic media. Because they are easily copied and the costs of securing data are high, duplicating or distributing them can damage customer or investor confidence, leading to substantial financial losses.
Constant allocation of resources for CI evolution	There is no doubt that every resource allocated by the company in a certain direction is based on an expense incurred in order to register, later on, certain gains, especially in the case of small companies it is very difficult to decide on the distribution of time or money for the participation of employees in different courses, since the presence of these employees in the company for a long period of time is uncertain. In the case of large companies it is also costly because the activity is larger, more people can perform the same task, so it is necessary that a larger number of people benefit from information, training and development courses.

Source: authors processing

Technology is indeed a trend that is bringing improvements to the company so that it can perform at a high level, but a trend must also be the investment in employees because their contribution is equally valuable (Sveiby, 1997), people in management structures need to pay more attention to the knowledge and skills of employees, who are a valuable source of intangibles, because they are not just performing a task, but contributing directly to the improvement of each process, product or service. Because measuring intangibles has been a challenge for several decades, the above-mentioned author has created his own way of quantifying intangibles based on external structure, followed by internal structure and skills, qualities as well as competencies all rolled into one term: competencies. These, according to the author, are to be broken down into three specific indicators: the first of growth, the second of efficiency and the third which refers to balance, continuity and stability. The same author has proposed a methodology for quantifying IC that provides for external, internal structure and competencies, broken down in turn into growth, efficiency and stability indicators. In the same context, (Bontis, 1998), proposed an explanation of intellectual capital as being based on knowledge already stored, but also circulating knowledge: shared or received in exchange. Referring to the market value of the organization he stated that it is composed of both intangibles and intangible assets owned.

3. Conclusions.

Intangible capital has evolved driven by its needs. Digitalization in turn has two essential components, intellectual capital and technology. It is difficult to say which is more important, what is certain is that the interaction between these elements can generate ideas for innovative strategies, products or services. In today's digital economy the speed of transactions is impressive, sometimes this phenomenon itself propels intellectual capital, sometimes the reverse. The central interest of the big economic giants, who have huge successes to run, must always be aligned with the interest of the citizen. A healthy digital economy must not only be geared towards making revenue in short periods of time, but also towards economic, social and political harmony, even if there are companies that have made astonishing profits in times of war or pandemics. The effort must be materialized in patents, democratic, healthy relationships with investors, customers, recipes for life-saving drugs, chemical formulas, brands that will then serve both the company's profit-making purpose and the needs of customers. Propelling and utilizing the benefits of the digital economy cannot be achieved without the involvement of intellectual capital. On the one hand the digital economy with its possibilities to create new things, to access a wide variety of information and to analyze large volumes of data boosts the development of creativity, research, development and innovation. On the other hand, without the contribution of human resources, the digital economy would not be able to influence global markets as much. Intellectual capital is difficult to assess and measure and the digital economy faces challenges related to security, privacy and unequal access to technology. The rapid pace of change and increasing competition calls for clearly defined regulations and enforcement rules that will allow relatively easy enforceability, comparability and transparent reporting.

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TRANSFORMING ACCOUNTING THROUGH ARTIFICIAL INTELLIGENCE: TOWARDS SUPERIOR EFFICIENCY AND ACCURACY

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Abstract: *This paper explores the transformative impact of **artificial intelligence (AI)** on accounting, focusing on its ability to enhance efficiency and accuracy in financial processes. AI technologies such as **machine learning (ML)**, **natural language processing (NLP)**, and **robotic process automation (RPA)** have evolved from early rule-based systems to dynamic tools that support predictive analytics and strategic decision-making. Through a **bibliometric analysis** of 960 articles published between 2010 and 2024, this research identifies key trends, opportunities, and challenges in adopting AI within the accounting profession. It emphasizes AI's role in modernizing accounting practices, improving financial predictions, and optimizing compliance tasks. Additionally, the analysis underscores the significant increase in AI-related research, especially since 2018, driven by innovations in big data, automation, and neural networks. By mapping the collaboration networks and thematic developments, the study provides insights into future directions for integrating AI into accounting, highlighting the essential role of **performance optimization** and **decision-making support**. The conclusion of the article demonstrates the importance of artificial intelligence in the modernization and efficiency of accounting and management processes.*

Key words: *Artificial Intelligence, Machine Learning, Robotic Process Automation, Accounting Innovation, Predictive Analytics, Big Data*

JEL: L86, M40, M41, M42, O33

1. Introduction

In today's world, **artificial intelligence (AI)** is having a profound impact on various aspects of life, influencing both individuals and businesses, with its rapid development driving constant change (Agusti & Orta-Perez, 2022). At its core, AI aims to assist humans in performing tasks and making decisions by utilizing intelligent machines. As people and businesses strive to integrate this advanced technology into their daily routines, **AI is creating significant shifts in the field of accounting**. According to Emetaram and Uchime (2021), AI's growing presence in accounting is notable due to its potential to allow accountants to provide more value to organizations.

AI's journey in accounting has evolved substantially. Initially, its role was limited to automating routine tasks through **expert systems** in the 1980s and 1990s. These systems, however, followed rigid rules without the capacity for adaptation. The 2000s saw the rise of **robotic process automation (RPA)**, which brought efficiency gains, but still lacked the learning abilities seen in today's AI systems. More recent advancements, such as **machine learning (ML)**, have enabled AI

to process vast amounts of accounting data, identifying patterns and anomalies, thus improving **financial forecasting and risk management**.

In addition to machine learning (ML), **natural language processing (NLP)** has revolutionized **auditing and compliance** by allowing the swift analysis of documents written in natural language, significantly reducing the time needed to spot issues. As AI has become a key tool for **predictive analytics**, it now aids accountants and managers in anticipating financial trends and making more strategic decisions. These technological advancements equip professionals with enhanced capabilities to navigate an increasingly complex financial landscape (Coman et al., 2022).

Early AI applications, such as **expert systems**, sought to replicate human decision-making in specific fields, reaching a level where they could substitute human judgment (Berdiyeva et al., 2021). Today, AI is considered an invaluable resource for professionals in **accounting and auditing**, providing numerous opportunities to improve productivity and effectiveness. However, successful implementation of these technologies requires organizations to develop the necessary skills and policies (Moll & Yigitbasioglu, 2019).

The adoption of emerging technologies like AI, machine learning, and blockchain has led to significant transformations in accounting practices, including the reengineering of procedures, reducing errors in accounting information, and enhancing overall efficiency (Zhang et al., 2020). Moreover, the use of RPA can greatly improve the quality and accuracy of accounting services, while saving time.

According to Fernandez & Aman, 2018 workplace safety is still a top priority, therefore businesses must invest in employees through training on the benefits and drawbacks of these new technologies. Despite the high accuracy provided by artificial intelligence (AI) and ERP systems, many professionals still choose to oversee data entry and processing manually (Hasan, 2022; Zhang et al., 2020).

Mates & Irimus, 2020 state that in the future, the evolution of accounting will be influenced both by technological advances, such as AI and automation, and by legislative adaptations and industry standards, which are constantly changing. The digitization of accounting and management becomes essential as stated by Goncalves et al., 2022 and Gulin et al., 2019, because it has the ability to reshape industry structures and revolutionize business models.

Technologies and software solutions are today indispensable in maximizing organizational performance, and artificial intelligence (AI) is among the most innovative examples. Through AI, companies benefit from modern tools that can take over part of human activities, thus contributing to improving performance both financially and non-financially (Saleh et al., 2021).

However, technologies such as cloud computing, AI and blockchain are predicted to transform the field of accounting through capabilities to exchange information on demand, automate certain tasks, identify risky transactions and facilitate the detection of those requiring regulation (Chukwudi, Echefu, Boniface & Victoria, 2018).

The integration of digitization, through the adoption of ERP and AI systems, has brought important changes for accounting professionals, especially in streamlining redundant tasks. Thus, repetitive activities have been largely eliminated, and ERP and AI systems are now responsible for processing and storing data in organizational databases. AI does not replace accountants but enhances their skills, allowing them to focus on more complex tasks, such as providing strategic advice and developing

innovative business models. Accountants who adopt AI or ERP systems and develop the necessary skills to work efficiently with these technologies will be well-prepared for success in the future. (Barna et al, 2024)

2. Basic content.

The research in this article was based on a quantitative research method, using bibliometric analysis. The analysis was carried out using the the RStudio application, using the Biblioshiny package, in which the authors used a sample consisting of 960 Web of Science articles selected in August 2024 based on the following keywords such as: "Artificial Intelligence In Account*" Or "AI In Account*" Or "RPA in Account*" Or "Robotic Process Automation In Account*" Or "Machine Learning In Account*" And "Performance". This sample consisted of articles published between 01.01.2010 – 31.07.2024.

The Figure 1 shows a clear upward trend in the number of papers published during the analyzed period. Starting from 2010, the number of papers was relatively low and constant until around 2017, after which it started to increase significantly. A sharp increase can be seen starting from 2018, with a more obvious jump between 2021 and 2022, where the number of works almost doubles. The largest number of works is registered in 2023, exceeding 200 works.

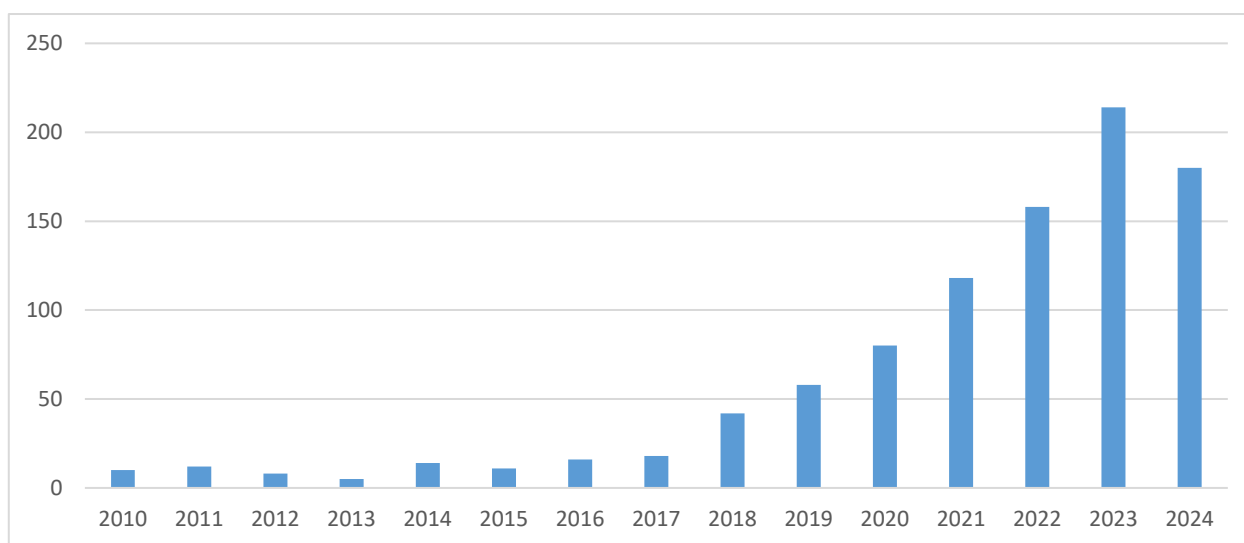


Figure 1 Number of articles published and their annual distribution during the period 2010-2024

Source: Authors creation using Bibliometrix (Biblioshiny), 2024

The Figure 2 represents the most relevant sources of scientific publications in the field of artificial intelligence and accounting. The vertical axis lists the sources, while the horizontal axis represents the number of documents published in each source.

The most prolific journal is *Expert Systems with Applications*, with 84 documents, highlighting the dominant role of this publication in research on expert systems applications in accounting and artificial intelligence.

Other important sources include the *Journal of Emerging Technologies in Accounting* with 27 documents, reflecting the interest in emerging technologies in this field.

Financial And Credit Activity-Problems of Theory and Practice and the *International Journal of Accounting Information Systems* have also published a significant number of papers (18 and 17 documents, respectively).

The remaining sources, such as *Technological Forecasting and Social Change* and the *European Journal of Operational Research*, show a diversification of journals that address topics related to technology and the automation of accounting processes.

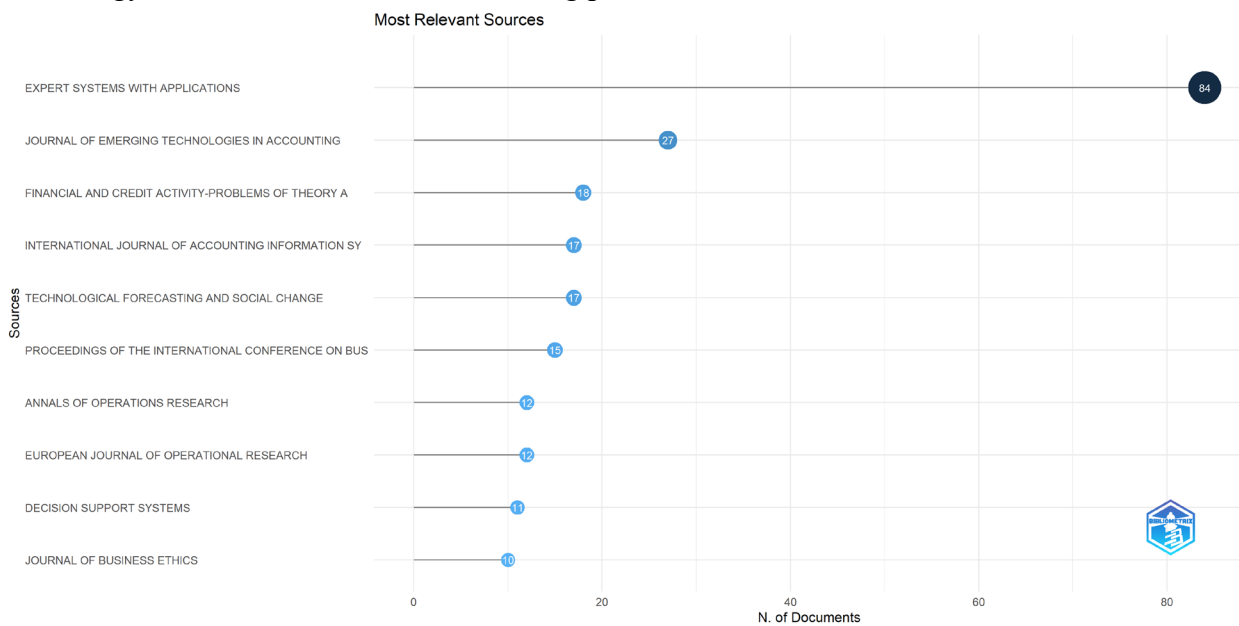


Figure 2 Most Relevant Source

Source: Authors creation using Bibliometrix (Biblioshiny), 2024

The graph in figure 3 highlights the most prolific authors in the analyzed field, according to the number of published works. In this analysis, *Vasarhelyi MA* stands out as the most productive author, with 8 papers, followed by *Li Y* and *Zhang J*, each with 6 papers.

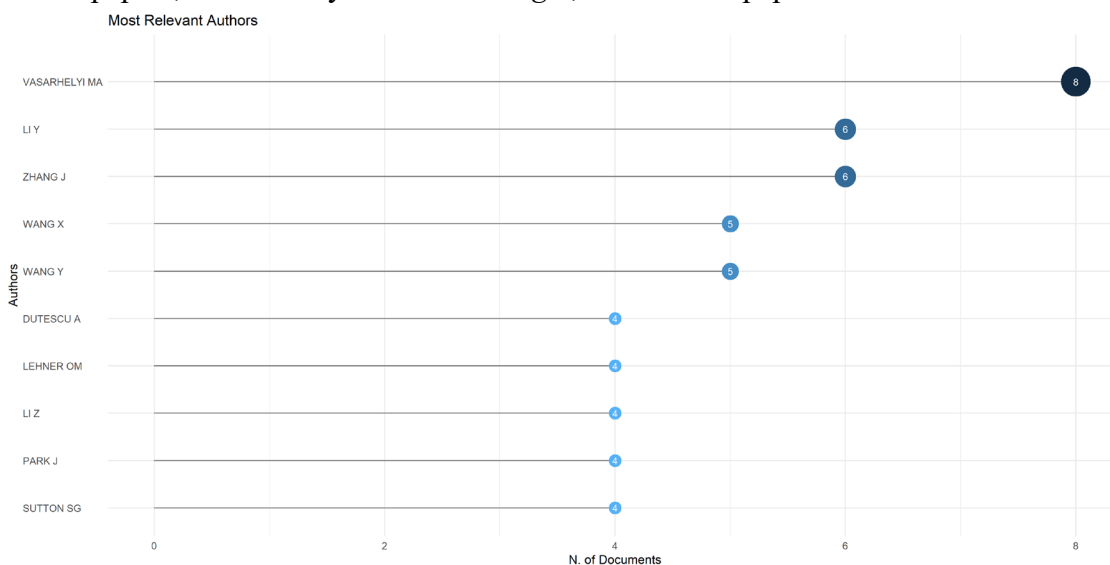


Figure 3 Most Relevant Authors

Source: Authors creation using Bibliometrix (Biblioshiny), 2024

”Artificial Intelligence” is the central and largest term, indicating that artificial intelligence is the dominant theme in the literature. It reflects the importance of AI in transforming the fields of accounting and management. ”Management” is also an essential word, management being closely related to the implementation and use of AI in organizations, especially in decision-making processes and performance optimization. Another major term, ”performance”, suggests that a significant focus in AI research is on improving performance in accounting and management. The term ”information” indicates the importance of managing and analyzing data within artificial intelligence (AI), whether it is large data sets (Big Data), information systems or advanced data processing technologies. The concept of ”Big Data” is also central, indicating the significant role of large data sets used in combination with AI to extract valuable insights and streamline accounting activities. ”Technology” plays a central role in the implementation of AI, emphasized by its frequency in this type of textual analysis. The term ”impact” draws attention to the researchers’ goal of measuring the influences of AI in various sectors, especially in accounting and management. ”Innovation” suggests academic interest in innovative aspects of AI, such as emerging technologies and methodologies that bring improvements to accounting practice.

The terms ”neural networks, systems, models” refer to the technical and methodological components of AI, including the use of neural networks and predictive models to increase accuracy and efficiency in accounting. ”Decision-making” is also a key element, highlighting the role of AI in decision support, whether it is risk management, investment planning or financial operations. Words like ”analytics, optimization, automation” highlight the use of AI in detailed data analysis, process improvement and automation of activities in accounting and management.

This word cloud highlights the most frequently discussed topics and themes in applied AI research in accounting and management. Major themes include artificial intelligence, management, performance, information and Big Data, all suggesting the researchers’ focus on optimizing performance and efficiency with these advanced technologies.. This information provides an overview of emerging research trends and directions in this field.

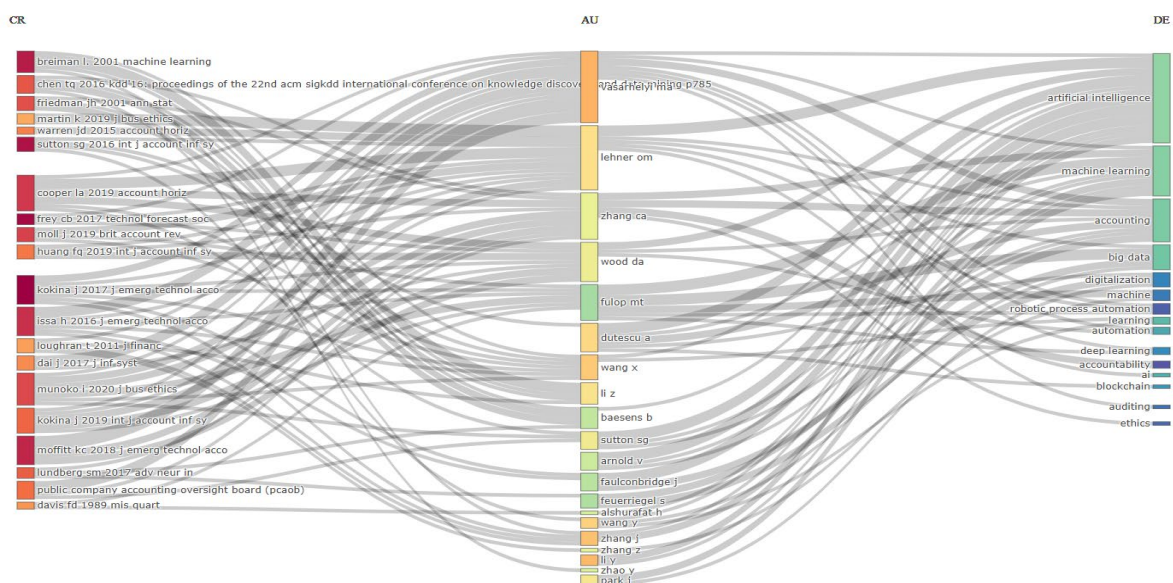


Figure 6 Three-Field Plot

Source: Authors creation using Bibliometrix (Biblioshiny), 2024

This diagram in Figure 6 represents the interactions and influences between cited references (academic papers), leading authors in the field, and major themes associated with artificial intelligence (AI) and accounting.

The Left Column (CR) lists reference works that are frequently cited in studies on the application of artificial intelligence (AI) in accounting. "Breiman L. 2001. Machine Learning" is a seminal work in the field of machine learning, influencing research related to the use of these methods in accounting, for example, for financial forecasting or fraud detection. Also here, "Kokina J. 2017. J Emerging Technol Acco" is an important reference on emerging technologies in accounting, including AI, and is often cited by other researchers.

The Middle Column (AU) highlights authors who have made significant contributions to the integration of artificial intelligence in accounting. These researchers explored various aspects of this topic, from the effectiveness of AI in audit activities, to the automation of accounting processes and the use of big data in financial decision-making. Vasarhelyi MA is a central author with an extensive portfolio of papers on the application of AI in accounting, frequently cited on topics related to "Artificial Intelligence" and "Machine Learning". Lehner OM is also another prominent author, who has researched the impact of AI on the transformation of accounting and auditing processes, with a focus on "Digitalization" and "Robotized Process Automation".

The Right Column (DE) identifies key themes in articles dealing with AI and accounting. Each theme represents a core or emerging research topic at the intersection of the two fields. "Artificial Intelligence" is a central element with multiple connections, suggesting that AI is playing a key role in the modern transformation of accounting, where it is being used to automate processes as well as increase accuracy and efficiency. "Machine Learning" is a topic closely related to AI, used to develop predictive models in accounting, anomaly detection and analysis of complex financial data. "Accounting" is the overarching theme that links all research, focusing on how advanced technologies such as AI can be integrated to improve traditional accounting practices.

Lines connecting references to authors and then themes illustrate the flow of knowledge and scholarly influences. It is noticeable how A seminal paper on machine learning such as Breiman's 2001 is cited by several authors exploring the application of machine learning in accounting, which in turn contributes to major topics such as "Artificial Intelligence" and "Machine Learning".

This chart illustrates how artificial intelligence, particularly through machine learning and big data applications, is becoming increasingly integrated into the accounting field. The highlighted research reflects a strong interdependence between leading authors and essential topics, underscoring the importance of AI in modernizing and streamlining accounting processes. This provides a clear picture of the influence of existing literature on contemporary research themes and future directions in digitized accounting.

This thematic map in Figure 7 is a visual tool that helps us understand the status and importance of these topics within a specific field, such as accounting or applied artificial intelligence in business.

The themes in the "Motor Themes" quadrant are considered to be well developed and highly relevant to the field. These are the main drivers of research and development in this field. "Artificial Intelligence" and "Management" are driving themes, they are both central and well developed, indicating that AI is essential in modern management, having a significant impact on accounting and decision-making processes. "Innovation", "Firm" and "Perspective" are other important themes,

suggesting that innovation and managerial vision play a crucial role in the adoption and implementation of AI.

The themes in the "Niche Themes" quadrant are well developed, but are not considered essential or central to the overall domain. These are specialized and may be of interest to specific niches. "Accruals", "Board", "Incentives" and "Stock" are examples of topics that are well defined but less central to the broad discussions of AI and accounting. These may represent specific aspects of financial management and corporate governance.

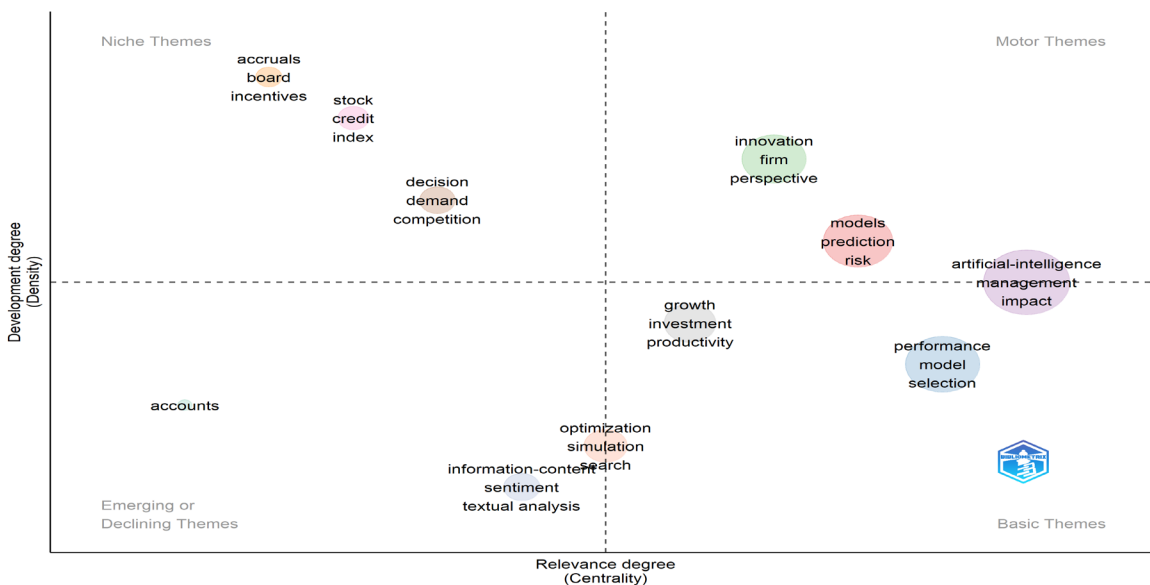


Figure 7. Thematic Map

Source: Authors creation using Bibliometrix (Biblioshiny), 2024

The presented topic map in the Figure 7 reflects a distribution of current and emerging topics in accounting research related to artificial intelligence. In the "Basic Themes" quadrant (bottom right) you are found the essential topics that form the basis of the domain. These topics are considered critical, but are still at an early stage of development, requiring further exploration to contribute to the advancement of the entire field. For example, topics such as “Performance” and “Model” are fundamental to the integration of AI into accounting practices, but require maturation to be implemented at large scale.

Instead, the "Emerging or Declining Themes" quadrant (bottom left) highlights topics that are either at the beginning of their development phase or starting to lose relevance. These are not domain essential and include topics such as "Accounts" and "Text Analysis". Although accounts remain a traditional and essential aspect of accounting, they may seem less innovative in today's context, where interest is turning to using AI to optimize and innovate processes.

This map thus provides an overview of research directions: the "Motor Themes" quadrant highlights the main areas that dictate future development, while the "Niche Themes" and "Basic Themes" quadrants indicate areas that require in-depth attention to become central themes in research. The "Emerging or Declining Themes" quadrant signals topics that are either early stage or may be replaced by more advanced technologies and methodologies.

3. Conclusions.

The integration of artificial intelligence (AI) into accounting represents a crucial step towards optimizing efficiency and accuracy in financial processes, bringing significant transformations to the field. The evolution from expert systems in the 1980s-1990s to modern technologies such as machine learning (ML), natural language processing (NLP), and robotic process automation (RPA) has allowed accountants to focus on higher-value tasks while automating repetitive ones. Our study highlights the impact of these technologies on improving financial predictions and risk assessment, facilitating better strategic decision-making.

The data analyzed in our research, based on 960 articles published between 2010 and 2024, demonstrates a significant increase in interest in AI-related research in accounting, especially after 2018. This paper reflected the growing importance of artificial intelligence in business accounting by updating accounting procedures, highlighting the relevance of big data, automation and neural networks. AI is confirmed to significantly influence the future of accounting by identifying research avenues of interest and developing topics through the use of maps and thematic analyses.

The research also emphasizes the role of automation in reducing errors and increasing the efficiency of accounting data processing. New technologies such as blockchain and cloud computing are bringing important changes to the way financial data is managed within companies.

However, implementing these technologies and training employees to use them remain significant challenges for organizations.

In conclusion, digitization and innovation are becoming fundamental elements for redefining organizational structures and business models, in a context where technology and accounting are becoming increasingly interconnected, thus preparing a future where the two fields are deeply integrated.

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BIBLIOMETRIC ANALYSIS ON CRYPTOCURRENCIES’ RELATED TAXONOMY

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***Abstract.** Researching the taxonomy of cryptocurrencies, this study examines the relationships between researchers, their affiliated institutions, and the countries they are associated with. Data from Scopus (Elsevier) and the Web of Science Core Collection were employed, mainly publications from 2005 to 2023. By leveraging tools like VOSviewer, Biblioshiny, and Microsoft Excel, we pinpointed influential research on cryptocurrency taxonomy, collaboration networks among researchers, thematic groupings, and research trends. Our findings indicate that although research collaboration is still evolving, the insights extracted in the thematic analysis outline the structure, components, and implications of taxonomy in the context of blockchain and cryptocurrencies, providing a foundational understanding. The limitation arises from the restricted timeframe, as the data was collected in August 2024. Given the dynamic nature of cryptocurrencies, the bibliometric analysis might benefit from updates to capture the latest developments.*

Keywords: cryptocurrency, taxonomy, blockchain, bibliometric analysis, VOSviewer, Biblioshiny

JEL: M41, G23, K42, L14, O30

1. Introduction

Blockchain technology is considered foundational, as it facilitates decentralized and transactional data sharing across networks lacking trust (Bachmann et al., 2022). This capability stems from its core features, such as distributed ledgers, cryptographic security, and consensus mechanisms, which ensure the integrity and immutability of transactions. By eliminating the need for a central authority, blockchain enhances efficiency, reduces the risk of fraud, and enables new business models and applications across various industries, including finance. Different authors have explored a taxonomy of blockchain-based innovations to understand better and manage technology developments, as cryptocurrencies have emerged as a revolutionary form of digital currency that operates autonomously from traditional financial institutions (Alashaikh, 2021; Bachmann et al., 2022; Derun & Mysaka, 2022; Yatsyk & Shvets, 2020).

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A taxonomy is a tool created through design science research which categorizes features of objects or elements to support further research, particularly in technology-driven domains like blockchain (Bachmann et al., 2022). Cryptocurrency taxonomy can be a valuable tool for researchers and industry professionals to understand the diverse landscape of this emerging asset class.

This study delves into the significant research in this field, identifying prominent authors, reputable institutions, and key countries that have shown interest in exploring the taxonomy related to cryptocurrencies. Bibliometry evaluates the influence and efficiency of various research components, such as authors, institutions, and countries.

The authors sourced their data for this research from Scopus (Elsevier) and the Web of Science Core Collection (WoS) databases. We used various software tools to analyse and visualize the data: VOSviewer for network analysis and visual images, Biblioshiny (from R Studio) for data processing and analysis, as well as Microsoft Excel for generating standard graphs (Lazea et al., 2024).

2. Research method

The process of bibliometric analysis starts with a systematic method aimed at identifying important literature from the WoS and Scopus. Researchers used the search string ("crypto*" OR "cryptocurrenc*" OR "virtual currenc*" OR "digital currenc*" OR "initial coin offering" OR "bitcoin" OR "blockchain*") AND ("taxonom*") to conduct their study based on article title, abstract, and keywords in Scopus, and on topic in WoS. We limited the research to the time frame between 2005 and 2023 as a final year to have a fixed database. The sources considered for analysis encompassed articles, review articles, proceeding papers, early access materials, book chapters, and editorial material published in English.

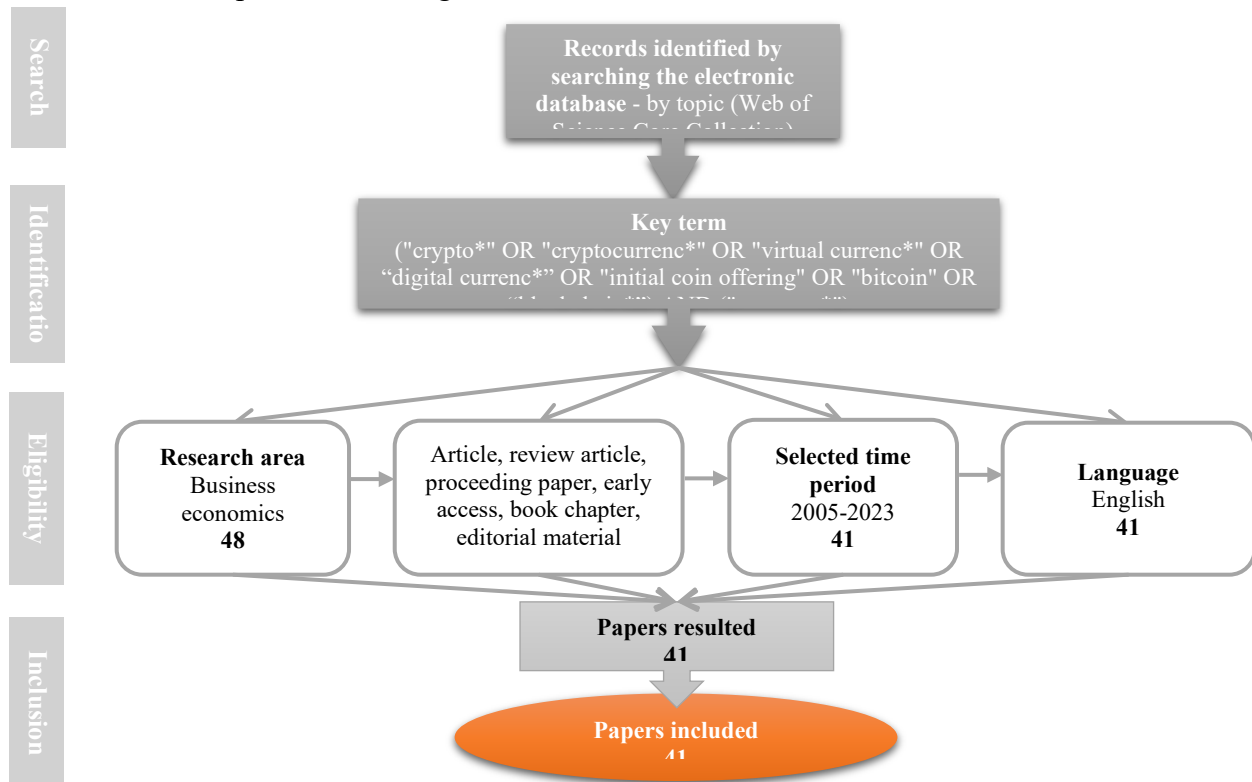


Figure 1. Diagram of the screening process on cryptocurrency-related taxonomy literature (WoS)

Source: Data processed by authors

The purpose of the bibliometric analysis is to evaluate the current trend concerning cryptocurrency-related taxonomy in the context of business economics. Hence, WoS resulted in 41 scientific papers that met the inclusion criteria revealed in Figure 1.

In our Scopus search, we focused on the business, management, and accounting domains, resulting in an initial pool of 4229 papers. After applying the filters shown in Figure 2, we identified 88 relevant papers to our research.



After merging the two databases using RStudio, a total of 129 papers were identified, which comprised duplicate entries from Scopus and WoS. Subsequently, 16 duplicate files were eliminated, leaving behind 113 pertinent files.

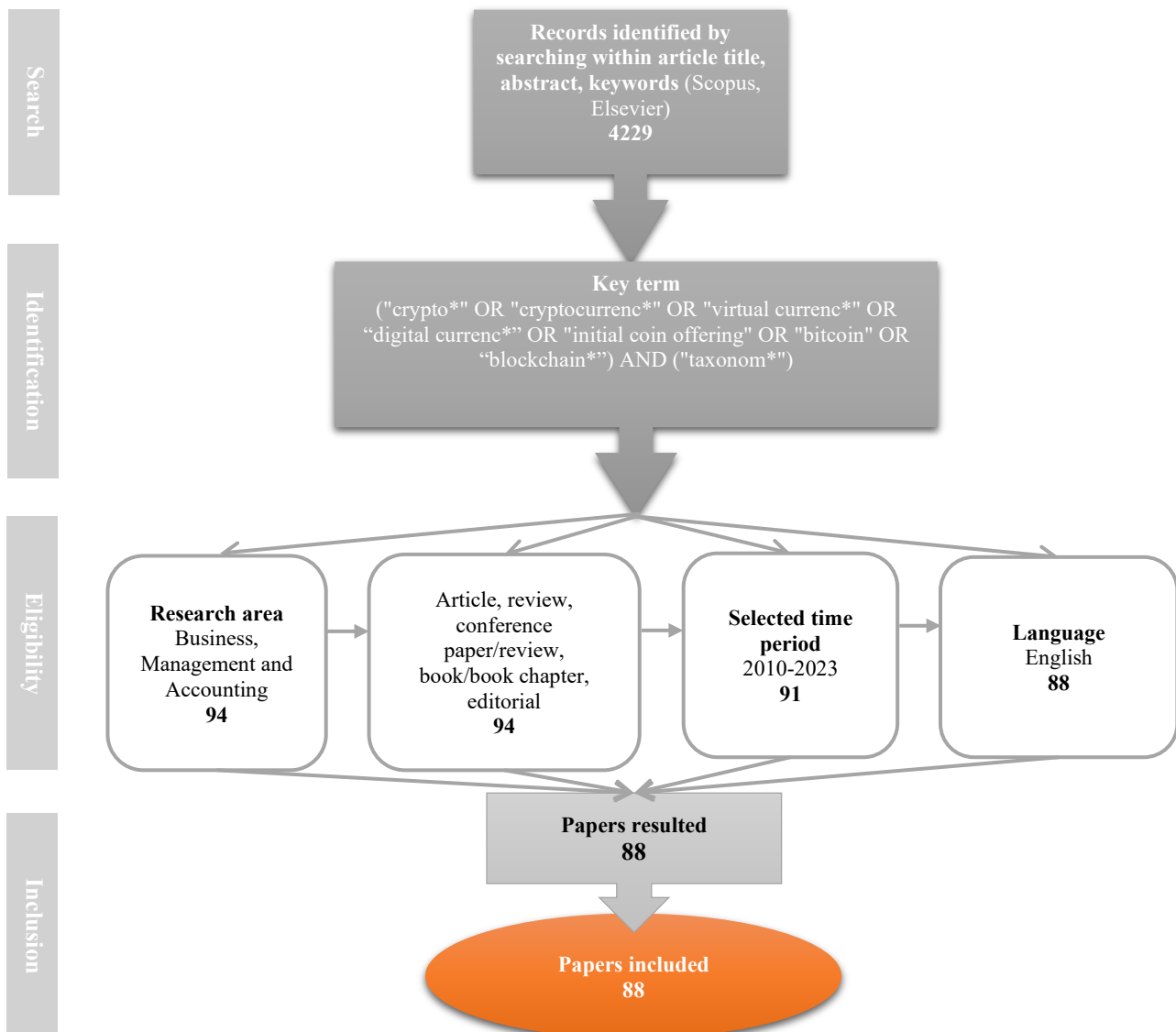


Figure 2. Diagram of the screening process on cryptocurrency-related taxonomy literature (Scopus)

Source: Data processed by authors

3. Bibliometric analysis

3.1. Annual and regional scientific activity

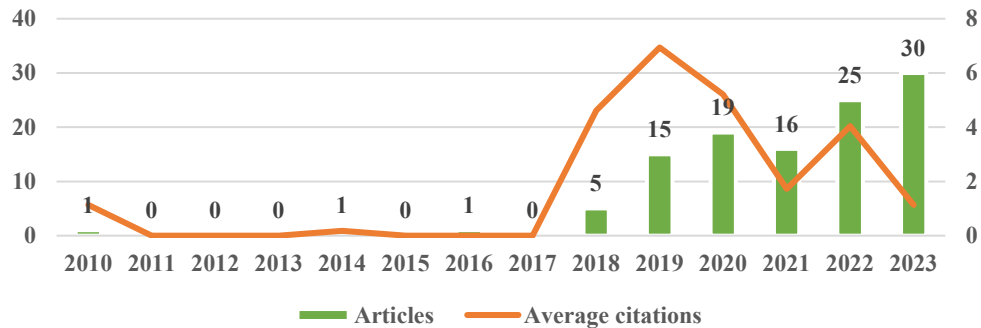


Figure 3. Annual publication and average citations of manuscripts

Source: Data processed by authors

Figure 3 illustrates the annual publication and citation of manuscripts on cryptocurrency-related taxonomy. In general, up until 2019, there was a noticeable positive correlation. This suggests that publications with a higher number of citations tended to be associated with a higher number of publications. However, as the number of publications increased over the years, there was a corresponding decrease in the number of citations. In terms of specific observations, there has been a notable rise in the number of publications from 2019, with 15 articles, to 2020, with 19 manuscripts. This was then succeeded by a further increase from 2021, with 16 articles, to 2023, with 30 articles. This pattern could indicate a significant surge in research activity in recent years.

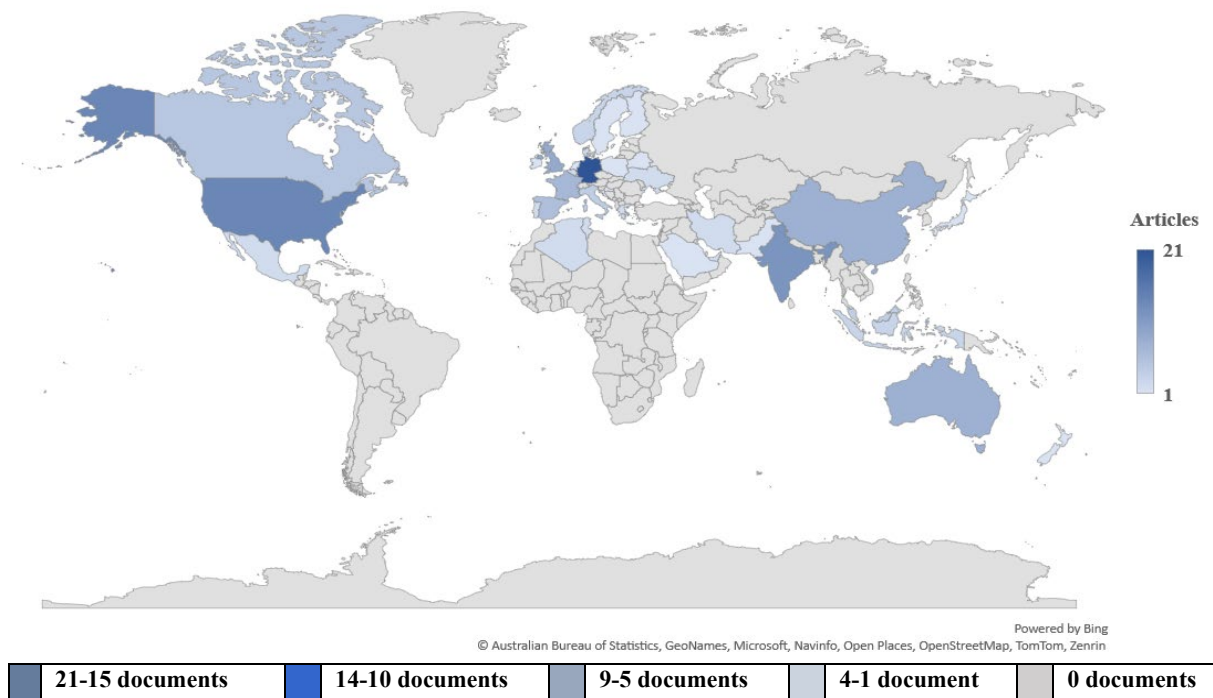


Figure 4. Country scientific publication on cryptocurrency-related taxonomy

Source: Authors' projection with MS Excel

The authors created a map using Biblioshiny to visually represent the distribution of articles related to cryptocurrency taxonomy across different countries for further analysis. Germany is the only country marked with dark blue, which signifies the highest number of publications (21 articles) based on this study. The USA and India seem to have published between 10 and 14 manuscripts. Australia, Canada, China, France, Spain, and the United Kingdom have shown fewer released articles.

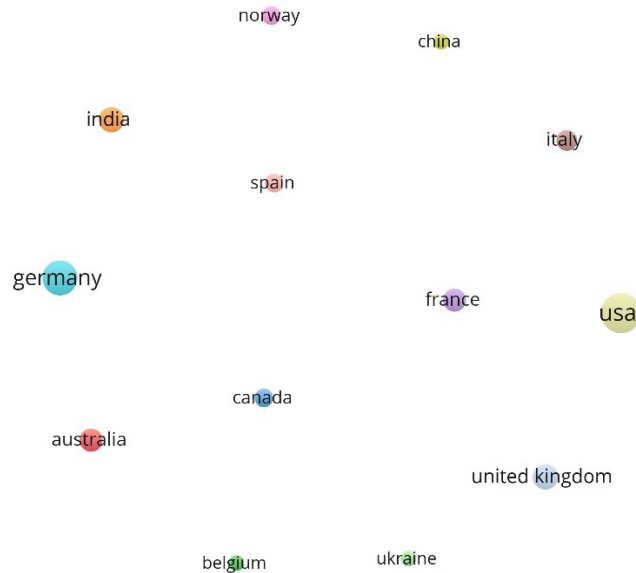


Figure 5. Co-authorship of countries on cryptocurrency-related taxonomy

Source: Authors' projection with VOSviewer

By analysing the co-authorship network of countries in VOSviewer, valuable insights can be gained into international research on crypto-related taxonomy. In this case, a low threshold of a minimum of three documents with at least one citation at the country level was chosen. Hence, 13 countries meet the threshold, but none of them are connected.

3.2. Co-authorship of authors

Through the analysis of co-authorship, one can investigate the collaborative patterns among researchers. Authors belonging to a cluster exhibit similar research interests and engage in frequent collaboration, often co-publishing articles together. In this case, the threshold was set at a minimum of one document with five citations from an author. As a result, out of the total of 291 authors, 166 met the criteria, and they were organized into groups of up to ten authors.

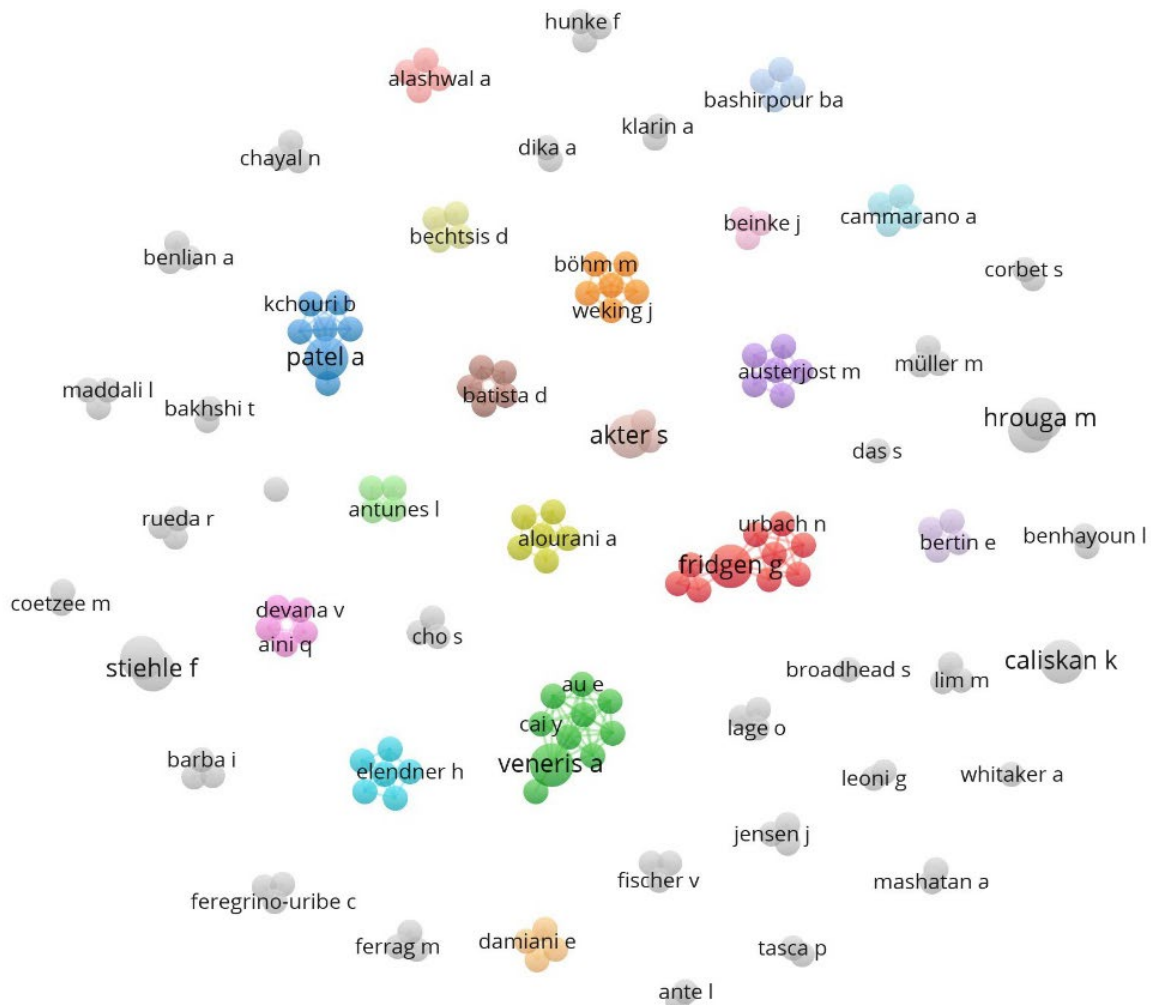


Figure 6. Co-authorship of authors' clusters on cryptocurrency-related taxonomy

Source: Authors' projection with VOSviewer

Hence, within the red cluster, the authors collaborating include Bachmann, Drasch, Fridgen, Hartwich, Miksch, Ollig, Regner, Rieger, Schweizer, and Urbach (two documents, 12 citations, nine link strength). Contained within the green cluster are the following esteemed researchers: Au, Cai, Jacobsen, Meijers, Motepalli, Pocher, Sun, Veneris, Zhang G., and Zhang S. This cluster encompasses two documents, 15 citations, and nine link strength. Notably, the blue cluster features Kchouri, Khan, Kräussl, Patel, Qi, State, and Yattoo, presenting two articles, 32 citations, and six link strength.

3.3. Co-authorship of institutions

The analysis of co-authorship at the institutional level highlights leading research institutions and elucidates collaborative patterns among institutions across diverse regions. In examining the institutional network, the criterion set for publication at the organizational level required a minimum of one document with five citations. This led to the inclusion of 99 out of 175 institutions within the parameters, with only seven demonstrating interconnectedness.

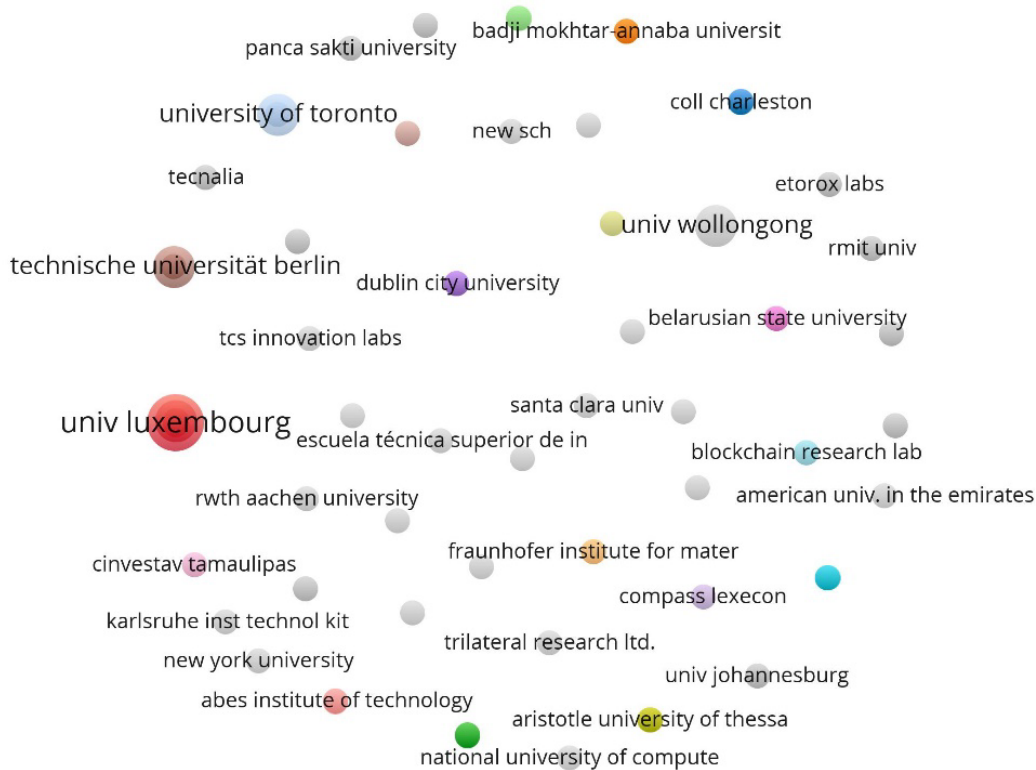


Figure 7. Co-authorship of institutions network

Source: Authors' projection with VOSviewer

The related institutions from the largest group are the University of Luxembourg, the Universities of Bayreuth, Augsburg, and Frankfurt in Germany, International Open University in Gambia, 570easi in France, and Fraunhofer FIT in Germany.

4. Keyword analysis

The process of keyword analysis encompasses the identification and highlighting of the most pertinent keywords and key terms, serving to apprise researchers of their significance. In the context of this analysis, the authors have established a criterion of three keywords. Consequently, after processing the database in VOSviewer, 19 out of the 333 keywords satisfied the specified criterion. All 19 keywords were used to calculate the total strength of the connections between keywords that occur together. In Figure 8 and Table 1, the keyword clusters can be grouped into three themes: “types of cryptocurrencies”, “technologies and frameworks”, and “security”.

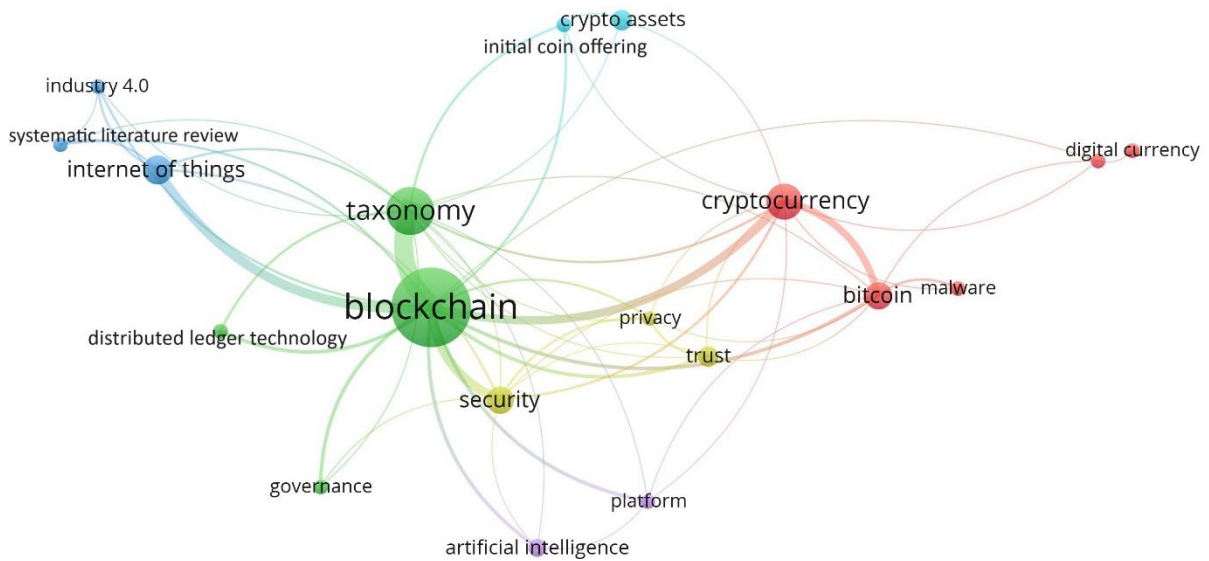


Figure 8. Co-occurrence cluster of author keywords on cryptocurrency-related taxonomy

Source: Authors' projection with VOSviewer

Table 1. Keyword clusters for cryptocurrency-related taxonomy in VOSviewer

Cluster 1 – red (5 items)	Occurrence	Cluster 2 – green (4 items)	Occurrence	Cluster 3 – blue (3 items)	Occurrence
bitcoin	8	blockchain	49	industry 4.0	3
cryptocurrency	13	distributed ledger technology	3	Internet of things	9
digital currency	3	governance	3	systematic literature review	3
malware	3	taxonomy	21		
stablecoin	3				
Types of cryptocurrencies		Technologies and frameworks		Technologies and frameworks	
Cluster 4 – yellow (3 items)	Occurrence	Cluster 5 – purple (2 items)	Occurrence	Cluster 6 – light blue (2 items)	Occurrence
privacy	3	artificial intelligence	4	crypto assets	5
security	8	platform	3	initial coin offering	3
trust	5				
Security		Technologies and frameworks		Types of cryptocurrencies	

Source: Authors' projection from VOSviewer

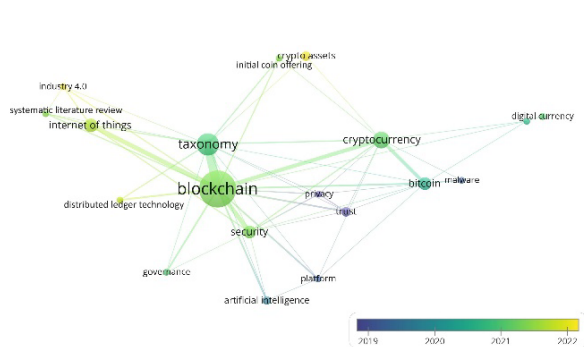


Figure 9. Co-occurrence overlay of author keywords

Source: Authors' projection with VOSviewer

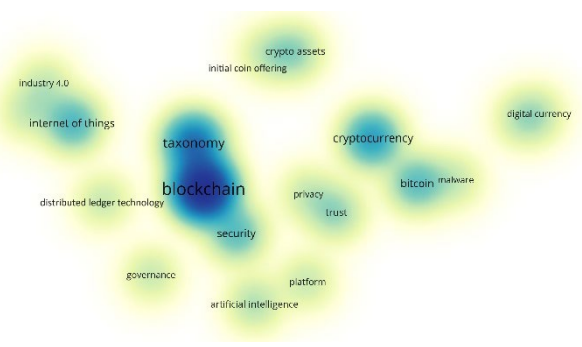


Figure 10. Co-occurrence density of author keywords

Source: Authors' projection with VOSviewer

Over the years, Figure 9 illustrates the gradual addition of new terms to crypto-related taxonomy research. Between 2020 and 2022, terms such as “blockchain” and “cryptocurrency” were added, indicating a growing interest in understanding the taxonomy of blockchain and cryptocurrency. The most recent terms, added in 2023 and coloured in yellow, include “crypto assets”, “Internet of things”, and “industry 4.0”.

Furthermore, Figure 10 provides a visual representation of the co-occurrence density of author keywords. The circular shapes in the visualization represent the keywords, and the size of each node reflects its prominence. The presence of multiple central clusters indicates the existence of distinct topical areas within the taxonomy related to cryptocurrency. The prominent blue clusters appear to centre around “blockchain” and “taxonomy”, while other clusters in softer colours highlight “cryptocurrency”, “bitcoin”, and “Internet of things”. Overall, the visualization of the clusters serves as a valuable starting point for exploring the main topics.

5. Thematic analysis

In order to address the knowledge disparity pertaining to contemporary cryptocurrency-related taxonomy deliberations and the array of viewpoints on the subject, we conducted a thematic analysis of relevant literature on blockchain technology and crypto assets. The uniqueness of this study lies in its methodology, which categorizes the assessed articles based on the research themes derived from VOSviewer's co-occurrence keyword clusters. These thematic categories regarding the taxonomy encompass types of cryptocurrencies, technologies and frameworks, and security.

The crypto-economy comprises diverse components (Wieninger et al., 2019), primarily focusing on the correlation between blockchain technology and digital assets (van der Merwe, 2021). There are various types of crypto assets, which can be categorized based on their use cases or purpose (Parrondo, 2023), underlying technology, and design principles (Tasca & Tessone, 2019). Despite these categorisations, van der Merwe (2021) highlights the common characteristics of digital assets, including high volatility, reliance on decentralised technology, and variances in risk.

Cryptocurrency taxonomy based on use cases or purpose

Derun & Mysaka (2022) emphasized the importance of a structured classification (taxonomy) for digital assets due to their intangible nature for accurately determining ownership rights and economic perspective. They suggested categorising digital assets into crypto assets and non-crypto assets based on their functionality and methods of obtaining financial benefits (van der Merwe, 2021). Crypto assets are characterized by secrecy, verification, data accuracy, and encryption, with distributed ledger technology ensuring that transaction data is accessible and transparent, making them suitable for business use. According to Derun & Mysaka (2022), crypto assets include cryptocurrencies, smart contracts, domain names, and crypto tokens.

Similarly, van der Merwe (2021) proposed a taxonomy that categorizes different types of digital assets, including cryptocurrencies, stablecoins, bitcoin futures, and decentralized finance (DeFi) products.

In their research, Fry & Ibiloye (2023) performed a taxonomic analysis and developed innovative approaches for classifying crypto assets according to their distribution patterns or historical trends. They found that, distributionally, cryptocurrencies (excluding those pegged to the US Dollar) share similarities with tech stocks, while time series analysis categorizes them primarily as speculative assets, with Bitcoin and potentially Solana being exceptions.

Yatsyk and Shvets (2020) address the absence of a standardized taxonomy for crypto assets by proposing a classification system that distinguishes between cryptocurrencies (payment tokens) and digital tokens (excluding cryptocurrencies). They outline four primary types of digital tokens: security tokens, utility tokens, asset-backed tokens, and hybrid tokens (Parrondo, 2023).

Cryptocurrency taxonomy based on technology and frameworks

Decentralized and distributed digital ledgers, known as blockchain technology, consist of blocks where transactions and information are recorded using a peer-to-peer network, ensuring data immutability and security, which is pivotal for emerging business practices (Cammarano et al., 2023). In terms of blockchain taxonomy, Caliskan (2020) proposes an actor-based taxonomy of cryptocurrency blockchains, focusing on the participants involved in maintaining blockchain infrastructure. Specifically, the taxonomy identifies two main actors: transactioners (users engaging in transactions) and accountants (those responsible for validating transactions).

One of the most widely recognized taxonomies in the cryptocurrency domain is the distinction between "coins" and "tokens". Coins, such as Bitcoin and Ethereum, are native digital assets that operate on their own blockchains, while tokens are built on top of existing blockchain platforms like Ethereum (Caliskan, 2020; Derun & Mysaka, 2022; Lage et al., 2022; Parrondo, 2023; Soares et al., 2023). These tokens can represent a variety of assets or utilities, such as digital currencies, access rights, or even project ownership.

Standard setters face difficulties in creating a framework due to the lack of clear definitions for crypto assets and structured criteria for determining their taxonomy (Parrondo, 2023; Whitaker, 2019).

Cryptocurrency taxonomy based on security

Another important taxonomy in the cryptocurrency domain is the classification based on the consensus mechanism. The most common consensus protocols are Proof-of-Work (miners solve puzzles), Proof-of-Stake (validators are chosen based on staked coins), and Delegated Proof-of-Stake (delegates are elected to validate transactions) (Tasca & Tessone, 2019). Proof-of-Work, used by Bitcoin, relies on energy-intensive mining, while Proof-of-Stake and Delegated Proof-of-Stake are more energy-efficient alternatives that use different mechanisms to validate transactions (Ghosh et al., 2020).

Custody is crucial for organizations and individuals accessing crypto assets. Custodians hold private keys, verify, and authorize transactions, ensuring efficient and secure transactions to prevent losses or theft. According to Jaroucheh & Ghaleb (2023) crypto asset custody solutions can be categorized into multiple classes based on five key dimensions: responsibility, distribution, connectivity, key storage, and technology.

6. Conclusions

Firstly, the keyword analysis identifies three major clusters related to the crypto-related taxonomy: 1) types of cryptocurrencies, 2) technologies and frameworks, and 3) security.

Secondly, the co-authorship network among the authors indicates that collaborative efforts are relatively underdeveloped. Similarly, the co-authorship networks among countries and organizations exhibit a comparable trend. These networks are in their nascent stages, with Germany, the USA, and India emerging as the most prominent contributors.

Thirdly, the thematic analysis reveals that understanding the different types of crypto assets is crucial for grasping their functionalities, use cases, and economic roles. Distinguishing between coins and

tokens is essential for understanding their underlying technology and how they function within their respective blockchain ecosystems.

The study's limitations include a timeframe of 2005-2023. Another time frame might reveal more about historical growth.

Finally, it is essential to acknowledge that the crypto asset industry is rapidly evolving, and new types of digital tokens may emerge that exhibit characteristics of multiple subclasses. This may require further analysis and professional judgment to determine the appropriate classification and accounting treatment.

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GREEN ECONOMY. THE CONNECTION BETWEEN ACCOUNTING AND SUSTAINABLE DEVELOPMENT

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Abstract: *The green economy is a concept that brings sustainability into discussion through the promotion of ideas such as caring for the environment, promoting economic growth through sustainable methods and creating equitable opportunities for all individuals in society.*

This transition can be achieved by accounting, which helps in combining sustainable development goals into economic decision-making. The current paper presents a bibliometric analysis of the most recent publications in the existing literature to investigate the relationship between accounting and sustainable development. This research investigates trends, collaborative networks, and significant papers and publications in the domain of quantitative analysis methods. This illustrates the positive effects of implementing a green economy. The study shows green accounting is gaining recognition, alongside sustainable reporting standards and the role of accounting in evaluating company performance concerning environmental and social aspects. In order to promote the transition to a healthier economy, interdisciplinary research must be enhanced and a better accounting framework developed.

Key words: *green economy, sustainable accounting, sustainable development.*

JEL: M40, M41, Q01.

1. Introduction

The green economy brings an innovative addition to the financial sphere by merging sustainability, care for the environment, and economic growth with long-term, sustainable perspectives.

The key fields of priority are to promote the effective management of natural resources, decrease carbon emissions, or encourage the companies to improve the general social conditions for all community members. Sustainable accounting brings into discussion what the actual significant impact of businesses is during the course of their operational and production services. (Gonzalez et al.,2020)

In order to deepen the research in understanding the relationship and connections formed between sustainable development and green accounting, this paper explores a bibliometric analysis of academic publications focusing on the green economy. The quantitative analysis emphasizes the connections made between research published in the financial accounting sphere.

Thus, accounting is intertwined with economic activities aiming at sustainable development, as sustainable development is becoming a highly publicized topic of great interest for all actors in the economic space.

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Companies are interested in creating a much bigger picture by setting and meeting sustainability goals that will be achieved by applying green accounting practices such as environmental cost accounting and sustainability reporting.

2. Basic content

Within the context of the economic industry, the current research investigates the implications of the interconnections that exist between the accounting and sustainable development, based on the context of green economy.

The current research aims to accomplish two goals:

1. The current study's major objective is to investigate how green economy concept relates to accounting's role in sustainable development. The business sector and international economy have begun to place a greater emphasis on this notion.
2. The study explores into the consequences of the financial sector's interdependencies among sustainable development, accounting, green economy, and sustainability.

We applied a bibliometric analysis to help us to identify recurrent patterns in the research that was conducted on the sustainable development. This was performed in order to emphasize the interdependent nature of these three components of our research.

The paper aims to map the green economy relationship with accounting and sustainability at the international level. The economic space has been analyzed in academia by different specialists, and there is a need for further research on the connections between accounting and sustainability. The current exploration consists in analyzing the types of publications, which writing languages were most often used, the countries where these studies were made public, and their connections regarding the research on SDG goals and WOS categories. The sample used for the present bibliometric research was extracted from the Web Of Science Core Collection on August 13, 2024.

In order to start our investigation, the keywords selected for the study case were:

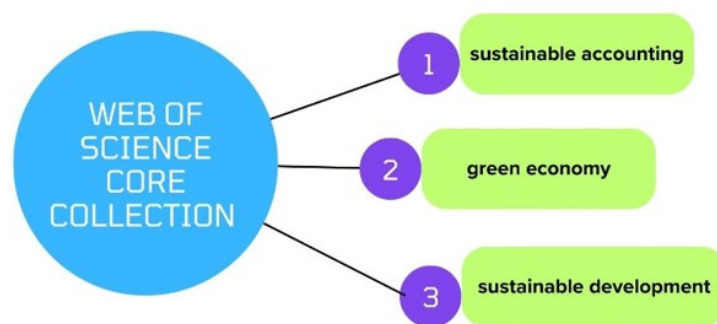


Figure 1. Keywords used on the Web of Science Core Collection database

Source: authors' own research, 2024

The subject of sustainable development in the economy is characterized by a wide network of interdisciplinary connections. This network allows for the gradual introduction of a sustainable business system with the intervention of experts and in accordance with established protocols and guidelines.

Numerous national and international sectors and industries are showing interest in sustainability.

Thus, for academics and economists who use this data, sustainable development in accounting is a relatively unexplored field.

We opted to limit our research to materials published between period 2022 and 2024 to ensure the validity of our findings. In view of this, papers that were found as published within the period selected were subjected to a detailed review.

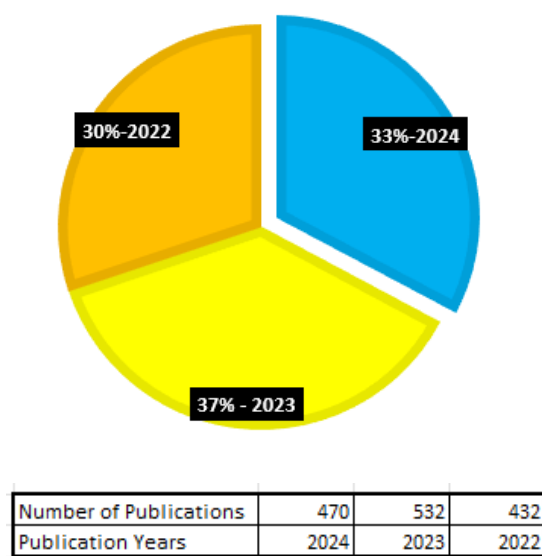


Figure 2. The annual distribution of published research

Source: authors' own research, 2024

Based on the preliminary search completed by the WOS core collection platform, an entire set of 1,434 results have been determined that fulfilled the specified criteria. Such terms have been encountered in an extensive variety of fields, including Economics, Environmental Studies, Energy Fuels, Management, and Ecology, to name among others. The number of academic publications that covers topics as green economy and sustainable development has been on the rise in the last period, fact that has been shown by the yearly allocation of these articles.

The publication data indicates a rising trend from 2022 to 2023, with the quantity of papers increasing by approximately 23%. This signifies an increasing interest and awareness within the academic and research community regarding the relationship between accounting and sustainable development in the framework of the green economy. The significant increase in 2023 may indicate heightened global focus on sustainability reporting, corporate accountability, and environmental impact assessment, which are essential elements of connecting accounting to sustainable development.

Figure no. 3 sheds light on the results obtained which shows that the green economy and the relationship between accounting and sustainable development predominantly dominates the Economic area with a percentage of over 49%, followed by the Business Finance sector with a percentage of 14%, Environmental Studies represents 6%, but we find studies in a significant number also in sectors such as Green Sustainable Science Technology, Agricultural Economics Policy or Ecology and others. Incorporating environmental concerns as a major topic further emphasizes Green Accounting's emphasis on ecological considerations. Rising environmental consciousness and the

demand for businesses to disclose their effects on the environment and their role in promoting sustainability are likely factors driving this trend.

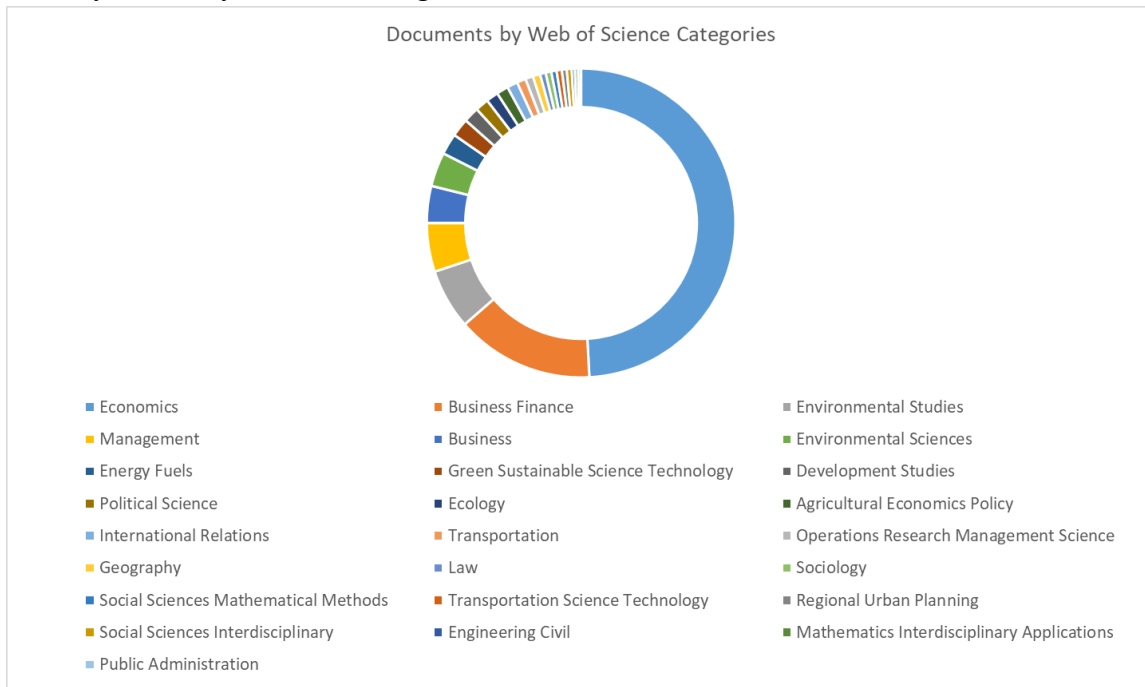


Figure 3. WOS Categories of the selected papers

Source: authors' own research, 2024

The Economics category includes about 49% of all papers, showing that the green economy is mainly considered from an economic point of view. This shows that most research centers around the financial and economic implications of environmental sustainability and the role of accounting in supporting economic progress closer to more sustainable systems. Topics will likely encompass cost-benefit analyses of environmentally friendly procedures, marketplace mechanisms for protecting the environment, and the economic aspects of green policies. In the Business Finance category, an amount of papers concentrate on the financial aspects of enterprises, including methods for financing green initiatives, investments in sustainable practices, and the inclusion of environmental factors into financial reporting. Categories of Management and Business present that a substantial part of the sample analyzed focuses on business strategies and management in correlation with sustainability. The data presented on Figure no. 4 shows the allocation of research papers according to Sustainable Development Goals (SDGs), highlighting the research focus areas.

40% of the presented research is discussing also about to Climate Action (SDG 13), the papers highlight that combating climate change is one of the main priority. This fact indicates that the environmental issues are associated with climate change and represent a high interest for academic researchers.

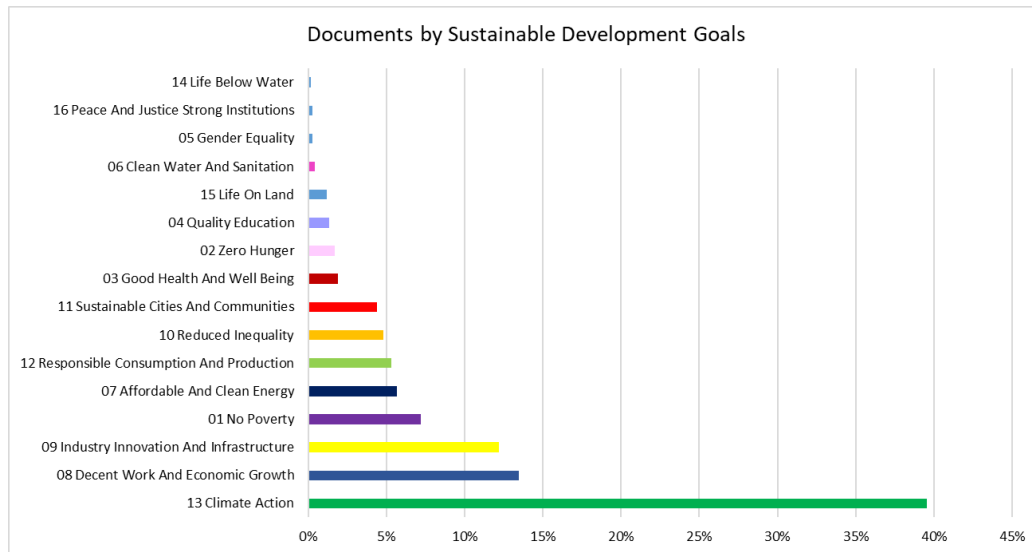


Figure 4. Presentation of published papers according to the SDGs addressed in the research
 Source: authors' own research, 2024

The following strongest SDGs mentioned are Industry, Innovation, and Infrastructure (SDG 9) and Decent Work and Economic Growth (SDG 8) with 13% and 12%. These two values express the idea that there is a substantial accent on the promotion of a new healthy economy and the which is expected to be connected to green activities and initiatives.

The data regarding SDG allocation reveals an extensive focus on environmental concerns, especially climate action, whereas health and social problems remain comparatively not fully yet explored.

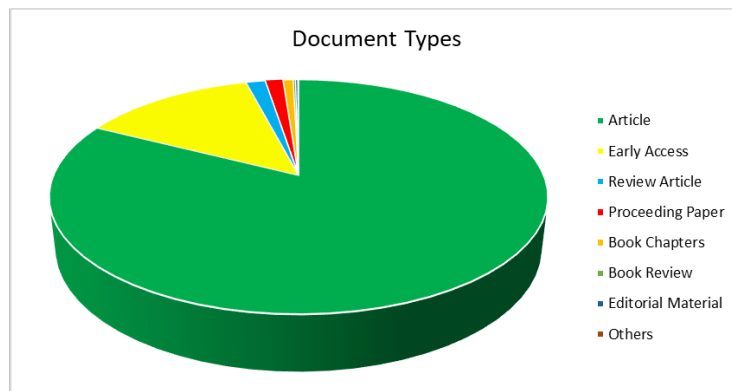


Figure 5. The data categorizing research papers by document types
 Source: authors' own research, 2024

The articles category represents 82.5% of publications. This reflects that the vast majority of research in this domain has been released as conventional research papers. These articles therefore offer original research findings, case studies, and empirical analyses, effectively improving academic knowledge and expanding theorists and practitioners in the green economy and sustainability accounting. The major volume of articles reflects a growing and active research field, that produces a constant flow of comprehensive research aimed to contribute to the ongoing discussion concerning the relationship of green economy and sustainable development.

Table 1. Distribution of the analyzed articles by countries

Countries	Distribution
China	30%
England	7%
USA	7%
Ukraine	5%
Australia	4%
France	4%
Germany	4%
Italy	4%
Pakistan	3%
Malaysia	3%
Spain	3%
India	3%
Russia	3%
Romania	2%
Poland	2%
Lebanon	2%
Taiwan	2%
Vietnam	2%
Netherlands	2%
Japan	2%
Canada	2%
Turkey	1%
Denmark	1%
Saudi Arabia	1%
Turkiye	1%

Source: authors' own research, 2024

The review of research articles by country shows interesting distribution about the contributions of various nations to the area of sustainability in relation to accounting. According to Table No.1, China is identified as the global leader in this area of research related to the green economy and sustainable development, with a total of 30% of the total publications in those domains. Next countries on this list are England and the United States, with 7%. Romania stands 14th, having published a total of 43 articles for the period between 2021 and 2024.

According to the Table no.2, English publications analyzed correspond to a total of 96.7% (1395 records) from all investigated papers. That means that the most common language of publication in the academic environment is English.

This present the big picture of the academic distribution in this field of study, with English serving as the universal language of the actual community. The common usage of English suggests significant research contributions to the green economy and sustainability accounting area are part of the countries where English is the primary language of academic communication.

Table 2. Distribution of the analyzed papers by language of publication

Languages	Record Count
English	1395
Russian	16
Turkish	6
Spanish	4
Ukrainian	4
French	3
Polish	2
Slovak	2
Portuguese	2

Source: authors' own research, 2024

3. Conclusions

The analyzed data present an increasing interest for this research area of the exploration for the relation between green economy, accounting and sustainability.

The upward trend shows that a lot of publications are influenced by the global policy changes and the international corporate sustainability initiatives. The sample selected for the bibliometric analysis presents the dimensions of the green economy and the upward trend of writings about sustainability in the economy

This research possesses specific limitations. The bibliometric analysis may be limited to certain accessible publications, as it depends on data from particular databases. The analysis is confined to the parameters of the chosen tools and databases. The findings may not encompass research disseminated in alternative languages or non-indexed publications.

Further study should concentrate on the clusters identified as underexplored in the co-occurrence analysis. Exploring the complex interconnections between social responsibility in business, finance, environmental leadership, finance, sustainable development, and associated variables can yield a more comprehensive understanding of the resulting implications for Green Accounting. This investigation may enhance theoretical development and practical application within the discipline.

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FISCAL INSTRUMENTS TO SUPPORT SUSTAINABLE DEVELOPMENT AND ENCOURAGE ENVIRONMENTALLY FRIENDLY BUSINESS PRACTICES

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Abstract: *In this paper, the role of fiscal tools is analyzed through the lens of a transition to a sustainable economy and the support of ecological business practices. These changes force authorities to develop tax policies that consider the climate agenda and the interests of the state, businesses, and consumers.*

Therefore, by analyzing fiscal instruments meant for eco-technologies, it can be concluded that fiscal support measures guarantee the implementation of ecological technologies, ensuring benefits for the environment, businesses, and consumers.

Keywords: *green tax, subsidies, green technology, innovation.*

JEL: H23, O13

1. Introduction.

In recent years, at the European Union (EU) level, multiple legislative initiatives have been promoted for the green transition. The most important is the European Green Deal, which helps make the EU climate-neutral by 2050.

As part of the Association Agreement with the EU and as a candidate country for EU accession, the Republic of Moldova harmonizes its national legislation with that of the EU and adopts measures for sustainable development. Since December 2023, when the European Council recommended starting accession negotiations, supporting green and circular economy initiatives by stimulating investments, improving production and responsible consumption, rational resource use, energy efficiency in all sectors of the national economy, and digital evolution and innovation are becoming increasingly important. Thus, it becomes increasingly necessary to rethink support measures for green technology investments with the help of fiscal policy instruments.

This paper aims to structure fiscal policy tools used internationally to stimulate investments in ecological innovation and to adjust national fiscal policies in response to the global climate agenda. To achieve this goal, methods like synthesis, comparative, and logical analysis were conducted. This combination of methods enabled a more comprehensive assessment of the effectiveness and prospects of these tools.

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2. Literature review.

Literature sources highlight that implementing green taxes plays a primary role in transitioning to a sustainable economy. These tools can determine economic activities toward sustainability and have advantages and disadvantages (Mărgărit & Bran, 2011). At the same time, they are essential in internalizing environmental costs and applying the "polluter pays" principle (Panayotou, 1995).

The fiscal practices of other states can be benchmarks for improving the national tax system but also urge the states to harmonize their practices (Frâncu et al., 2021).

In the current economic context, sustainable business development includes environmental, social, and governance criteria, which are increasingly important (Todos, 2022). It is believed that by orienting incentives towards green and sustainable practices, innovation in production processes and green products will be encouraged. (World Bank, 2020). Economic instruments can stimulate technological innovation, influence consumption and production patterns, and generate funding for environmental initiatives (Panayotou, 1995). However, implementing common fiscal rules may encounter obstacles, especially from states reluctant to eliminate tax discrimination and evasion (Frâncu et al., 2021). These tools are vital to balancing economic growth with environmental protection and social responsibility.

3. Results and discussions.

To enable enterprises to face the competition, and to support the development of a sustainable economy, they must implement green innovations. The authorities have as a priority to encourage technological innovations, employing a set of public policy instruments aimed at optimizing the use of resources within the economy and reducing the negative impact of human activity on the environment. The choice and transformation of fiscal instruments depend on fiscal political objectives, socio-economic policy, environmental policy, and motivation, along with the particularities and principles of each state.

The analysis of the international practice of taxation identified the most commonly adopted measures adopted by the authorities at the national level regarding the greening of tax payments and the motivation for investments in ecological technologies (Mai et al., 2016; Cramton et al., 2017). At the same time, they were grouped into the following categories:

1. Incentives for investments in ecological technologies presuppose the application of measures and policies that ensure the development and implementation of technologies that rationally use natural resources, have low energy consumption, protect the environment, and are essential in the transition to a green and sustainable economy.

For example, the United States offers tax breaks in the form of tax exemptions and accelerated depreciation on company profit taxation. Based on the "Opportunity Zones" program as part of the Tax Cuts and Jobs Act, tax incentives for certain categories of businesses and investors have been established in certain regions since 2017. Thus, reducing the tax burden stimulates ESG investments in various fields, including environmental protection, social development, and corporate governance (KPMG, 2019).

To control environmental pollution, solid waste management, and the recycling of valuable materials, a tax-exempt bond financing program called the Pollution Control Tax-Exempt Bond Financing Program is applied in the United States. Thus, borrowers have an opportunity to reduce the cost of

financing eco-technologies because the interest rate for bonds is lower than that for bank loans. The California Pollution Control Financing Authority (CPCFA) finances environmental projects for wastewater treatment plants, waste-to-energy processing, and waste management through green bonds. These projects can be funded through tax-free bonds.

Local authorities can help small and medium-sized enterprises benefit from tax breaks in implementing green initiatives, such as green vehicles for companies that collect waste, waste oil recycling projects, and construction waste recycling projects. Annual tax incentives in the United States contribute to an increase in the number of projects in which investments are made, totaling approximately \$15 billion annually. This allowed the United States to become a leader in green technology. (Novikova, 2020)

Malaysia applies a set of green tax incentives for industrial enterprises and investors. The financing of green technologies is carried out within the Green Technologies Financing Scheme (GTFS 3.0) which is part of the Sustainable and Responsible Investments (SRI) support program and aims to stimulate the introduction of green technologies and reduce the tax rate, fiscal incentives for the introduction of electric cars, exemption from paying income tax and from paying the tax on green incomes Green Income Tax Exemption (GITE), subsidies for the introduction of ecological investments Green Investment Tax Allowance.

In the Republic of Moldova, green technologies are associated with those that, when used, cause no environmental harm or minimal environmental harm.

Outdated equipment and technologies harm productivity, financial performance, and the environment. Fiscal support measures for investments in green technologies allow businesses to offset negative externalities. These objectives include reducing the company's tax base by deducting research and development expenses from profit and depreciation expenses, exempting property taxes during certain periods in the case of the installation and commissioning of efficient high-energy installations, and subsidizing the payment of dividends on issued green bonds.

2. Fiscal credit for investments in technologies for renewable energy production, and energy projects for clean energy and biofuel production.

The tax credit is used internationally. In the United States, the investment tax credit (ITC) is used with other financial instruments, such as subsidized loans, discount cash rebates for installing renewable energy sources, and Solar Renewable Energy Certificates (SREC).

In the United States, the ITC is used for solar energy or a solar tax credit, which allows a reduction in taxes to be paid in the federal budget by deducting 30% of the cost of installing a solar panel system. From 2033, the ITC will be reduced to 26% and remain until 2035. The ITC is a direct fiscal instrument to stimulate consumers and can be considered an indirect fiscal instrument for the production of green technologies that contribute to an increase in demand. In 2015, the American Clean Energy Investment Act was adopted, which stipulates the conditions for granting tax credits for electricity production from renewable sources and clean energy projects. Thus, consumers of electricity from wind turbines installed in coastal waters can benefit from a 30% tax credit.

3. Special taxes (consisting of ecological and energy taxes) and subsidies In international practice, special taxes (environmental and energy taxes) and subsidies for investments in green technologies have begun to be widely used. The introduction of a carbon tax as an environmental tax is considered

justified as an additional source of financing for technologies that adapt to the consequences of climate change, reduce greenhouse gas emissions, and improve resource allocation.

Approaches to emissions taxation show the following differences from country to country:

- a) *determining the type of tax (carbon tax, coal tax) and tax rate.* Most states levy a carbon (methane, greenhouse gas) tax on the carbon content of fossil fuels, which varies and increases gradually. For example, tax rates in Ireland, the Netherlands, and Norway will increase to 125 euros by 2030. In Japan, a carbon tax was introduced in 2012, in Singapore in 2019, and in Colombia in 2017, and it is charged per ton, which is \$3, \$4, and \$5 per ton. In India, a coal tax of \$6 per ton of coal mined or imported was introduced in 2010.
- b) *the process for imposing taxes is according to the national, regional, or local budget level* Thus, in most states, a carbon tax is introduced at the national level: Great Britain, Germany, and Norway. On the other hand, no carbon tax is applied at the national level in the United States, Canada, Russia, and China. In the US, this tax is set individually by the states, and in Canada, it only applies in certain provinces.
- c) *legal aspects, content, and order of modification of the tax elements.* This refers to the taxation subject, the tax base, the tax rates, the tax benefits, the tax period, the calculation procedure, and the payment term.
- d) *fiscal administration* refers to the body that administers the tax and the legal fiscal control procedure.
- e) *the legal structure* and the relationship between fiscal law and land, civil, banking, financial law, etc. The carbon tax increases budget receipts and the expenditure of producers and consumers, reduces the tax base of business income, and, if collected in an ecological fund, increases the accessibility of resources for green growth.

The energy tax (fuel tax, electricity tax) is considered an environmental tax. For example, in Sweden, excise duties are levied on hydrocarbon oils, and fuel taxes of \$28 per ton have been levied since 1991. Such taxes are considered carbon taxes. Singapore charges carbon and fuel taxes on the transport sector.

Most governments when setting special taxes start from the idea that such taxes increase the cost and price of products and energy, which motivates businesses to invest in green technologies to reduce harmful substances. The mechanism for applying these indirect taxes (excise duties) is based on shifting the fiscal burden toward consumers who pay the excise duty included in the price by the producer (or the subject of the tax). In the case of increasing direct taxes (emission taxes), the company's profit margin decreases, which can affect producers and consumers by demotivating them. Countries have created special funds for environmental protection when carbon tax revenues accumulate. In India, the coal tax collects revenue from the National Clean Energy and Environment Fund and funds projects in the energy sector for renewable energy. (Singh, 2020) In Singapore, emission taxes are intended to finance projects to reduce emissions.

Most of the time, states do not provide financial assistance to support the implementation of green technologies from the revenues from special taxes. Subsidizing these innovative ecological projects is often done on a competitive basis. For example, in China, green investment loans and grants are given for the production of energy-efficient cars; in Indonesia, such subsidies are provided for the production of biodiesel, in Japan to create sustainable infrastructure, and in Singapore, temporary grants are given to households to offset part of the utility costs. (IMF, 2021).

4. Voluntary agreements between authorities and companies in the energy sector regarding preferential taxation for developing innovations.

Increased carbon taxes and consumer discontent in the industrial and energy sectors have led authorities to adopt specific measures. For example, voluntary agreements are made with manufacturers seeking to implement clean innovations and technologies. The collection of taxes reduces profit, and the development and implementation of divine ecological technologies are financially difficult. Thus, the government provides a tax incentive to reduce the tax burden on companies that agree to mitigate the negative consequences of the new emissions tax introduction that affect the prices of manufactured products and energy.

A package of tax measures was implemented in the UK, which included a Climate Change Levy (CCL) and a scheme of voluntary Climate Change Agreements (CCA) available to businesses in energy-intensive industries. This package is expected to reduce CO₂ emissions by up to 60% by 2050. The CCL came into force in 2001 and is the charge on a unit of energy and fuel (electricity, coal, natural gas, liquefied petroleum) sold to industrial and commercial customers. The CCL stimulates innovation to reduce carbon emissions. The CCL is also called an energy tax with differentiated rates. The CCL rates are set per kilowatt-hour (KWH) equivalent for each fuel type. Thus, CCL becomes a price incentive for energy conservation. Tax rates vary according to carbon emissions. Electricity produced from renewable sources is exempted from taxes. CCL, as an energy tax, harms large and energy-consuming industrial enterprises.

The CCA is a scheme of voluntary agreement between businesses and the government to mitigate the adverse effects of the CCL and maintain the competitiveness of these businesses. Energy-consuming enterprises enrolled in the CCA are eligible for up to 80% tax reductions if they promise to reduce carbon emissions or energy consumption (Martin et al. 2014)

5. A mix of fiscal incentives for investments in green technologies and tax incentives to discourage environmental pollution.

In international practice, different measures are used to discourage environmental pollution, such as different rates (coefficients) of taxes and fees, fines and penalties, and administrative and criminal liability of officials. However, these measures do not always produce the expected results. The introduction of eco-technologies involves additional business expenses that should be considered when forming a tax base. In some states, R&D expenses help to reduce the profit tax base. Modernization expenses, additional equipment purchases, or fixed assets are not part of R&D expenses and therefore will not be taken into the calculation for these tax incentive applications. incentives. Another incentive is the depreciation of fixed assets calculated over a fairly long period (5 years or more). Even if they reduce the tax base, these expenses may become insignificant. For enterprises, economic benefit reflects the increase in the rate of profit, and the level of financial benefit or its absence will be the key factor in the enterprise's decision to implement innovations. The solution lies in a reasonable combination of a tax incentive for investment in green technologies and a tax on environmental pollution.

According to the "polluter pays" principle of sustainable development, polluters must fully cover the damages caused by their actions or inactions on the environment, and the financial liability should be a multiple of the damage caused.

For an investor, the benefits of green technologies should be greater than the costs of covering environmental damage. When calculating corporate income taxes, spending on innovation and green technology investments must be considered. The profit margin of green technology companies is expected to increase. Therefore, the profit after taxation should rise, and the revenue from the sale of products obtained due to the application of ecological technologies should be greater than the cost of innovation, which should be considered when calculating taxes. It is necessary to review tax incentives, fines ought to be increased, and multiply the damage caused to the environment and the state budget.

Thus, fiscal incentives and penalties, together with financial support and credit measures (state financial assistance, competitive grants, reduced interest on loans) can contribute to solving the problems of introducing green technologies.

6. Fiscal administration and measures to combat evasion through environmental taxes and the illegal application of preferential taxation in cases of green technologies.

Most states show an interest in improving environmental conditions and reducing emissions.

Many countries with high greenhouse gas emissions, such as China, Brazil, Indonesia, and India, are characterized by high levels of tax evasion, and new carbon taxes do not help to reduce tax evasion. In this regard, tax administration transformation is necessary. Measures to counter environmental tax evasion, illegal application of preferential taxes for innovation activities, and investments in green technologies increase budget revenues. The development of ecological tax administration must be based on the "polluter pays" principle by digitizing the interaction between tax authorities and taxpayers, forming trusting relationships between citizens and the authorities.

As a young state, the Republic of Moldova faces a series of problems related to the environment, due to the economic activity of the state that did not take into account its ecological impact.

Therefore, numerous strategies, policies, and measures have recently been adopted to contribute to economic greening. In the Republic of Moldova, enterprises can implement green technologies through the SME Greening Program and grant-based state aid. The EU, within the Eastern Partnership, assists in the form of grants within the EU4Environment program. With the adoption of the Program for the promotion of the green and circular economy in the Republic of Moldova for the period 2024-2028, it is desirable to review and adapt fiscal instruments, so that they contribute to environmental pollution, and to simulate enterprises to adopt the latest friendly production technologies in the environment, but also to get more profit.

4. Conclusions.

Fiscal policy instruments used to stimulate investments in eco-innovation are systematized according to several criteria. There may be special tax incentives for producers (reduced tax rates, tax deductions) and consumers (investment tax credit for green technologies purchase). Another category of fiscal incentives aims at green technologies implementation in certain sectors of the economy toward technologies for reducing carbon emissions, the production of renewable energy sources, energy efficiency, waste, and garbage processing technologies.

To stimulate investments in eco-technologies, the following actions are possible: the introduction of the carbon tax as a source for financing ecological technologies, the application of a mix of fiscal incentives for investments in green technologies and taxes to discourage environmental pollution, and

the establishment of voluntary agreements between authorities and producers related to the implementation of eco-technologies in exchange for fiscal advantages.

In general, the green technological development of enterprises does not imply radical changes in the fiscal policy of the states; individual approaches are needed to stimulate investments in green technologies at the level of each state.

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EXPERIENCE OF FOREIGN COUNTRIES IN INVESTING IN RENEWABLE ENERGY SOURCES

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Abstract: *In recent decades, the world and the region have experienced an energy crisis, expressed in rising prices for energy resources and the complexity of their delivery from traditional places of production. Therefore, in many countries there has been a need to invest in Renewable Energy Sources. To increase investment, many countries use methods to stimulate economic agents.*

In this article, we will compare the incentive methods of a few countries, compare the established tariffs for the purchase of electricity, and compare the difficulties that these countries face in stimulating increased growth of investment in renewable energy sources.

Key words: *electricity, renewable energy, investments, energy prices, industry.*

JEL: *Q42, Q43, Q47.*

1. Introduction

In recent decades, renewable energy sources (RES) have become an increasingly pressing topic in global energy policy. Climate change and limited fossil fuels are forcing countries around the world to look for alternative and environmentally friendly sources of energy. Investments in renewable energy sources are becoming a key tool for achieving sustainable development and reducing greenhouse gas emissions.

As a result, the world economy found itself in a transformation of the entire global energy sector. These processes are accelerated by the direct rise in prices for traditional energy resources in recent years and decades. Also, in view of the ongoing global political, military, and social processes, the costs of delivering energy resources from traditional places of their extraction and receipt to places of greatest consumption have increased, and the risk of their direct supply has also increased, which leads to higher prices for insurance, guarantees and security.

As a result, not only countries that do not have fossil energy resources, but also countries that have significant reserves and production of them have come to understand investing in renewable energy sources. Also, many countries, in addition to investing in renewable energy sources, are actively studying ways to increase their efficiency, reduce their cost and scale.

Also, the development of energy technologies largely determines the degree of development and rate of economic growth of the state's economy. This article examines the experience of various countries in the field of investing in renewable energy sources, analyzes their successes and difficulties, and draws conclusions about the most effective approaches.

2. Research results

Table 1. Commissioned renewable energy capacity for a number of countries in Megawatts

CAP (MW)	2 014	2015	2 016	2017	2 018	2019	2 020	2021	2 022	2023
World	1 698 295	1 852 496	2 015 003	2 185 712	2 360 957	2 548 686	2 819 247	3 083 431	3 391 349	3 864 522
Europe	439 951	465 128	488 677	513 004	537 514	574 844	609 134	651 443	715 649	785 821
China	414 651	479 103	541 016	620 856	695 463	758 870	896 412	1 017 852	1 156 126	1 453 701
Bulgaria	4 123	4 136	4 145	4 289	4 316	4 319	4 364	4 532	5 015	6 215
Moldova Rep	69	69	71	81	106	110	116	153	255	308
North Macedonia	682	716	720	731	736	742	820	828	973	1 354
Romania	11 152	11 212	11 162	11 145	11 169	11 169	11 121	11 120	11 580	11 763
USA	180 970	196 009	216 174	230 714	245 595	263 821	293 527	326 733	354 314	385 205
Brazil	106 445	112 646	121 378	128 425	136 613	144 658	150 685	161 483	176 709	194 085
India	71 892	78 582	90 414	105 258	118 227	128 475	134 774	147 390	163 213	175 934
Germany	90 325	97 851	104 436	112 514	118 905	125 068	131 686	139 077	149 143	166 939
South Africa	2 711	3 430	4 652	6 552	7 911	8 014	9 523	9 827	10 505	10 623

Source: compiled by the author based on data from (IRENA). (2024, July)

For comparison, we took 10 countries from different regions of the world, among them very developed countries in terms of the implementation of renewable energy sources. The table shows that several countries occupy a significant share in global production from renewable energy sources, and many countries have grown significantly over 9 years. China in 2014 occupied a share of 24.4% of the world's renewable energy capacity, and in 2023 - 37.6%, which indicates an accelerated growth in implementation compared to the world level. Moldova increased significantly over the period by 4.5 times and South Africa by 3.9 times.

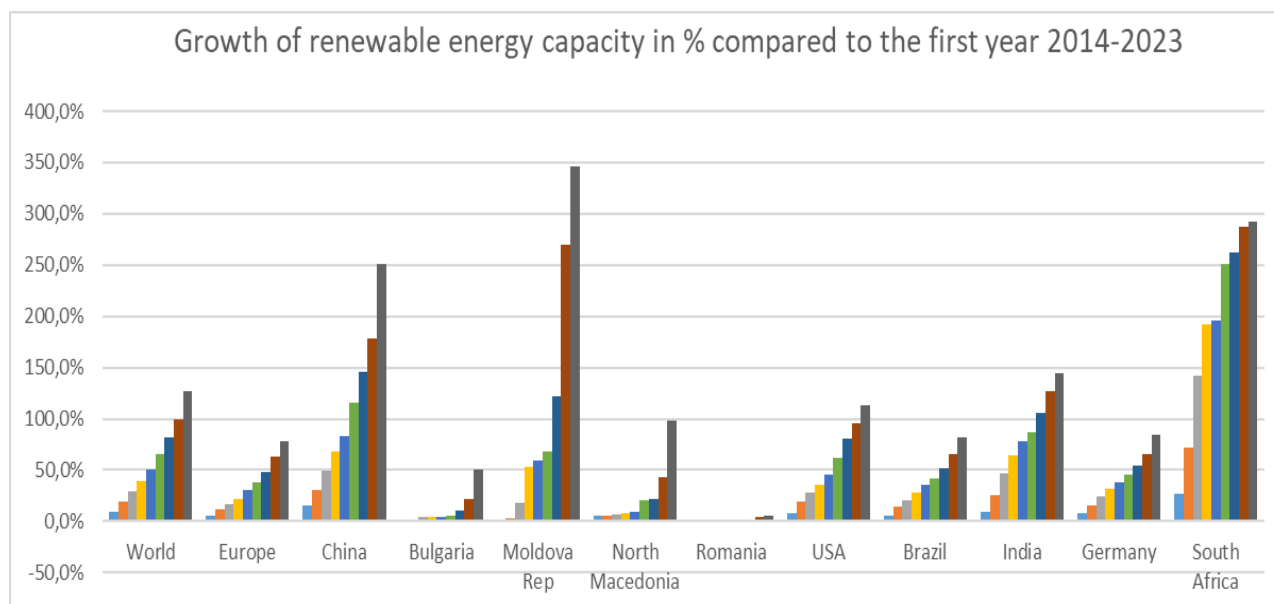


Figure1. Growth of RES capacity in % relative to the first year from 2014 to 2023

Source: compiled by the author based on data from (IRENA). (2024, July)

According to the figure, we see that the greatest growth in % compared to the first year of 2014 was demonstrated by Moldova 346.4%, as well as South Africa 291.8%, the growth in China was also significant 250.6%, these values significantly exceed the global and pan-European growth of 127.6% and 78.6%, respectively.

In the case of China, the result is very significant, despite the fact that even the starting positions in China were significant. In the case of Moldova, the impact is not significant RES capacity in 2014 and significant injections in subsequent years.

These countries have had some experience in introducing investments in renewable energy sources

German experience

Energy turnaround (Energiewende): Since 2010, Germany has been implementing the Energy Transition program, which aims to transition to 100% renewable energy sources by 2050. According to the German Federal Ministry of Economics and Energy, in 2023 the share of renewable energy sources in the country's energy balance exceeded 45%. (German Federal Ministry for Economic Affairs and Climate Action, 2024)

Increase in renewable energy capacity: In 2022, Germany installed an additional 5.5 GW of wind power capacity and 4.5 GW of solar panels, a new record for the country (WindEurope, 2022)

According to the Institute for Economic Research in Cologne (IW), Germany has invested more than 30 billion euros in the development of renewable energy sources in 2022. A significant portion of this investment comes from the private sector, stimulated by various subsidies and tax benefits.

US experience

The United States is actively investing in renewable energy, but policies and approaches to renewable energy development can vary greatly from state to state.

Leaders in solar energy: California is a leader in solar energy development, with more than 32 GW of installed solar capacity, representing about 30% of the nation's total installed solar capacity. (Solar Energy Industries Association [SEIA], 2024)

Wind energy development: Texas ranks first in the U.S. for wind power, with more than 30 GW of installed capacity. This allows the state to generate about 20% of its electricity from wind. According to the US Department of Energy, \$3.5 billion was announced in 2023 for the development of renewable energy infrastructure, including modernization projects electrical networks and the development of energy storage systems. (U.S. Department of Energy, 2024)

Chinese experience

China is a world leader in the production and consumption of renewable energy. The country is actively developing all types of renewable energy sources, including solar, wind, hydro and bioenergy.

Main achievements

Large-scale projects: China's solar sector is set to break records in the coming years. When installed capacity crosses the 500 gigawatts (GW) mark by the end of 2023, it will have taken 13 years to reach that milestone. (Rystad Energy, 2024)

Leadership in equipment production: China is the largest manufacturer of solar and wind energy equipment, exporting to dozens of countries around the world. The Chinese government allocates

huge funds for the development of renewable energy sources. In 2022, investments in this sector exceeded \$100 billion, allowing the country to maintain a high rate of growth in this industry (Bown, 2023)

Indian experience

India is actively developing solar energy, using large areas to install solar panels.

National Solar Mission: In December 2021, the Ministry of Natural Resources requested expressions of interest for a Phase II evaluation study of the grid-connected rooftop solar program. The program was part of the National Solar Mission, which aimed to connect 40 GW of rooftop solar systems to the grid. by 2022. (Mordor Intelligence, 2024)

Experience from Brazil

Brazil is one of the world's leading countries in the use of hydropower but is also active in the bioenergy and wind energy sectors.

Development of bioenergy: Brazil is a world leader in the use of biofuels and bioenergy, allowing it to significantly reduce its dependence on Fossil Fuels

Wind parks: In 2022, wind power capacity in Brazil reached 20 GW, representing about 10% of the country's total electricity capacity. (Flanders Investment & Trade, 2022)

Experience from North Macedonia

North Macedonia, as a small country in the Balkans, is actively seeking to diversify its energy sources and reduce its dependence on fossil fuels.

Hydropower development: North Macedonia has traditionally relied on hydropower, which accounts for a significant portion of the country's electricity production. In recent years, the government has increased investment in upgrading existing hydroelectric power plants.

Solar energy projects: A solar energy initiative was launched in 2021, with plans to build large solar parks such as the 50 MW Bitola solar power plant (Energy Community, n.d.)

North Macedonia has developed a national strategy for sustainable energy development, which places particular emphasis on the development of renewable energy sources and the reduction of greenhouse gas emissions. As part of this strategy, the country seeks to increase the share of renewable energy sources to 23% by 2030 (Energy Community, n.d.)

Romanian experience

Romania is one of the leading countries in Eastern Europe in the use and development of renewable energy sources. Thanks to its natural resources and support from the European Union, the country has made significant progress in this area.

Wind energy: Wind energy is the main direction of development of renewable energy sources in Romania. The country has powerful wind resources, especially in the Dobruja region, where more than 3 GW of capacity has been installed (WindEurope, 2023)

Bioenergy: Romania is actively developing bioenergy, using waste from agriculture and forestry to produce energy. In 2022 power bioenergy exceeded 500 MW (European Energy, 2024)

Romania receives significant financial support from the European Union for the development of renewable energy sources.

Bulgarian experience

Bulgaria, as a member of the European Union, is actively developing renewable energy sources as part of the overall EU goals of reducing carbon emissions and transitioning to sustainable energy.

Solar energy: Bulgaria has significantly increased investment in solar energy in recent years. By 2024, about 1.5 GW of capacity will be installed in the country solar power plants (IENE, 2024)

Geothermal energy: Bulgaria has significant geothermal resources, which are gradually being brought into operation to produce electricity and heat. Bulgaria actively uses European Union funds to support renewable energy projects. In 2023, the European Commission allocated 300 million euros to Bulgaria to modernize its energy infrastructure and develop new solar and wind energy projects (European Parliament, 2023)

Experience of the Republic of South Africa (RSA)

South Africa, one of Africa's largest economies, is aggressively developing renewable energy to reduce its dependence on coal, which has long been the country's main source of energy.

Renewable Energy Program (REIPPPP): The South African Renewable Energy for Private Producers Program (REIPPPP) is one of the continent's most successful examples. This program has attracted more than \$20 billion in investment and led to the commissioning of approximately 6 GW of capacity in the renewable energy sector, including solar, wind and bioenergy (Bloomberg, 2022)

Solar and wind projects: Large solar and wind parks, such as the De Aar solar farm and the Jeffrey's Bay wind farm, are examples of successful implementation of renewable energy in the country. Collectively, these projects provide thousands of megawatts of clean energy, helping reduce the country's carbon footprint

South Africa is actively receiving international support for the development of renewable energy sources. In 2021, the country was supported by international donors, including the World Bank, which allocated more than \$8 billion for projects in the field of renewable energy sources and modernization of the energy system (African Development Bank, 2021) The government also continues to encourage private investment in the sector, which is helping to develop new projects.

Experience from Moldova

Moldova, being one of the least developed countries in Europe, faces a number of economic and political challenges, but at the same time is taking steps towards the development of renewable energy sources.

Solar energy:

In recent years, Moldova has begun to actively develop solar energy, and in 2023, a project to build a solar power plant in the Cahul region with a capacity of 2 MW was completed. Although these figures are modest compared to other countries, this is an important step towards energy independence for Moldova.

Bioenergy: Moldova also uses biomass as an energy source, which is especially important for rural areas where there is access to agricultural waste.

Moldova receives significant support from international organizations such as the European Bank for Reconstruction and Development and the United Nations Development Program (UNDP), which finance projects in the field of renewable energy sources. In 2023, the EBRD allocated a grant of 10 million euros to Moldova for the development of solar energy and modernization of the energy system (EU4Moldova, 2023) At the same time, many countries face problems and challenges when introducing investments in renewable energy sources

Table 2. Problems and challenges in the implementation of renewable energy sources

China	Bulgaria	South Africa	North Macedonia	Romania	USA	Brazil	India	Germany	Moldova Rep
The growth of renewable energy production leads to overload of power grids, which requires significant investments in the modernization and expansion of networks.	Like other countries in the region, Bulgaria produces a significant portion of its electricity from coal-fired power plants, which complicates the transition to renewable energy sources	Despite progress in the development of renewable energy sources, coal continues to be the main source of energy in South Africa, which creates environmental and economic problems. Coal-fired power plants provide 70% of South Africa's electricity	The Macedonian economy is experiencing difficulties in attracting foreign investment in renewable energy sources due to political instability and insufficiently developed infrastructure	Processes for obtaining permits for the construction of new renewable energy projects may be delayed, which hinders the development of the sector	Despite the growth of renewable energy sources, traditional energy sources such as oil and gas are still highly developed in the United States, which creates competition for investment and resources	The development of large hydropower projects leads to significant environmental consequences, such as flooding of large areas and changes in ecosystems	Limited access to financing for small and medium-sized renewable energy projects slows down their development	The growing share of renewable energy sources creates problems with balancing electrical networks, which requires additional investments in energy storage systems and network modernization	Limited investment opportunities and financial instability are slowing down the development of renewable energy sources in the country. Most of the projects are financed by international donors and organizations
Despite the active development of renewable energy sources, China continues to face serious environmental problems due to the large volume of CO2 emissions.	Problems with corruption and poor governance may reduce the effectiveness of renewable energy projects	Frequent changes in government policy and economic instability create uncertainty for investors and slow down the development of new renewable energy projects	Despite the growth of renewable energy sources, coal power plants continue to provide a significant part of the energy mix, which complicates the transition to cleaner energy sources	The energy infrastructure inherited from Soviet times requires significant investments in modernization for the effective use of renewable energy sources.	Policy changes and insufficient federal support may create uncertainty for investors	-	Existing energy infrastructure cannot always cope with the integration of new energy sources	High costs of maintaining renewable energy infrastructure and integrating them into the overall energy system lead to an increase in the cost of electricity for end consumers	Moldova depends on the import of electricity from neighboring countries, which poses a threat to energy security. The development of renewable energy sources is considered as one of the ways to reduce dependence

Source: compiled by the author based on data from Daily Maverick. (2023, November 1)., European Commission. (2023, December 21), EY Romania. (2021, April)., World Economic Forum. (2022, July)., World Bank. (2023, May 4)., Energy Community. (2024, August 2)., Deloitte. (n.d.)., Clean Energy Wire. (n.d.)., U.S. Department of State. (2024)., ScienceDirect. (2024).

As we see from the table, the problems of many countries are most often similar, the most developed ones have problems with overloading of power grids and the need to invest in their expansion, developing ones have issues with financing and instability of government policies, and many countries are heavily dependent on traditional energy sources, which delays the transition to RES.

Table 3. Average purchasing tariffs for electricity by country

Fixed tariffs (FIT):	Unit of measure	China	Bulgaria	Moldova Rep	North Macedonia	Romania	USA	Brazil	India	Germany	South Africa
solar power plants	EUR/MW	45.87-64.22	81.91-180.99	93.2-102.07	120-160	120-180	96.33-133.03	21.83-24.5	27.52	62.2-85.6	24.75-36.67
wind power plants	EUR/MW	45.87-64.22	62.64-89.92	82.38-95.34	89	20-30	96.33-133.03	21.47-24.58	36.7	-	24.75-36.67

Source: compiled by the author based on data from (DSIRE). (n.d.)., Clean Energy for EU Islands. (n.d.)., United Nations Development Programme. (n.d.)., pv magazine. (2021, July 22)., ANRE. (n.d.)., energypedia. (n.d.)., Cliffe Dekker Hofmeyr. (2023, February 23), World Bank. (n.d.)., National Development and Reform Commission of China. (2019, April 30), pv-tech. (2023, July 24)., Schoenherr Attorneys at Law. (2023, June 15)., Balkan Green Energy News. (2023, July 1),

As we can see from the table, the lowest purchase prices for solar and wind energy are observed in Brazil, India and South Africa.

The price largely depends on various factors regarding the investments made and other conditions, but the general trend is characteristic. At the same time, the growth in capacity commissioning in these countries over the past 9 years has been significant, which indicates other important factors for investing in renewable energy sources. In Brazil, the increase in the share of hydroelectric power plants also had an impact, in India and South Africa to a lesser extent.

The highest purchase prices are found in Moldova, North Macedonia and the USA. At the same time, capacity growth over 9 years has increased significantly in Moldova, but this was also influenced by the low initial base. The US and Macedonia are also growing significantly in capacity, although not as significantly.

China, with average prices in this table, shows significant growth in renewable energy capacity. Other incentives influenced this, as well as the fact that China produces power plants, and their prices are quite lower than those of other market participants.

In addition to purchasing tariffs, there are other incentives for introducing investment in renewable energy sources.

Table 4. Investment promotion methods for the countries under consideration

Stimulation methods	Moldova Rep	Germany	USA	Romania	India	China
Tenders for large renewable energy projects						
Tender system for new renewable energy projects. Projects that offer the lowest price per kWh of energy produced are awarded contracts, reducing energy costs for consumers and encouraging competition between producers.	It applies	It applies	-	-	It applies	-
Exemption from value added tax and property tax						
Equipment used to produce renewable energy sources can be exempted from VAT, which reduces capital costs for investors.	It applies	-	-	It applies	It applies	It applies
Green Certificates						
a system of green certificates that can be sold to companies to meet their obligations, creating an additional incentive for energy production from renewable energy sources.	-	-	-	It applies	It applies	It applies
Reduces income tax						
In some cases, renewable energy projects can receive tax incentives, making the investment more attractive.	It applies	It applies	-	It applies	-	-
Quotas for the use of renewable energy sources (Renewable Portfolio Standards, RPS)						
mandatory quotas for the share of renewable energy sources in the energy balance, which forces energy companies to invest in the development of renewable energy sources to meet requirements.	-	It applies	It applies	It applies	It applies	It applies
Green Bonds						
State and local authorities and banks issue bonds, the proceeds of which are used to develop renewable energy projects.	-	-	It applies	It applies	It applies	It applies
Grants and subsidies						
provides subsidies and grants for renewable energy projects, especially in rural and remote areas.	It applies	-	It applies	It applies	It applies	It applies
Investments in infrastructure						
Federal and local authorities support the construction of new transmission lines and other infrastructure projects needed to integrate renewable energy sources into the national energy grid.	-	-	It applies	It applies	-	It applies
Cercetare și inovare în surse regenerabile de energie						
Accelerarează permisiunea	-	It applies	It applies	It applies	-	It applies
Accelează permisiunea						
simplificarea procedurilor administrative și accelerarea procesului de obținere a autorizațiilor pentru construcția de instalații de energie regenerabilă.	It applies	-	-	It applies	It applies	It applies
Loans, international financing						
State banks give preferential loans for renewable energy projects, so does the EBRD	It applies	It applies	-	-	It applies	It applies
(Production Tax Credit, PTC)						
It is given for every kilowatt-hour of energy produced at renewable energy installations. The main recipient is wind energy.	-	-	It applies	-	-	-
Tax credit for investments in renewable energy sources (Investment Tax Credit, ITC)						
It allows investors to receive a return of up to 26% on the cost of a renewable energy project	-	-	It applies	-	-	-
Accelerated Depreciation (AD)						
accelerating the depreciation of assets related to renewable energy sources	-	-	-	-	It applies	-
Clean Energy Funds						
to finance local renewable energy initiatives	-	-	It applies	-	-	-
Funding from EU funds						
financing from EU funds including within the Horizon 2020 and ENPARD programs for Moldova	It applies	It applies	-	It applies	-	-
Electricity tax exemption (EEG-Umlage)						
Small producers of energy from renewable energy sources can be exempted from paying electricity taxes	-	It applies	-	-	-	-
Loan guarantees						
In some cases, renewable energy projects receive government loan guarantees	-	It applies	-	-	-	-
Programs for private households and farmers						
Installing small-scale renewable energy sources such as solar panels on house roofs	It applies	It applies	-	-	-	-

Source: compiled by the author based on data from Cherry Tree Group (n.d.), Korolev (2022), Mordor Intelligence (2023), Flanders Investment & Trade (2022), Clean Energy Wire (2023), World Bank (2022).

As we can see from the table, the methods of stimulating investment in renewable energy sources in the countries studied are very similar. These include green certificates and green bonds, and exemption from VAT and income tax, grants and subsidies and quotas for the purchase of electricity and all kinds of funds. From the experience of the countries studied, Moldova can additionally apply incentives for the implementation of renewable energy sources in the form of green certificates and bonds, quotas for the purchase of electricity, investments in infrastructure, scientific research in the field of renewable energy sources

3. Conclusions.

Having analyzed the above information, we observe that the production of electricity from renewable energy sources is actively developing both in the world and in the countries, we studied, and there has been significant growth.

Countries see this as a significant prospect in the development of alternative energy sources and in reducing air carbonization.

The experience of these countries in introducing renewable energy sources is in many ways similar, but at the same time there are specific features of each country.

First, purchase prices differ from RES. In this context, the Republic of Moldova has significant advantages, since the purchase price is much higher than many countries. Also, in other methods of stimulating the introduction of investments in RES, countries generally use similar incentive methods and Moldova also follows their experience.

Yes, there are methods that Moldova should study and perhaps also apply to further stimulate the introduction of investments in RES. Because Moldova has risks for energy security and the risk of interruption of gas supplies for electricity generation at MOLDGRES, there is a need for additional stimulation of the introduction of RES increases even more.

While Moldova has significant renewable energy potential, especially in solar and wind, the required infrastructure and investments do not meet the country's needs. This is due to bureaucratic obstacles, regulatory problems and the difficulty of integrating new energy sources into the existing energy system.

Support measures from the state may include public-private partnerships, provision of government loans and guarantees, compensation for investment costs, provision of grants, reduction of duties, elimination of bureaucratic barriers,

simplification of administrative procedures for investors, weakening of taxation, regulation and obligation to purchase generated capacity at fixed prices

Nevertheless, all these restrictions, increased supply risks, and increased prices indicate that investments in the renewable energy sector are the most appropriate soon.

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THE IMPORTANCE OF FINANCIAL AND ACCOUNTING INFORMATION IN DETERMINING AND COMBATING ECONOMIC CRIME

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Abstract: *Economic crime includes fraud, tax evasion, money laundering, corruption, and other illegal activities. It usually arises from the desire to avoid the high costs associated with regulatory compliance. Taxes perceived as too high or unfair can lead entrepreneurs to seek illegal ways to reduce their tax obligations. The effect of these activities is a loss of revenue for the government, which highlights the importance of an efficient tax system.*

Keywords: *financial and accounting information, economic crime, tax evasion*

1. Introduction

Economic theory highlights the essential role that trust and security play in fostering growth and ensuring the smooth functioning of the market economy, which is understood as a set of necessary procedures and rules for the production of resources and their efficient exchange within society. This trust and security among economic operators stem from the belief in a complex system of rules guaranteed by public institutions' controls, which focus on steering the attitudes and behaviours of economic operators in the desired direction, as well as penalizing dishonest conduct and resolving conflicts of interest. The development of the modern economy is constantly influenced by the quality and quantity of illicit and criminal acts committed, with public institutions being responsible for ensuring transparency in capital and labour, maintaining competitive order in the market for goods and services, and ensuring the effectiveness and efficiency of the justice system in defending rights and resolving disputes.

2. Basic content

Over time, accounting has developed considerable knowledge of a company's economic and financial situation. It can optimally provide the necessary information about a company's position and performance and help determine its fiscal risk. One of the purposes of accounting is to serve as a "dashboard," a guiding tool for economic entities to operate under optimal conditions and in compliance with current legislation, thereby avoiding the transition of companies into the underground economy.

The accounting information made available to the management of units, regardless of their field of activity, provides the opportunity to choose optimal programs and establish economic policy guidelines. The current trend in accounting information is to become much more efficient through the use of electronic computers and automated management calculations, which significantly reduce data processing time and offer timely support for economic and financial decision-making.

The scope of accounting information is vast, often presenting specific information derived from processing and interpreting value movements related to a creative activity using accounting logic.

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"The main data source of the economic information system, and at the same time one of its core components, is accounting, the primary tool for understanding, managing, and controlling the assets and results achieved by economic entities.³²"

Accounting information is the primary tool used to carry out controls. Its usefulness stems from its ability to describe, measure, and classify economic activities, allowing for advanced processing and ensuring long-term compatibility. Transparency of information is essential for fulfilling the functions of accounting information. It aims to provide a fair representation of the risks within a company's economic activities and ensure the proper functioning of the market based on fair competition. Through transparent and timely communication, fraud prevention is achieved.

Control involves continuous or periodic supervision, analysis, and verification of a situation or activity to monitor its progress and make decisions to reduce potential risks and improve operations. The constant evolution of operations and transactions subject to control requires a complex structure, determined by various criteria:

- a) Based on the time of execution, about when the respective operations are carried out, we have:
- Preventive control – exercised before the execution or commitment of the respective operations. This type of control is typically carried out during the approval or authorization of transactions and operations;
 - Concurrent control – performed during the execution of the controlled operations, taking the form of hierarchical control, mutual control, or self-control;
 - Subsequent control – conducted after the operations have been completed and carried out by specialized control bodies (internal audit, budgetary control, inventory control, or specialized state inspections).
- b) Based on the objectives controlled, we have:
- Economic control – focuses on the planning and efficient use of material resources, as well as fulfilling the established tasks. It uses measurement standards in terms of value, natural units, and labour;
 - Financial control – generally takes place within credit relationships and financial relations. It primarily uses the value standard;
 - Technical control – ensures compliance with product quality, manufacturing technologies, the characteristics of fixed assets, etc.

For control to be effective, it must be comprehensive, requiring both an economic and financial approach and a technical one for the objectives being controlled. The economic and financial solutions adopted can have technical consequences, and vice versa.

"Between economic control and financial control, there are numerous interferences, as most economic operations also have financial and management implications, which is why, in practice, we exercise an economic-financial control or financial and management control"³³.

- c) Based on the methods used, there are:
- Documentary-accounting controls – which involve the analysis of primary documents, operational records, and both analytical and synthetic accounting registers;

³² Conf. Univ. Dr. Elena Diaconu, *Rolul informației financiar-contabile în dezvoltarea durabilă a firmei*, Universitatea „Spiru Haret” București.

³³ Prof. Dr. Ioan Oprean, *Control și audit intern – suport de curs pentru masterat*, Cluj Napoca, 2010

- Factual controls entail on-site inspection, physical observation, expert evaluation, and inventory checks.

d) Based on the level of proximity to the controlled activities, we have:

- Direct controls – which involve the personal supervision of the controlled activity or subordinates' activities by control bodies or management;

- Indirect controls – through which the analysis of the controlled activity is based on information and reports received, tax declarations, statements, explanatory notes provided by those being controlled, etc.;

- Mutual controls – which are conducted between members of working groups, between enterprises, or between departments, based on comparing different documents that contain similar indicators;

- Self-control – which involves a self-analysis of the activity to determine the degree of achievement of the proposed objectives.

e) Based on economic and financial interests and the level from which control is exercised, we have:

- State-exercised controls – carried out by state control bodies, ensuring compliance with the current legal regulations within the controlled domain;

- Controls exercised at the company level – aimed at managing risks that may jeopardize the achievement of objectives, as well as the efficient and proper management of assets;

- Legal or statutory control – performed by independent experts who are members of the Body of Expert Accountants and Authorized Accountants of Romania (CECCAR) or the Chamber of Financial Auditors of Romania (CAFR).

f) Based on the scope, we have:

- Comprehensive controls – which involve a multifaceted approach to the controlled activities, with participants including specialists from various fields, forming a "mixed control brigade." These brigades can include experts in sociology, taxation, accounting, IT, marketing, technical, legal fields, etc.;

- Partial controls – which focus on a specific group of objectives or a particular sector of activity, such as payroll, legality of trade operations, stock management, compliance with fiscal and financial discipline, etc.

Thematic control is a form of partial control carried out by state control bodies that target several companies at the same time, analyzing the same limited group of objectives.

Both partial and comprehensive controls can be conducted as spot checks or as full controls. Typically, spot checks are conducted initially, and if irregularities such as falsifications, omissions, frauds, or other significant errors are found, the control is escalated to complete control.

The totality of illegal acts committed by organizations, associations, companies, or individuals in connection with banking, financial, commercial, and customs transactions through fraud, money laundering, deception, falsification of business figures, breach of trust, fraudulent bankruptcy, unpaid insurance policies, tax evasion, and other offences constitutes an economic and financial crime or economic corruption. Among these, tax evasion is the most common in practice.

The phenomenon of tax evasion is considered omnipresent and can be explained from multiple perspectives: economic, legal, theological, political, physical, and moral. Regardless of the level of taxes and duties, tax evasion exists in varying proportions across different countries.

When discussing global financial markets, it is also necessary to consider the globalization of white-collar crime and corruption. Therefore, an effective strategy to combat tax evasion, coordinated at the global level through legal norms and rules on transparency and economic security, is a priority. Tax evasion often falls within the white-collar crime category and can result in significant material losses. Tax evasion lies at the border between illicit and licit activities. It manifests as a protest by taxpayers against suffocating fiscal policies, thereby contributing to the growth of the black economy.

Tax evasion reflects the attitude of taxpayers who refuse to comply with their legal obligations to pay taxes and duties, which can lead to administrative or criminal liability for the taxpayer.

Tax evasion can take several forms:

- Traditional fraud – characterized by evading the payment of tax obligations, typically through the non-submission or incorrect submission of legal documents; the drafting of false documents; underreporting the value of inherited assets; increasing expenses to reduce taxable income; or providing services or producing goods paid under the table;
- Legal fraud – involves concealing the true nature of a contract or entity, such as continuing an economic activity without a profit motive in order to avoid paying the corresponding taxes;
- Accounting fraud – the most advanced form of tax evasion, characterized by maintaining regular accounting records using false documents to inflate expenses and reduce income; preparing false tax records and registers; falsifying balance sheets; creating fictitious payment documents, etc.;
- Valuation fraud – for example, this may involve underestimating the value of inventory or overestimating provisions and depreciation, thereby deferring profit over time.

Tax evasion is classified according to the following criteria:

a) Based on the method used to avoid compliance with tax regulations:

- Legal (or tolerated) tax evasion – this occurs when a portion of the income of certain individuals or social categories is exempt from taxation through legal loopholes, simulated evasion, or oversight. "In the case of legal tax evasion, the taxpayer tries to position themselves as favorably as possible to take maximum advantage of the benefits offered by the current tax regulations"³⁴. Due to the high level of taxpayer innovation regarding current legislation, the most common methods of legal tax evasion include: investing in machinery and technical equipment whose value can be deducted from profit tax according to regulations (e.g., electronic fiscal cash registers); deducting protocol and advertising expenses from taxable income; offering employee benefits (deducting professional expenses, company cars); making donations; and supporting scientific and cultural activities, among others.
- Fraudulent tax evasion – involves concealing the taxable object, underreporting the taxable base, or using other means to evade the payment of due taxes and duties, all of which involve violations of the current legal provisions. The most common form of tax evasion is fraud, as opposed to legal evasion, and it automatically entails a breach of legal provisions based on fraud and bad faith.

In practice, distinguishing between legal and illegal tax evasion is very difficult because the transition between the two is more continuous than a clear break. Thus, taxpayers' constant attempts to exploit legislative loopholes can direct them from legality to fraud.

b) Based on geographic scope:

- National fraud – conducted within the territory of a single state;

³⁴ D. D. Șaguna, *Tratat de drept financiar și fiscal*, Ed. All Beck, București, 2000, p. 286

- International fraud – transcends the borders of one state.
- c) Based on the perpetrator of the fraud:
 - Fraud committed by individuals;
 - Fraud committed by legal entities.
- d) Based on the complexity of the means used:
 - Simple or artisanal fraud – involves deficient methods of execution due to the involvement of a single perpetrator, typically acting without the help of others;
 - Industrial fraud – characterized by a high level of complexity, mainly due to the ingenious techniques applied and the use of fictitious supporting documents.
- e) From a fiscal perspective, fraud includes:
 - Income reduction, representing the diminishing of the taxable base, regardless of the means used;
 - Timing of tax obligations, primarily composed of value-added tax (VAT) and customs duties.
- f) Based on the duration of the tax fraud:
 - Long-term fraud – in this case, an economic agent initially builds a good reputation, then proceeds to stop paying taxes and duties owed to the state, along with failing to pay debts to suppliers of goods and service providers, eventually leading to insolvency and transferring revenues to another state;
 - Short-term fraud usually manifests in creating a company with the sole purpose of requesting a VAT refund for a specific economic transaction, after which the company ceases its activity following the receipt of the VAT.

Tax evasion is considered a measure of a state's inability to implement effective public policies. Therefore, developing a solid tax system is the ideal solution for combating tax evasion. This tax system must regulate taxes and duties, allow for lower taxes that are easier for taxpayers to bear, and establish penalties for violating tax provisions.

Since taxpayers typically pay taxes and duties out of fear of the penalties they may face, one measure to counteract tax evasion would be to increase the severity of actions aimed at combating tax evasion. "Economic studies show that tax evasion decreases at the same rate as the likelihood of detecting tax evasion cases increases, along with the intensification of penalties aimed at such offenses"³⁵.

Combating economic crime can be achieved by curbing tax evasion, and the main methods that can be implemented include:

- Changing taxpayers' mentality alongside shifting the tax administration's attitude towards taxpayers, which can be accomplished by fostering a partnership between the two;
- Increasing the strictness of authorization conditions for economic agents;
- Relaxing fiscal policies, such as tax amnesty, short-term tax and duty reductions or exemptions, and the gradual reduction of the share of direct and indirect taxes in the long term);
- Improving the tax apparatus through the professional and social training of officials;
- Increasing data transparency, a measure aligned with the EU's policy on combating tax evasion;
- Promoting non-cash payments – using bank cards linked to accounts allows for tracking the origin of funds and, in the long term, helps eliminate a significant portion of the underground economy.

³⁵ M. Zagler, *International tax coordination: an interdisciplinarity perspective on virtues and pitfalls*, Ed. Routledge, New York, 2010, p. 52

The current fiscal innovations of ANAF (the National Agency for Fiscal Administration) include improving interaction with taxpayers through the Virtual Private Space (SPV), the obligation to submit electronic invoices (e-Invoice system), the requirement to obtain a UIT code for the transport of goods with high fiscal risk (e-Transport platform), as well as the pre-filled VAT declaration (e-VAT), which is currently in the process of being implemented.

3. Conclusions

In conclusion, economic and financial information is the primary tool for conducting controls, thus forming the starting point for combating economic crime. The importance of economic and financial information stems from its ability to describe, measure, and classify economic activities, enabling advanced processing and ensuring long-term compatibility. Information transparency is essential for fulfilling accounting information functions, fairly representing the risks inherent in a company's economic activities and ensuring the proper market functioning based on fair competition. In this way, transparent and timely communication helps prevent fraud.

The totality of illegal acts committed by organizations, associations, companies, or individuals about banking, financial, commercial, and customs transactions through fraud, money laundering, deceit, falsification of business figures, breach of trust, fraudulent bankruptcy, unpaid insurance policies, tax evasion, and others, constitute an economic and financial crime, or economic corruption. Among these acts, tax evasion is the most common in practice.

Combating economic crime can be achieved by curbing tax evasion, with the main methods that can be implemented including changing taxpayers' mentality; increasing the strictness of authorization conditions for economic agents; relaxing fiscal policies, such as tax amnesty, tax and duty reductions or exemptions (in the short term), and gradually reducing the share of direct and indirect taxes (in the long term); improving the tax apparatus through the professional and social training of officials; increasing data transparency, a measure aligned with the EU's policy on fighting tax evasion; and promoting non-cash payments – using bank cards linked to accounts, which allows for tracking the origin of funds and, in the long term, eliminating a significant portion of the black market economy.

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FINANCIAL INDEPENDENCE AND GENDER EQUALITY

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Abstract:

This article investigates the multidimensional aspects of financial independence with a particular focus on gender equality. It proposes a comprehensive measurement framework organized around three core dimensions: income, wealth, and power and control.

The framework integrates empirical and theoretical perspectives to provide a nuanced understanding of financial independence and its gendered implications.

The analysis highlights significant gender disparities in income and employment across the EU and Moldova, with women consistently earning less and facing more barriers in accessing financial resources compared to men. In Moldova, women's financial vulnerability is exacerbated by their reliance on non-productive income sources such as social benefits and remittances, alongside challenges in accessing credit. The article also explores the dimension of power and control, revealing persistent imbalances in household decision-making where women often have less influence over financial decisions.

The findings underscore the need for targeted interventions to enhance women's financial literacy, improve access to credit, and promote gender equality in decision-making. By considering the intersectionality of gender with other personal and societal factors, this article provides insights into developing more effective strategies to support financial independence and reduce gender disparities. Ongoing reforms and institutional oversight are essential to advancing these goals and achieving a more equitable financial environment.

Key words: *Financial Independence, Gender Equality, Income Disparities, Wealth Gap*

JEL: J16, J31, D31, G21, I32

1. Introduction

Financial independence has substantial implications for both women and men, affecting their ability to lead healthy, secure, and fulfilling lives, exercise agency and choice, and live free from economic and other forms of domestic and intimate partner violence. Over the past three decades, income inequality has been rising across advanced capitalist societies (Piketty, 2014). For women, gendered income inequality has significant sociological consequences, including an unequal division of household labor and an increased likelihood of experiencing abuse within relationships. Additionally, such inequality has macroeconomic effects, such as hindering economic growth and exacerbating overall inequality.

Gender disparities in financial independence may be further intensified by ongoing global economic challenges, including rising inflation, energy prices, and the associated cost-of-living crisis, which disproportionately affect women.

The EU's 2020–2025 gender equality strategy acknowledges that “*women and men in all their diversity should have equal opportunities to thrive and be economically independent, be paid equally for their work of equal value, have equal access to finance and receive fair pensions*” (European Commission, 2020). Promoting women's economic rights and independence is a strategic objective of the Beijing Declaration and Platform for Action (BPfA) under Area F, on women and the economy. Launched by the United Nations in 1995, the BPfA is a global agenda for women's empowerment. Moldova's aspirations for European integration have brought renewed focus to the issue of gender equality, particularly in the realm of financial independence. As the country works towards aligning its policies and practices with EU standards, understanding the multidimensional nature of financial independence has become increasingly important.

This article examines the gender analysis of financial independence among EU member countries, using them as a benchmark for the Republic of Moldova. It draws insights from recent studies and surveys to explore the three core dimensions of financial independence: income, wealth, and power and control. Additionally, the article considers the overarching factors that shape these dimensions, including personal characteristics, household dynamics, and societal norms.

2. Financial independence and gender equality

The gender analysis of financial independence has significantly advanced our understanding of this complex issue, revealing its multidimensional nature. Early studies primarily focused on (married) women's financial dependence on their partners and the associated repercussions (Becker, 1981; Blood & Wolfe, 1960; Hobson, 1990). These studies applied a gender perspective to examine power imbalances between men and women, with many economic models assuming that households function as a unified economic entity.

Contemporary research broadens this perspective by considering a wider array of factors related to financial independence. Recent literature emphasizes the importance of looking beyond mere financial resources to understand how decision-making processes influence whether and how financial resources contribute to living a life aligned with one's values and aspirations (e.g., Sen, 1985).

Current studies often explore financial independence in the context of earnings and income within female-male relationships, typically in marriage or partnership (Kalmijn et al., 2007). This approach provides insights into women's income situations, including their resources for power and decision-making relative to their partners. Indicators such as women's earnings compared to their partner's or relative to household income are commonly used (Bettio & Ticci, 2017; Alper, 2019; Beznoska, 2019; Bonke, 2015; Kalmijn et al., 2007). Research shows that in the EU, a greater share of household income typically correlates with increased protection from material deprivation (Guio & Van den Bosch, 2021; Karagiannaki & Burchardt, 2020).

In my view, understanding financial independence through a multidimensional lens, especially with a focus on gender equality, necessitates a nuanced measurement framework. Such a framework should be firmly rooted in both empirical and theoretical literature, highlighting the essential

dimensions and their intricate interconnections. This approach aims to offer a more thorough and gender-sensitive interpretation for various analyses related to financial independence.

After reviewing the relevant information and the most recent statistical data, can be highlighted the following structure for the measurement framework, which is organized around three core dimensions:

- **Income:** This includes various sources such as earnings, state benefits, transfers, or pension payments.
- **Wealth:** This encompasses assets and liabilities, representing the financial 'safety net' available to the individual.
- **Power and Control:** This dimension covers access to resources, financial literacy, decision-making, and spending.

In the author's view, this framework provides a more comprehensive and equitable perspective on financial independence by taking into account the diverse needs and experiences of different individuals.

In addition to the core dimensions, the framework acknowledges overarching factors influencing financial independence. These factors include:

- *Personal Characteristics:* Gender, age, race, nationality, social status, sexual orientation, disability, and ethnic origin.
 - *Household and Family Characteristics:* Presence of a partner, marital status, and dependent children.
 - *Extended Familial Context:* Financial or other support from ex-spouses, non-resident family members, or other relatives.
 - *Societal Factors:* Gendered norms, stereotypes, and policies at both Member State and EU levels.
- Consequently, the analysis of financial independence and gender equality will be conducted through the lens of the above three dimensions, both at the European level and within the context of Moldova, taking into account the influencing factors.

Thus, regarding the *income* dimension, data and evidence reveal substantial and persistent disparities between women and men in employment, earnings, and overall income. Estimates of gender differences in aggregate income remain challenging due to the lack of individual-level data across various income sources and measurement difficulties.

In the EU, data from Eurostat (2022) indicate that 19% of economically inactive women and 3% of economically inactive men were not seeking employment due to caregiving responsibilities for adults with disabilities or children. This reflects the disproportionate burden of homemaking and unpaid care work on women, as highlighted by the European Institute for Gender Equality (EIGE, 2021). Additionally, significant differences are observed in employment rates and working hours between women and men of working age (20–64 years) in the EU (EIGE, 2015). According to EIGE's Gender Equality Index (2023), the full-time equivalent employment rate for individuals aged 15–89 is lower for women (42%) compared to men (57%).

These gender disparities in labor market participation and working hours have significant implications for the gender gap in earnings and, consequently, income.

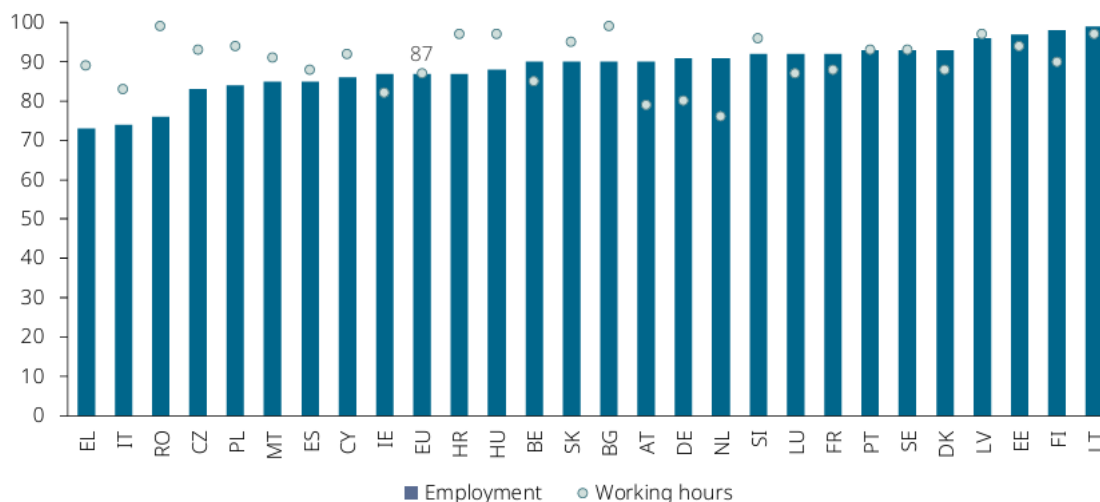


Figure 2. Women’s employment rate and working hours as a percentage of men’s employment rate and working hours, by EU Member State (%), 20–64, 2022)

Source: EIGE (2024). *Financial independence and gender equality: Joining the dots between income, wealth and power*

NB: The employment rate is defined as the percentage of the total population (women and men aged 20–64) who worked at least on 1 hour for pay or profit during the reference week or were temporarily absent from such work.

Figure 1 shows that, in all EU Member States, women of working age are less likely to be in employment than men of working age. On average across the EU-27 in 2022, the employment rate for women was 87 % of the rate for men. This marks a slight improvement from 84 % in 2013. In addition to a lower employment rate, women of working age in the EU work on average 34.7 hours per week, which is 87 % of the hours worked by men (39.9 hours).

In Moldova, at the same time, the main indicators of the labor market register a positive trend according to gender equality index from 2024 (CPD, 2024). Over the last 3 years on the market work, both women and men are becoming more active. Compared to the year 2022, the activity rate in the row for men rose from 45.1% to 46.3% and the employment rate for women rose from 35%, up to 36.8%, as reflected in Figure 2. At the same time, gender inequality among working people remains considerable significant: the activity rate among men is about 10% higher than that of a women, and the employment rate by 8%. This inequality is further fueled by stereotypes existing regarding gender roles in society, such as that the one who has to work is the man, and it is the women who have to take care of the housework and childcare.

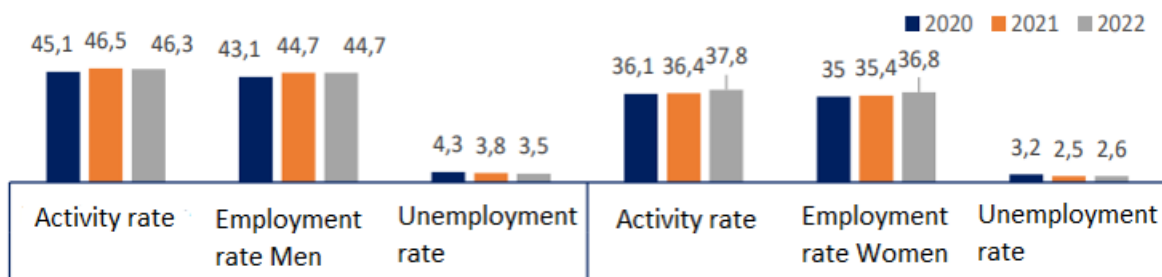


Figure 2. The main indicators on the labor market, %, 2020-2022

Source: National Bureau of Statistics (NBS)

In Moldova, many women primarily rely on social benefits and remittances for their income. According to data from the National Bureau of Statistics (NBS), women are predominantly dependent on non-productive income sources, such as social benefits and remittances, whereas men primarily earn through wage labor. This reliance on non-productive income sources significantly increases women's financial vulnerability.

Concerning the second dimension that refers to *wealth*, in EU Member States there is a lack of comparable data on individualised wealth (assets and liabilities). The main dataset on assets and liabilities, the Household Finance and Consumption Survey (HFCS) from the European Central Bank, provides detailed information about a range of assets and liabilities at the household level, but not at the individual level.

The *gender wealth gap* is larger in relation to financial assets than property, a trend observed in several EU Member States (Sierminska, 2017), including Germany (Table 1), France and Italy. This may be because property is more likely than financial assets to be jointly owned in couple households and/or other multi-adult households.

Table 1: Mean values of women’s and men’s assets and liabilities and corresponding gender gaps (18+, Germany, 2019)

Asset type	Mean value (EUR)		Gender gap (%)
	Women	Men	
Financial assets: savings accounts, bonds, shares	16 558.54	27 189.77	39
Residential assets: owner-occupied property	108 629.60	119 885.00	9
Aggregate wealth: tangible assets and investment properties as well as financial and residential assets	143 308.80	185 741.00	23
Residential debt: owner-occupied property	17 192.18	20 297.88	15
Private debt: personal credit debt, personal loans	1 886.67	4 097.61	54
Aggregate debt: debts relating to investment property as well as residential and private debt	22 631.43	31 165.56	27

Source: EIGE (2024). *Financial independence and gender equality: Joining the dots between income, wealth and power*

NB: The gender wealth gap is defined as the difference in the mean value of women’s and men’s assets/liabilities as a percentage of the value of men’s. Different definitions of the gender wealth gap are used in the literature, but this approach is consistent with how Eurostat defines the gender pay gap.

Evidence from Germany indicates that while women typically hold fewer assets than men, they also incur less debt, with the gender gap in aggregate debt standing at 27%. This disparity in debt levels does not necessarily translate into greater financial strain for men. As illustrated in Table 1, the majority of debt in Germany is residential, such as mortgages, which generally serve as a means of accumulating wealth and are accessible primarily to individuals with a certain level of capital. Nonetheless, gender gaps are evident in both private debt (54%) and residential debt (15%).

A review of international literature on gender and debt (Callegari et al., 2020) reveals that men are more likely to incur debts related to bankruptcies, public debts, unpaid alimony, and high-cost items like televisions and cars. Conversely, women are more prone to accumulating debt through credit cards. In partnerships, the higher-earning partner, who is disproportionately male, is more likely to make decisions regarding debt and borrowing (Callegari et al., 2020).

In Moldova, statistical data indicate significant gender-based disparities in financial security. Women frequently encounter greater difficulties in accessing credit and financial services, which can hinder their ability to accumulate assets. For example, women are more likely to be engaged in informal employment, which often does not contribute to formal financial asset accumulation. This underscores the need for targeted financial literacy programs and policies to improve women's access to financial resources.

The financial safety net in Moldova, defined by the balance of assets and liabilities, shows resilience despite economic challenges. However, addressing gender disparities in financial access and literacy is essential for improving the overall financial security of individuals, particularly women. Ongoing reforms and oversight by the National Bank of Moldova are aimed at further strengthening this safety net, ensuring that both men and women can effectively navigate the financial landscape.

The literature on the third dimension of **power and control** underscores the significance of resources in determining an individual's ability to make autonomous decisions and influence household matters. According to the EU-SILC 2010 ad hoc module, couples were asked about the balance of decision-making regarding various financial aspects, and responses varied widely across different types of decisions (Figure 3). Decision-making tends to be more balanced in general decisions and those concerning expenditure on consumer durables and furniture. In most relationships, decisions about saving and borrowing are also balanced. However, when borrowing decisions are dominated by one partner, it is more frequently the man, while decisions about saving are equally shared between men and women.

Gender differences are most pronounced in decisions related to everyday shopping and children's expenses, with women disproportionately making these decisions. Across the EU, fewer than half of both women and men in partnered relationships report equal decision-making regarding everyday shopping.

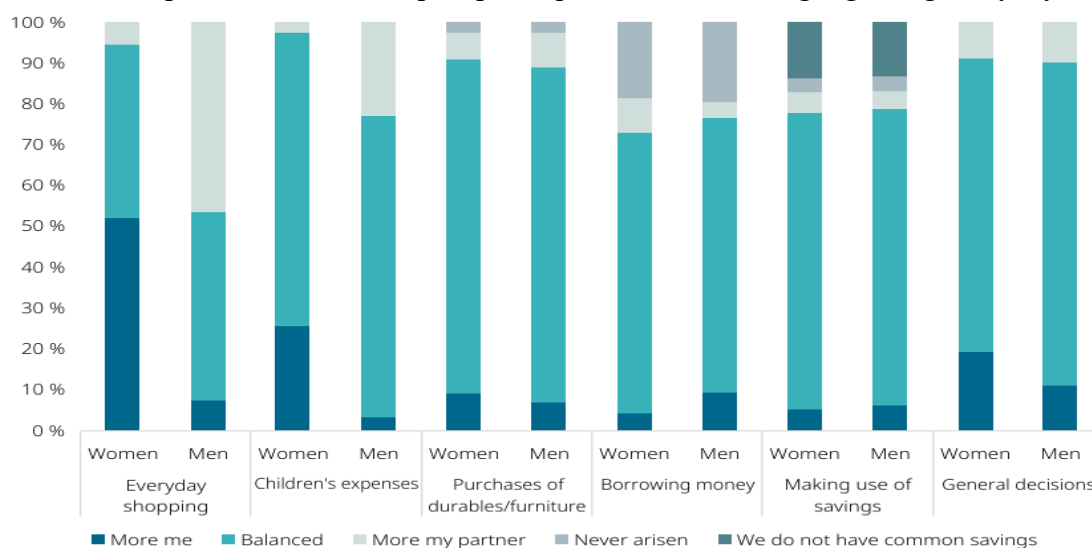


Figure 3. Financial decision-making by partnered women and men (%), 16+ years, EU, 2010
 Source: Eurostat (2012)

In Moldova on the other hand, the dimension of *power and control* in household decision-making reflects significant gender disparities, particularly in financial matters. Statistical data highlight how these imbalances affect women's autonomy and influence within households.

According to data from the National Bureau of Statistics of Moldova (NBS), women in Moldova often face challenges in accessing and controlling financial resources. For instance, a survey conducted in 2023 reveals that only 35% of Moldovan women report having equal say in financial decisions within their households, compared to 55% of men. This disparity is evident in several key areas (ABA ROLI and CIPE):

- **Household Budgeting:** women are less likely to participate in decisions related to household budgeting. Approximately 60% of women reported having limited or no input in household budget decisions, whereas 40% of men reported the same.
- **Savings and Investments:** women in Moldova have less control over savings and investment decisions. Only 30% of women report having a significant role in financial planning and investment decisions, compared to 50% of men.
- **Access to Credit:** women are disproportionately affected by barriers to accessing credit. While 70% of men are able to secure loans or credit, only 55% of women have similar access, reflecting broader issues of financial control and empowerment.
- **Decision-Making in Family Businesses:** In families involved in business activities, women are underrepresented in decision-making roles.

These statistics illustrate the ongoing gender imbalance in power and control within Moldovan households, highlighting the need for targeted interventions. Efforts to enhance women's financial literacy, improve access to credit, and promote gender equality in decision-making are crucial for addressing these disparities and empowering women in Moldova.

3. Conclusions

This article has explored the multidimensional nature of financial independence, emphasizing the importance of a nuanced measurement framework, particularly from a gender equality perspective. The reflected framework, organized around the core dimensions of income, wealth, and power and control, offers a comprehensive approach to understanding financial independence by considering both empirical and theoretical insights.

The analysis of income data reveals persistent gender disparities in employment, earnings, and overall income. In the EU, women consistently face lower employment rates and fewer working hours compared to men, which contributes to a significant gender gap in earnings. Similarly, in Moldova, while there have been improvements in employment rates for both men and women, substantial gender inequalities persist, particularly in access to financial resources and decision-making.

The wealth dimension highlights that women often hold fewer assets and incur less debt compared to men. However, this does not necessarily equate to greater financial stability for women, as they are more reliant on non-productive income sources such as social benefits and remittances. This reliance exacerbates their financial vulnerability, especially in Moldova, where barriers to credit access further undermine women's financial security.

The dimension of power and control reveals significant gender imbalances in household decision-making. Women in both the EU and Moldova frequently have less influence over financial decisions

and are more likely to be underrepresented in decision-making roles, whether in family budgeting or in business contexts. Data indicate that women often face barriers to accessing credit and financial services, which limits their ability to accumulate assets and make autonomous financial decisions. Addressing these disparities requires targeted interventions, including policies to enhance financial literacy, improve access to credit, and promote gender equality in financial decision-making. By considering the intersectionality of gender with other personal and societal factors, such as age, ethnicity, and socioeconomic status, we can develop more effective strategies to support financial independence for all individuals. Ongoing reforms and oversight by relevant institutions are crucial for advancing these goals and ensuring a more equitable financial landscape.

As Moldova continues its journey towards European integration, addressing gender disparities in financial independence is crucial for achieving true equality and empowering women. Targeted interventions to promote women's participation in the formal labor market, improve access to credit and financial services, and enhance financial literacy can help narrow the gaps in income, wealth, and power and control by adopting a multidimensional approach to financial independence and prioritizing gender equality, Moldova can create a more equitable society that enables both women and men to thrive and contribute to the country's development

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THE PROFITABILITY OF BANKS UNDER SHOCKS CAUSED BY NON-DIVERSIFIABLE FACTORS

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Ion Pârțachi³⁷ PhD

Abstract: *Listing the last ten years of the economic evolution of the Republic of Moldova, the banking system has a strong contribution on the development of the financial system, as well as strongly building up the resilient and robust environment, where individuals were ensured with the strong capital quality and stable and sustainable development. As we will see, during mentioned period crisis that were visible in the Republic of Moldova were generated by non-diversifiable factors, and the reaction of banks and at some point, in time of authorities were as quick as possible for mitigation of the negative effect that arise on individuals and on business areas.*

Key words: *Crisis, Banking system, Profitability, Deposits evolution, Loans*

JEL: G01, G10, G1

1. Introduction

Being small and open economy, the Republic of Moldova is highly exposed to the external environment and at the same time, the low diversified portfolio of household's financial assets (mostly holdings in banks deposits) enforce the role of banks in preservation of storage values in the country.

Thus, the Republic of Moldova was directly affected by systemic internal, regional and global events, like respectively the closure of three the banks as result of fraudulent actions, rise of costs of energy and food products and the security crisis in the region created by the aggression of the Russian Federation in Ukraine (IMF, 2023).

During the last ten years, Since the end of 2014, the banking system in the Republic of Moldova comprise 11 banks, instead of at the beginning of mentioned period.

An overview of the evolution of the banking system of the Republic of Moldova and of the economy in general, suggest that we were heated at least by 3 crises:

- a) Banking fraud crisis (here the fraud means the fraudulent actions that lead a licence withdrawal, and consequently – closure of three banks). For the current meaning 2014 was a year when 3 banks were liquidated. Period of active impact Nov.2014 – Oct.2016.
- b) Energy resources crises (i.e. prices on the energy resources). Period of active impact Oct.2021 – Mai.2022.
- c) Armed conflict effect (war in Ukraine impacted directly the banking system) Period of active impact Feb.2022-Mar.2023.

There is another event in the last past years that can be considered as a crisis – namely COVID-19 pandemic situation, but having an indirect impact on the banking system, I will intentionally exclude it from the current research.

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In current research, the non-diversifiable factor represents factors that are close to systemic risk framework, as the mitigation from the potential effect of such a risks can be evaluated only as a theoretical dimension, or as empirical results action.

It can be mentioned that the non-diversifiable characteristic of factors that arise in the crisis was usually supported by the quick and prompt action of the banks' management, and of the supervisory authority (in our case the National Bank of Moldova).

2. Factors and the impact of crises.

The current research underline crises that was observable in the Republic of Moldova, and I will try to simplify the visuals by grouping into two distinct crises. First one – named generally “banking fraud” (hereinafter - FIRST crisis) and the second named “Energy and war effect” crisis (hereinafter – SECOND crisis). The former *de facto* comprise the stratified effect of two crises that by coincidence share an overlapped period.

If we will put main effects that overcome each of mentioned crises a short summary can be as following:

- “Banking fraud” crisis –

- a) Discovering of lack of governance in the management of 3 banks – as result the supervisor starts to revise the entire regulatory framework and redesign the legal requirements on the bank governance procedures.
- b) Identified a coordinated actions between 3 banks to perform non-core business activities, that leads to the insolvency – resulted on revision of reporting coverage.
- c) Distinguish the potential disruption of the banking system and allocation of state support for the repayment of deposits – as alternative of deposit insurance scheme, the state allocates funding for the smooth migration of deposits outstanding amount to other banks (Oct.2016)
- d) Shock on exchange rate for main currencies (EUR and USD)

- “Energy and war effect” crisis -

- a) Increase on price of energy resources (gas, electricity, gasoline).
- b) Increase of consumption as result of receiving of refugees from Ukraine.
- c) Increase of rental costs because of high demand from refugees from Ukraine.
- d) Withdrawing of deposits from banks (in 45 days the total withdraw of cash was around 4.4 bn in MDL equivalent)

Macro-indicators

The environment where operate banks is a crucial in case of the Republic of Moldova, as being small open economy with a constant and huge inflow of remittances. Int should be mentioned that on its path to the European Union accession, on last three years in addition to mentioned inflows, the Government received a consistent support from external partners.

Thus, exchange rate is very important for the understanding the potential impact on profitability of a bank as well as to understand the balance sheet evolution of the outstanding amount of deposits and loans.

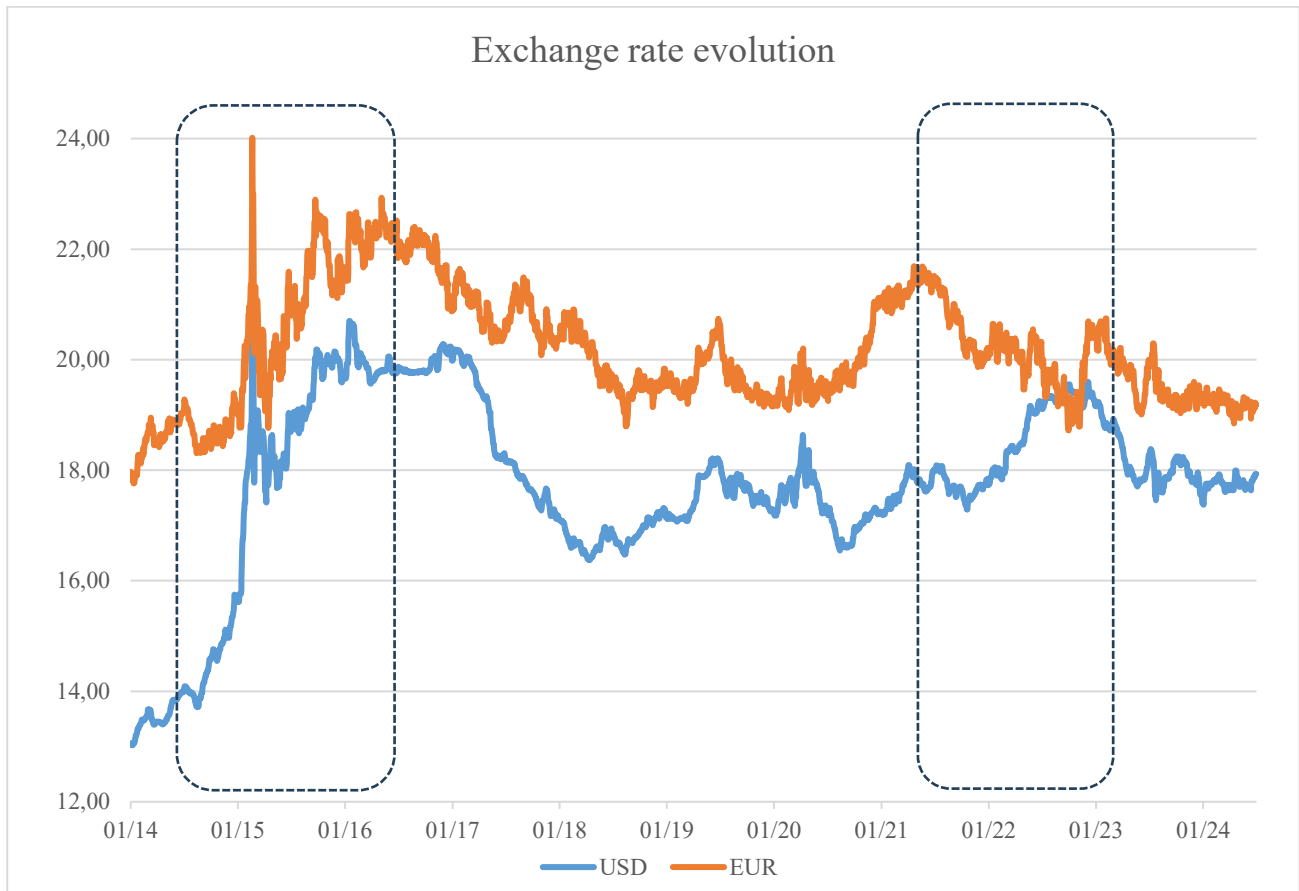


Figure 1. Evolution of the exchange rates for main currencies (USD and EUR)

Source: www.bnm.md

Another indicator that have a multi-factorial effect on banks` profitability is the inflation level, first of all from liquidity perspective: as the high level increase the remuneration of deposits in order to slowdown the dollarization³⁸ in conjunction with the fact that in the high inflation environment the propensity to accumulation of deposits decrease because of increasing need of current costs for the final consumer, in addition high inflation generate a slowdown in loans disbursement as result of increase of prices of goods in the country.

³⁸ Dollarization – conversion of local currency deposits into foreign currency

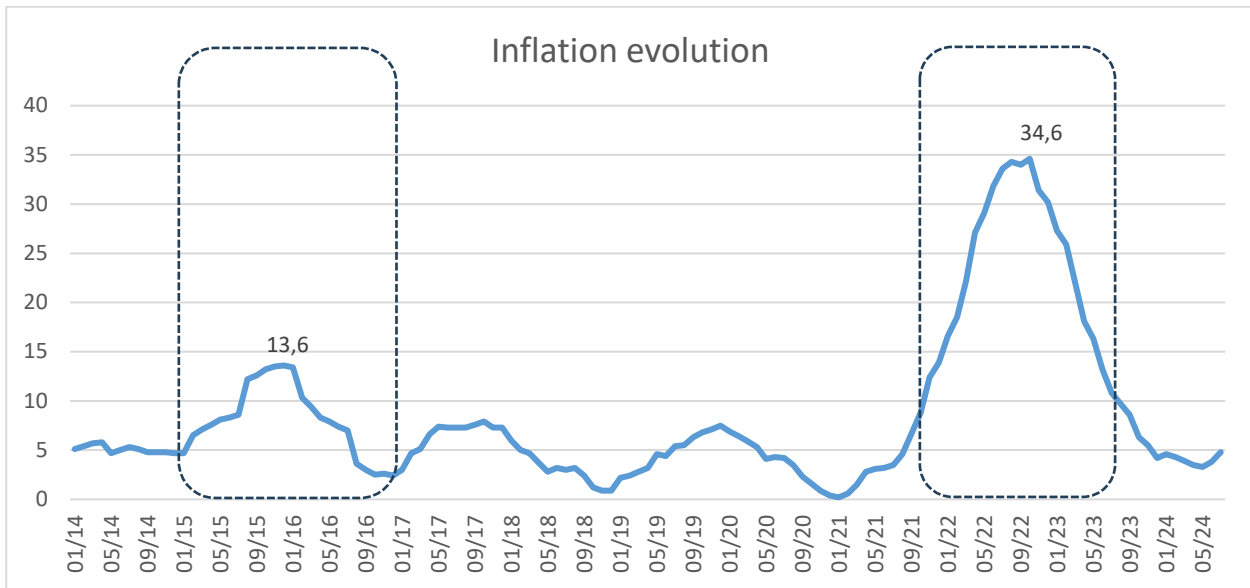


Figure 2. Evolution of the annual inflation

Source: www.bnm.md

Profitability

It should be mentioned that if we want to analyze the profitability of banks, we have a special case in case of Moldova, specially because of very high required reservation rates with a peak of 45% for foreign currency and 40% for local currency deposits with less than 2 years maturity. That is why having a high reservation rate and at the same time high base rate leads to a regulatory effect of increase interest income.

With the reference to the base rate, another profitability impact that can be measured by positive impact is the investment in T-bills and National Bank` Certificates, that follow the base rate path and generate additional interest income.

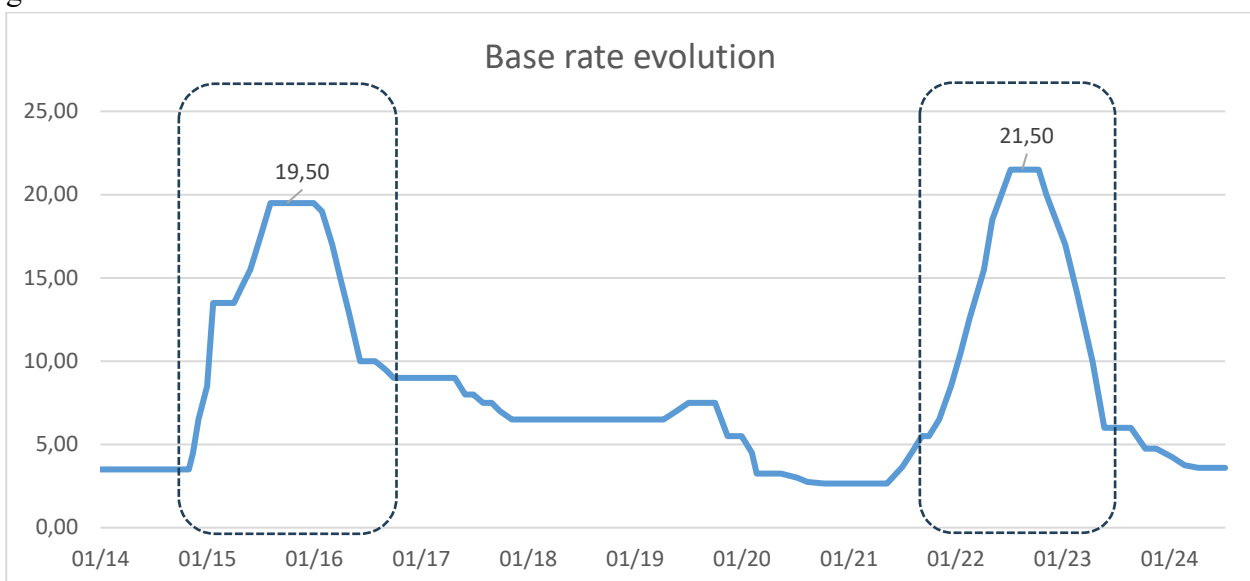


Figure 3. Evolution of the Base rate

Source: www.bnm.md

For the research purposes, we can clearly see the crisis driven behaviors by analyzing the deposits evolution, especially deposits of individuals. The data suggest a totally different behaviors in FIRST and SECOND crises.

We see clear the evolution paths of deposits in the Figure no.4. like the opposite effects of consumer (individuals) reaction.

If the FIRST crisis has two direct impacts on banks` financial statements: i) deposits outflow as a panic effect and lack of trust in the banking system; ii) sharp depreciation of the national currency.

In case of SECOND crisis, the main effect was the deposits outflow, that created a big impact on the way the liquidity was managed by banks. That is why on the first 45 days from the Feb.22nd 2022 the total withdrawal of deposits from banking system was at the unprecedented level of 4.4 bn MDL. This fact in conjunction with the increase in required reserves normative level (as effect of the National Bank of Moldova decision) creates a pressure on liquidity management in banks. To be noted that starting with the Jan.2022 the level of LCR minimum requirement was increased to the value of 100%, so the concentration on liquidity area was extremely high, and fortunately overpassed by the banking system well.

Even the some researches (Anastasiou and Drakos, 2021) conclude that the depositors` crisis sentiment is related to irrational behavior and it is negatively associated with bank deposit flow, the post-crisis data denote the returning of deposits into banks, and in some cases the amount of deposits that were reverted to banks exceeded the initial outflows.

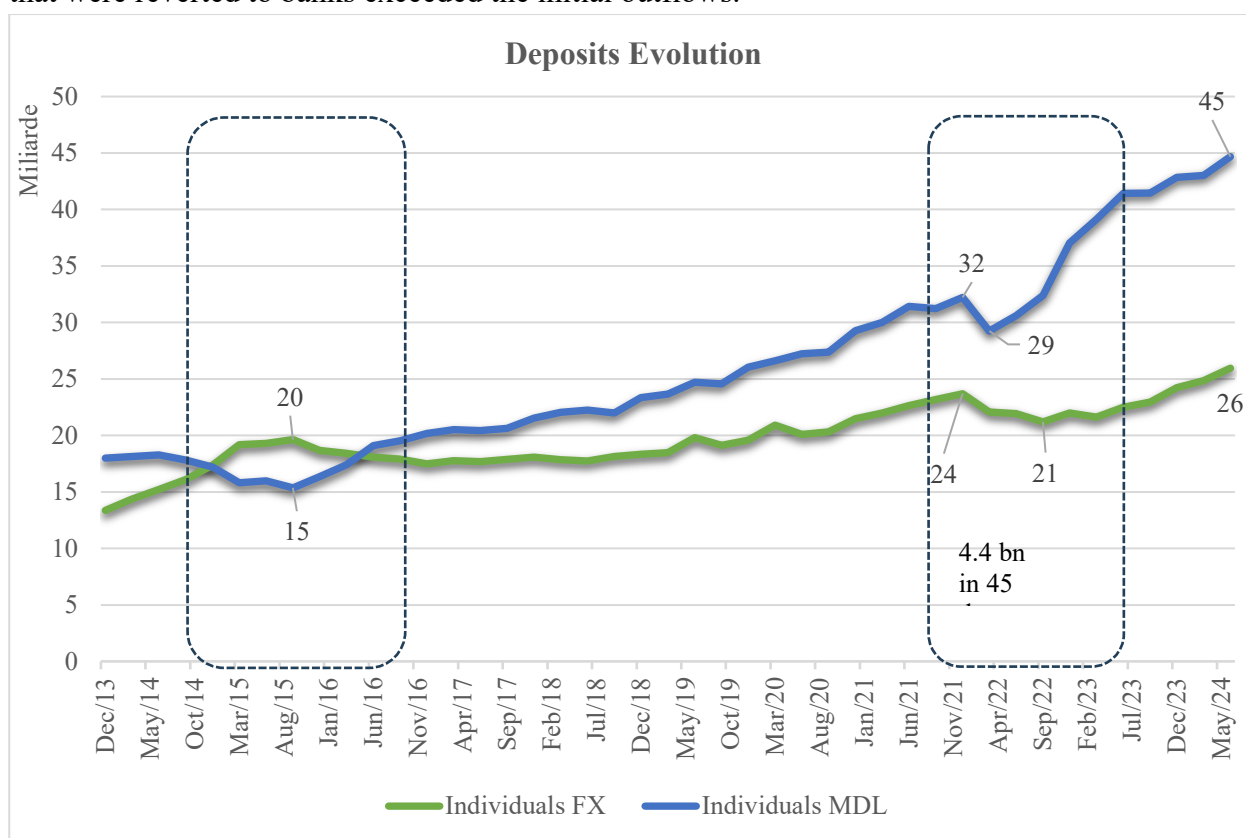


Figure 4. Evolution of the deposits in MDL and foreign currencies (USD and EUR)

Source: www.bnm.md

As was mentioned before, crises impact is clearly reflected as an indirect effect in banks' P&L (Profit or Loss statements), because of interest rates volatility effect, because banks most likely increase their investments in less risky financial assets (T-bills and NBM Certificates) and at the same time the required reserves start to be remunerated at high interest rates (Nilsson, 2022).

In this regard, the Interest Income increase, as financial assets are repriced at higher interest rates, less loans (because a big part of loans can be at fixed interest rates or the repricing period is semestrial or annual, so it is not affected by the volatile evolution of indexes in a frequent way.

On the other side, Interest Expense is affected by the adjusted upward pricing, because of the necessity to maintain an appropriate level of liquidity. In the case of Republic of Moldova, it is evident that during crises as a competitor for the deposit's investment can be identified the accessibility to the T-bills. That can be a subject for additional research, as the diversification of investments – is a key element of the financial inclusion educational program, and I believe that in the next 5 years the investment in T-bills will be visible more and more as an alternative of banks deposits.

As result, as data show (Figure 5), the net interest income during crises appears on an upper path, and the cycle of the crisis least up to 24 months.

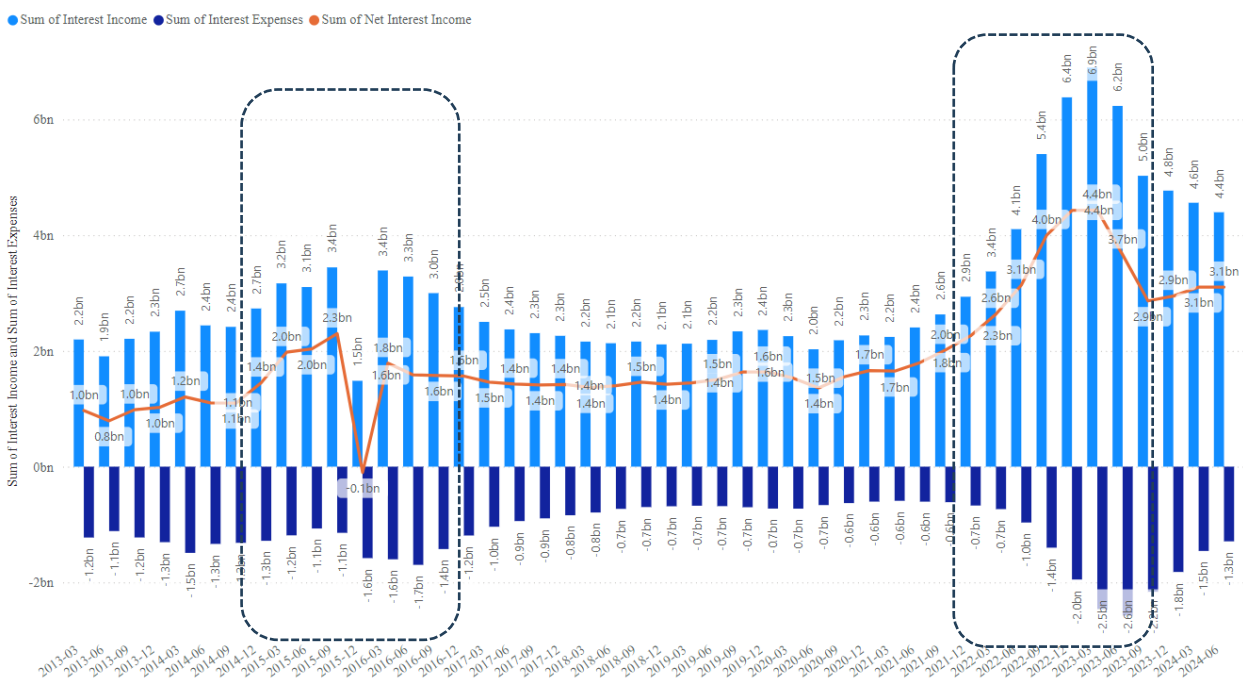


Figure 5. Evolution of the monthly Net Interest Income

Source: www.bnm.md

It is important that at mentioned above crises the authorities tried to implement the reactive action, to diminish the negative effect on individuals and on business areas. As some actions that were performed as supportive, I can list: quick interventions on the foreign currency market – to reduce the potential depreciation of MDL; strong support of most vulnerable individuals – by compensating the increase of prices on energy resources market; adjustment of wages; with external donors' assistance was implemented the support of families that take care on refugees; others.

3. Conclusions.

As we can conclude, the statistical treatment of time series can be mostly predictable, in case of crisis that are supported (or fueled) by the external, non-diversifiable factor.

For the further research, it is important to try to isolate the effect of the depreciation of the national currency that was blended with the effect of evolution of the outstanding amounts of deposits in foreign currency. That can be crucial in the data normalization process to identify the common approach and separate the nominal currency effect.

The profitability of banks in general is influenced by many factors, and in case of non-diversifiable it is not easy to predict the effect, as the origin of factors can arise as a separate path or can be stratified as the effect of a cumulative approaches.

In this case it depends how smooth we treat the annualized data, so I suggest to reflect about using of moving average series instead of monthly/quarterly data on Profit or Loss statement, as the seasonality is not used in the calculation of profitability ratios and can mislead in conclusions.

The moving average of most frequent data series can be calibrated to realize the early warning indicators that can be used to understand the current evolution path by choosing the reference backward available data (in most cases it should be possible to choose the one economic cycle period, so calibration should be done in a dynamic way, as the duration of an economic cycle can differ from time to time). The research on that will be prepared soon.

One of factor that can impact the data series analysis in case of the banking system of the Republic of Moldova is the consistency of the system by number of banks. That leads to the need of calibration of data series as in case of liquidation of banks even it is possible to track the re-distribution of the deposits portfolios, on the lending area it is almost unclear how the outstanding on loans is treated, especially because liquidated entities are not covered by the dissemination data by the supervisor.

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OVERSIGHT OF THE REGULATORY FRAMEWORK FOR ESTABLISHING CONSUMER RIGHTS IN PAYMENT SERVICES

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Abstract

This article aims to examine the role of oversight of the consumer protection framework through the prism of payment services, emphasizing the importance of regulations that ensure a safe and transparent environment for users, the knowledge of financial services consumer rights and the proper realization of institutional roles. From the right to clear and transparent information to security mechanisms and the protection of personal data, this analysis will explore the contribution of institutional mandates overseeing the legislative and regulatory framework to creating a trusted payment experience.

This research is relevant not only for consumers, who need protection and assurance in their use of financial and payment services, but also for financial service providers, who need to comply with legal requirements and maintain ethical standards in their dealings with customers. Through this research, we aim to highlight not only the challenges but also the opportunities that arise in the context of evolving payment services and consumer protection, thus contributing to a constructive dialog in the financial field.

Key words: *consumer protection, consumer rights, regulatory framework, supervision, payments services, fraud, payment service user.*

JEL Classifications: *A12, B31, D11, D12, D18, G53*

Introduction

In an increasingly digital context of the development and promotion of financial services, which have become increasingly prevalent and essential in modern society, and which also provide tools to better support and increase financial inclusion, the need for effective protection of financial consumers is becoming increasingly important. Innovations in payment services, advanced by new developments in technology, have enormous potential to reach people's payment needs, which serve as a starting point for the growth of other financial services such as credit, deposits, insurance, with payment services as the gateway to financial inclusion. For this to happen, effective protection of consumers of financial services is more necessary than ever. Consumer protection and consumer rights in this area are becoming increasingly important as users face various risks and vulnerabilities.

Payment services play a key role in facilitating financial transactions and supporting modern economies. These services not only simplify payment processes, but also transform the way consumers interact with products and services, giving them unprecedented flexibility. However, along with these benefits, payment service users-consumers of financial services also face significant protection challenges.

Financial consumer protection policies have a key role to play, alongside financial inclusion and financial education, in promoting fairer and more sustainable growth while also contributing to the stability of the financial system. It is crucial for people to have access to quality financial products and services, to be integrated into the financial system, to be supported to make well-informed

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decisions and to benefit from safeguards and protection tools and measures that are appropriate to the needs of the payment service user, that inform, safely and securely protect them in their interactions with payment service providers and that effectively and fairly protect them against harm or provide redress mechanisms in such cases.

These policies, to address information asymmetries and ensure fair treatment of the payment service user, need to be integrated into the institutional regulatory and supervisory mandates enshrined in law. Oversight of consumer protection policies is essential in terms of preventing abuses and unfair practices, ensuring fairness, improving transparency, improving the quality of products and services, promoting economic stability, ensuring compliance with the legal framework for consumer protection of financial services, adapting to technological trends in financial services, etc

Abuses and unfair or misleading practices by product and service providers are prevented by closely monitoring consumer protection policies, thus protecting consumers against fraud, manipulation or other forms of exploitation and ensuring that service providers comply with ethical and legal standards.

The role of policy oversight contributes to maintaining a fair business environment in which consumers' rights and interests are respected, which is essential for maintaining public confidence in the market and for the efficient functioning of the economy.

Consumer protection contributes to increased transparency in the financial market. Clear regulations and strict supervision oblige financial institutions to provide full and accurate information about the products and services on offer, helping consumers to make informed decisions.

Constant monitoring of consumer protection policies incentivizes financial service providers, including payment providers, to improve the quality of their products and services, as they are aware that non-compliance with the rules may lead to sanctions, penalties or other prescriptions.

Well-implemented and monitored consumer protection policies contribute to economic stability, as consumer confidence is enhanced when consumers know that protection mechanisms are in place and that they can complain without any holds back, making them more likely to use financial services and participate more actively in the economy, which can lead to economic growth and a healthier business environment.

Oversight also becomes crucial to ensure compliance with consumer protection laws and regulations by all market participants, providers of financial services, including payment services. Without proper supervision, there is a risk that these regulations will be ignored, which would directly affect consumers.

The oversight of consumer protection policies allows for rapid adaptation to new challenges, such as digitalization or the emergence of new technologies, thus ensuring that consumer protection remains relevant and effective in a market that is constantly evolving.

Financial services consumer protection supervision is not only a legal necessity, but also a vital tool to ensure a fair, transparent and sustainable financial system. Without such supervision, consumers could be vulnerable to abuse and the stability of financial markets could be threatened and put at risk.

Enforcing payment of consumer rights

Oversight of the regulatory framework for establishing consumer rights for payment services is essential to protect consumer interests and to ensure that consumers benefit from safe, efficient and transparent payment services. This involves tracking and monitoring the activities of financial service

providers to ensure that they comply with the rules and standards set for the benefit of consumers. The main consumer rights in relation to payment services that are subject to this supervision are:

- The right to clear and transparent information on the use of payment services (costs,) is an essential right to protect consumers and ensure a fair relationship between service providers and users. This right implies an obligation for payment service providers to provide easily accessible, clear and accurate information on all relevant aspects of their services, such as general prior information, pre-contractual information, conditions for the provision of payment services, associated costs (details of fees, charges and other costs related to the use of the service), terms and conditions (information about users' rights and obligations, including cancellation or return of funds procedures), security (data and personal information protection policies and security measures in place), frequency and method of payment (information about how and when payments are made).
- The right to payment security and protection of personal data focuses on how users' personal information is collected, stored, used and shared, and relates to the protection of users during financial transactions. This right is fundamental to ensuring a secure and trusted experience when using financial services, by adopting technical security measures and using advanced encryption technologies to protect information transmitted during payments, implementing strong authentication methods (SCA) such as two-factor authentication (2FA), to prevent unauthorized access to user accounts, fraud detection, through automated transaction monitoring systems to identify suspicious activity and prevent fraud, and fraud liability, which consists of compensating payment service users-consumers in case payments are made without their consent due to security breaches.
- The right to reclaim the financial service user-consumer's funds in the event of an unauthorized or erroneous payment transaction ensures that users can recover funds in situations where payments are made without their consent or due to errors and refers to the user's ability to claim the return of funds in the event of unauthorized (e.g. fraud) or erroneous (e.g. wrong amount or wrong account) transactions.

The following describes some examples of countries in the European Union that demonstrate effective consumer protection practices in financial services:

The UK's Financial Conduct Authority (FCA) is recognized for its strict consumer protection regulations in the financial sector. For example, it requires payment service providers to offer appropriate advice before selling their financial products, ensuring that consumers fully understand the risks involved and the complexities of how these products work. Similarly, the UK is the country that protects consumers through a Financial Services Compensation Scheme (FSCS) in the event of a financial services provider becoming insolvent. This mechanism can compensate consumers of financial services, thus providing an extra level of security for their financial means.

France, through the Authority for Prudential Supervision and Resolution (ACPR) supervises financial institutions and ensures compliance with consumer protection regulations for financial services, including payment services, by obliging providers to be transparent about all costs and associated fees, thus protecting consumers from hidden costs. Similarly, financial education is promoted by the French Government through national campaigns, which support consumers in better understanding financial products in order to make informed and empowered decisions.

In Germany, the Federal Authority for Financial Supervision, BaFin⁴⁰, ensures robust consumer protection in the financial sector by imposing strict standards for the provision of clear and accessible

⁴⁰ Federal Financial Supervisory Authority

information about financial products so that consumers can compare and evaluate the available options. Dispute resolution mechanisms in Germany include an effective Financial Ombudsman system, which offers consumers a fast and free way to resolve disputes with banks or other financial institutions through mediation and possibly compensation.

The Swedish Financial Services Authority, Sweden's Finansinspektionen⁴¹, monitors regulatory compliance and consumer protection, requiring banks to provide clear information and avoid aggressive marketing practices when promoting financial products.

Sweden is also recognized for its rapid adoption of electronic payments, and legislation protects consumers from online fraud, with financial institutions obliged to use advanced authentication methods to protect consumers from unauthorized access to their bank accounts.

The Netherlands Authority for Financial Markets (AFM) in the Netherlands provides strict consumer protection in the area of financial services, with a particular focus on monitoring the advertising of financial products to prevent misleading claims and to ensure that the information provided is accurate and does not mislead the consumer of financial services.

Similarly, the Netherlands has issued strict regulations obliging financial institutions to be transparent about all fees and costs involved in financial products, with the consumer being given a detailed explanation of all costs before entering into a contract for financial services.

The Italian Financial Supervisory Authority (CONSOB) in Italy protects consumers of financial services through strict regulation and continuous monitoring, ensuring the consumer has all the necessary information needed to make informed decisions, thus preventing fraud and abuse.

In Italy, protection against overproduction of risky financial products is also in place, whereby banks and financial institutions are obliged to assess the risk profile of customers before recommending complex financial products. For example, if a client has a low risk profile, the bank cannot recommend high-risk investments without providing adequate justification and clear risk disclosure. These examples show how different countries are putting in place effective measures to protect consumers of financial services, ensuring that they are informed, protected from abuse and fraud, and have access to dispute resolution and compensation mechanisms in case of problems.

In terms of supervision, there are regulatory and supervisory authorities at national and European level dealing with the regulation and supervision of payment services. In Europe, the main regulator is the European Banking Authority (EBA), which has the role of developing European rules and standards for payment services, as well as overseeing the activity of credit and payment institutions. In addition, there are also national supervisory authorities, which are responsible for ensuring that financial institutions comply with the regulations and standards set by the European Banking Authority and for protecting consumer interests.

The regulation and supervision of payment services and consumer rights are topics of interest to regulators and researchers in the financial and legal fields. Among the main studies and research several of relevance have analyzed the regulatory and supervisory framework for payment services in several countries and identified best practices in consumer protection, addressing issues such as transparency of information, data protection and accountability of financial service providers.

[BaFin - Functions & history](#)

⁴¹ [Consumer protection | Finansinspektionen](#)

According to the study conducted by the Organization for Economic Cooperation and Development (OECD)⁴², transparency of information, data protection and security, payment service providers' liability for the execution of the payment transaction, accessibility and financial inclusion are the most important aspects of consumer protection of financial (payment) services, the supervision of these requirements is aimed at ensuring accurate and transparent information to payment service users, communicating essential consumer information in a clear and accessible way, protecting the data and security of payment service transactions, preventing unauthorized access to consumers' personal and financial information, reimbursing the payment service user for fraud or errors in the payment service provided, sharing responsibility between consumers, payment service providers and other stakeholders, and of course promoting financial inclusion and access to safe and convenient payment services.

Another study that investigates existing regulations and policies in different countries to protect consumers of payment services is "Consumer Protection in Mobile Payments: A Cross-Country Analysis"⁴³ focusing on mobile payments, identifying risks and vulnerabilities in mobile payments, consumers' experience and their perception of the level of protection and security, which makes it possible to identify gaps and weaknesses in regulation and make recommendations to improve consumer experience and confidence, as well as explores how consumer protection regulation and policy in the area of mobile payments is adapting to technological changes and innovations in this field.

The findings of this research highlight concrete examples of good practices identified in various countries and, in particular, recommendations for regulators and supervisors on improving the regulation and protection of payment services consumers. However, in order to achieve these tasks, it is necessary to clearly dedicate these roles and assume the tasks related to the protection of consumers of payment services, which is perceived and applied in the national framework.

Internationally, the European Banking Authority (EBA) has an important role to play in protecting the rights and interests of consumers of financial services, including in relation to payment services. The main responsibilities of the EBA regarding this task refer to:

1. Develop and promote European standards and rules for payment services, by working together with European and national institutions to develop regulations and rules that protect consumers and promote healthy competition in the payment services market.
2. Supervision and monitoring of the payment services market, through the responsibility of monitoring the activity of payment service providers, as well as national supervisory authorities, to ensure that they comply with European regulations and rules.
3. Protecting consumers in disputes with payment service providers by providing assistance and guidance to consumers facing payment service issues, as well as an alternative dispute resolution system.
4. Promoting financial education and consumer awareness, promoting financial education and consumer awareness of their rights and options regarding payment services.

⁴² <https://www.oecd.org/daf/fin/financial-education/G20-OECD-report-on-financial-consumer-protection-and-financial-inclusion-in-the-context-of-covid-19.pdf>

⁴³ <https://www.oecd-ilibrary.org/docserver/5k9490gwp7f3-en.pdf?expires=1685108806&id=id&accname=guest&checksum=BBFFA0E8577348F39AAA7AF1D828832E>

Overall, EBA plays a key role in protecting the interests of financial services consumers and ensuring that the payment services market functions transparently, efficiently and for the benefit of consumers. At the same time, the policies and approaches developed and adopted on the subject of financial consumer protection of the authorities must evolve and adapt in accordance with the environment.

The issue of consumer protection supervision is discussed both at the level of the G20 [2] group, made up of 19 advanced and emerging economies and the European Union, as well as at the level of the Organisation for Economic Co-operation and Development (OECD), which is an international organisation that aims to promote economic and social policy worldwide, whose activities include:

1. Establishing safety and quality standards for products and services, as well as monitoring their implementation
2. Creating mechanisms for resolving disputes between consumers and suppliers
3. Promoting consumer education and information about their rights
4. Creating a legislative and institutional framework to protect consumers against unfair and fraudulent commercial practices.

Overall, the G20 and the OECD work to ensure that consumers have access to safe, high-quality and fairly priced products and services, and that their rights are protected in the global economy, as well as the implications for policymakers, supervisory bodies and financial consumers of an increasing digitalization of the financial services sector, financial consumer protection policy and the regulatory challenges and opportunities arising from financial innovation.

The D20 Task Force is responsible for the high-level principles on Financial Consumer Protection⁴⁴, which lay the foundations for a comprehensive financial consumer protection framework. The principles have been adopted by the OECD and endorsed by the G20.

While the G20/OECD High-Level Principles on Financial Consumer Protection lay the groundwork, they are supported by relevant practical elements and evidence-based guidance and examples on how they can be implemented in the form of effective approaches. Effective approaches, which are based on approaches used or tested in different jurisdictions, support jurisdictions to learn from each other and share perspectives and provide a 'toolbox' with policy options on how to enhance the protection of financial consumers. One of the main principles for the supervision of the consumer protection framework is the integration of consumer protection into legislation, the regulatory and supervisory framework, which should cover all financial services, including payment services, and this regulation must be proportionate to the characteristics, types, risks and diversity of financial services and consumer needs. This principle also requires the existence of robust and effective legal supervisory mechanisms, including sanctions against misconduct, financial fraud and abuse.

Another principle talks about the role of supervisory bodies expressly dedicated and directly responsible for the protection of consumers of financial services. Cooperation with other financial services supervisors and the exchange of information between authorities or various sectoral structures is also essential and should be encouraged, paying particular attention to consumer protection issues arising from payment transactions, as well as the risks that may arise from the digitalization of these financial services.

The Directorate for the supervision of compliance with the regulatory framework regulating the protection of consumers of financial services is assigned to the competences of the authorities that

⁴⁴ <https://www.oecd.org/daf/fin/financial-education/high-level-principles-on-financial-consumer-protection.htm>

supervise entities offering financial services, in particular payment services, these being usually Central Banks or specialized authorities for the protection of consumers of financial services. The special regulation that ensures the protection of consumers of payment services at European level is the EU Directive 2015/2366 on payment services in the internal market (PSD2) [1].

This Directive enhances the protection of the consumer of payment services by providing a solid legislative basis for carrying out payment transactions, contributing to better information and transparency of payment service conditions, in addition to reducing costs and promoting competition in the payment market. In addition, payment service providers that are covered by this Directive should establish a consumer complaint procedure, which they can use before claiming out-of-court compensation or before initiating legal proceedings. The new rules will oblige payment service providers to respond in writing to any complaint within 15 working days.

Directive (EU) 2015/2366 on payment services in the internal market (PSD2) also provides for the obligation of national authorities to monitor and enforce compliance with the provisions transposed into the local legislation of this directive.

Conclusions

The supervision of the consumer protection framework in the Republic of Moldova requires a concerted effort from the authorities, the private sector and civil society. By strengthening legislation and institutional roles, educating consumers and ensuring transparency, a safer and fairer consumer environment can be created. This approach will not only improve consumer experience but will also contribute to the sustainable economic development of the country.

Respectively, the main issues relevant to the supervision of the regulatory framework may include:

1. Clear highlighting of institutional roles (regulatory and supervisory)
2. Financial supervisory authorities, such as central banks, regulators have the responsibility to supervise and control the activities of financial service providers in terms of consumer protection. These authorities are responsible for monitoring compliance with regulations and standards in the financial industry and can impose sanctions or other corrective measures in case of irregularities.
3. Clear regulation of consumer rights and obligations of financial service providers-payment service providers
4. There are different regulations and standards that govern the activities of financial service providers and ensure consumer protection. These may include requirements for disclosure of information, publicity, transparency and disclosure of tariffs and fees, assessment of consumers' ability to repay, prevention of money laundering and combating terrorist financing. Supervisory authorities have the role of ensuring that financial service providers comply with these regulations and standards.
5. Supervision of compliance with the consumer protection framework by financial service providers-payment service providers.
6. Supervisors carry out regular monitoring and inspections to verify financial service providers' compliance with the regulatory framework. These activities may include the analysis of financial documents and reports, the verification of financial service providers' internal procedures and direct interactions with consumers to assess their level of compliance and satisfaction.
7. Submitting complaints and creating dispute resolution mechanisms

THE INFLUENCE OF BOARD CHARACTERISTICS ON FINANCIAL PERFORMANCE: EVIDENCE FROM S&P 500 HEALTHCARE COMPANIES

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Abstract: *The field of corporate finance is constantly changing, with a strong focus on various performance metrics. This study examines 64 healthcare companies listed on the S&P 500 index over the period from 2014 to 2023. Using a range of analytical techniques, including linear and nonlinear regression models, as well as interaction-based models, this research seeks to uncover the effects of key corporate governance factors on profitability. The analysis reveals that board size has a consistently negative impact on the performance of these healthcare companies, regardless of whether the period is marked by crisis or stability. Moreover, the frequency of annual board meetings also negatively affected financial performance; however, this relationship shifted to a positive impact during crisis periods. The study further underscores the significant role of gender diversity within companies. Gender diversity demonstrated a positive influence on performance, particularly during crises. Conversely, board independence, while beneficial in non-crisis periods, showed a negative effect during crises. The research also identified a turning point for board independence, indicating that the optimal level of independence may vary depending on the context. Overall, this study provides insights into how various corporate governance policies impact financial performance, transparency, and shareholder protection. It highlights the importance of evaluating board characteristics, including size, meeting frequency, diversity, and independence, to understand their effects on company performance. The findings emphasize the need for companies to adapt their corporate governance strategies in response to evolving conditions to maintain robust financial health and effective leadership.*

Key words: *corporate finance, corporate governance, board characteristics, regression models*

JEL: G30, G34, G39

1. Introduction

Profitability remains a central focus in corporate finance, with ongoing discussions about the variables that affect it. This paper seeks to identify key corporate governance indicators impacting firm performance, particularly within the healthcare sector of the S&P 500 index, from 2014 to 2023. The motivation of selection of the healthcare sector is due to its significant role in the economy and its notable performance changes during recent years, influenced by rapid advancements and increased demand. The S&P 500 serves as a relevant benchmark, representing a large segment of the American market and ensuring a robust environment for analyzing corporate governance's role.

The research question of this study aims to investigate how corporate governance factors affect the profitability of healthcare companies. Understanding these relationships is crucial for stakeholders aiming to enhance firm performance and navigate challenges effectively.

This paper's originality is grounded in several key criteria. This research stands out due to its extensive 10-year timeframe, which offers a comprehensive dataset. Additionally, the use of nonlinear regression models provides deeper insights into complex relationships that linear models might miss. Including a dummy variable for the pandemic crisis allows the analysis to capture its specific impacts and interactions, adding nuance to the findings.

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The study's global relevance lies in its exploration of how governance practices influence profitability, contributing to better transparency and ethical business management. This insight can attract international investors and strengthen global business practices.

The paper is structured as follows: an introduction to the research topic, a review of relevant literature, methodology including data and econometric techniques, presentation and discussion of findings, and a concluding summary.

2. Basic content

2.1 Literature Review

In recent studies examining the impact of various corporate governance and financial indicators on profitability, a range of methodologies and results has emerged. Board size has been a critical focus of research due to its potential implications for corporate governance and financial performance. (Pucheta-Martínez & Gallego-Álvarez, 2020) conducted a study across 34 countries, including regions from Africa, Asia, Europe, Latin America, North America, and Australia, spanning from 2004 to 2015. Their multivariate data analysis, supported by robustness checks, demonstrated that larger boards generally have a positive effect on company performance. This positive correlation suggests that increased board size can enhance oversight and strategic decision-making, leading to improved financial performance. Conversely, (Augusto, Pascoal, & Reis, 2020) found a negative impact of board size on profitability, suggesting that excessively large boards might introduce inefficiencies and dilute financial performance.

Regarding the number of board meetings is another crucial indicator of corporate governance. (Bettinelli, Bosco, Gentry, & Dibrell, 2023) explored this factor within 172 non-financial enterprises listed on the Italian Stock Exchange from 2004 to 2013. Their linear regressions with panel data revealed a positive effect of frequent board meetings on profitability, suggesting that regular meetings enhance oversight and decision-making, which in turn improves financial performance. In contrast, (Tejerina-Gaite & Fernández-Temprano, 2021) found a negative effect of the number of board meetings on profitability ratios, possibly due to inefficiencies or increased costs associated with frequent meetings. Gender diversity has been increasingly recognized for its potential to influence corporate outcomes. (Brahma, Nwafor, & Boateng, 2020) investigated 100 United Kingdom companies within the FTSE100 from 2005 to 2016, utilizing linear regressions with panel data and GMM. Their study found a positive effect of gender diversity on profitability, indicating that diverse boards enhance financial performance through a wider range of perspectives and improved decision-making. However, (Dodd & Zheng, 2022) studied 213 companies in the ASX200 index from 2004 to 2018, using both linear and nonlinear regressions. Their findings were mixed, with linear models showing a positive effect on profitability, while nonlinear models indicated that the impact of gender diversity varies with its level, suggesting complex dynamics in its influence on financial performance. Board independence is another vital aspect of governance. (Mohan & Chandramohan, 2018) analyzed 30 companies listed on the Bombay Stock Exchange from 2007 to 2016, using linear regressions with panel data. Their study revealed a positive effect of board independence on ROE and ROA, suggesting that independent boards provide better oversight and governance. In contrast, (Herenia & Julián, 2024) examined 30 manufacturing companies listed on the Amman Stock Exchange from 2017 to 2021. Their study used linear regressions with panel data and found a negative effect of board independence on ROE and ROA, possibly reflecting challenges in maintaining effective oversight in specific contexts.

Firm size has shown varied effects on profitability. (Mercè, 2023) found a positive effect of firm size on ROE and ROA. Regarding firm age has also been a subject of interest. (Bettinelli, Bosco, Gentry, & Dibrell, 2023) examined 172 non-financial enterprises listed on the Italian Stock Exchange from

2004 to 2013. Their findings revealed a negative effect of firm age on profitability ratios, possibly suggesting that older firms face performance decline due to outdated practices.

Sales revenue growth rate has produced mixed results in terms of profitability. (Hsu, Lin, Chen, & Huang, 2021) focused on non-financial companies listed on the Taiwan Stock Exchange from 2000 to 2012. Their linear regressions with panel data showed a positive effect of sales revenue growth. Concerning effective tax rate has varied effects on profitability across different sectors. (Vintilă, 2024) examined 466 pharmaceutical companies in Europe and the United States from 2012 to 2021, using linear regressions with panel data. The study found a negative impact of effective tax rates on ROE and ROA, suggesting that higher tax rates reduce profitability.

The indicator measuring current ratio has shown mixed effects on profitability. (Asmaul & Ibnu, 2019) analyzed 138 companies listed on the Indonesian Stock Exchange from 2013 to 2016, using linear regressions with panel data. Their findings indicated a negative effect of the current ratio on profitability ratios, suggesting that higher current ratios might be associated with lower financial performance due to inefficient asset utilization. Debt to capital has revealed a generally negative impact on profitability. (Tripathi, Aziz, & Joshi, 2024) studied non-financial companies listed on the Indian Stock Exchange from 2000 to 2021, using linear regressions with panel data. Their research found a negative effect of debt to capital on ROE and ROA, indicating that higher debt levels reduce profitability due to increased financial risk. Pandemic crisis studies have uniformly shown negative effects on profitability. (Cho & Saki, 2021) analyzed 55 textile and apparel companies listed on the New York Stock Exchange in 2020, using time series analysis. Their research revealed a negative impact of the pandemic crisis on profitability ratios, highlighting the severe adverse effects of pandemic crisis on the textile industry.

In summary, the current body of research provides a diverse perspective on how different corporate governance and financial indicators affect profitability. Despite extensive research on corporate indicators and their impact on profitability, a notable gap exists in the current literature. Specifically, there has been no investigation into the performance of healthcare companies within the S&P 500 index, utilizing nonlinear regressions and interaction variables. This sector remains underexplored, particularly regarding how the pandemic crisis has influenced governance variables for these companies. Addressing this gap could provide valuable insights into the unique challenges faced by healthcare firms during the crisis and their governance dynamics, offering a more comprehensive understanding of the pandemic’s impact on corporate performance and governance in a critical industry. The healthcare sector is crucial in the S&P 500 index because it represents a significant portion of the economy, influencing public health outcomes and economic stability, and driving substantial investment and innovation.

Table 1 provides a synthesis of the discussed literature, summarizing key research findings on various indicators affecting corporate governance and profitability.

Table 1. Summary of the Literature Review

Indicators	Study	Companies	Years	Methodology	Effect
Board Size	(Pucheta-Martinez & Gallego-Álvarez, 2020)	34 countries grouped geographically: Africa, Asia, Europe, Latin America, North America, and Australia	2004 – 2015	Multivariate data analysis Robustness analysis	+
	(Augusto, Pascoal, & Reis, 2020)	858 companies from the United States and 560 companies from Europe	2016	Multiple regression	-
Number of Board Meetings	(Bettinelli, Bosco, Gentry, & Dibrell, 2023)	172 non-financial enterprises listed on the Italian Stock Exchange	2004 – 2013	Linear regressions with panel data	+

	(Tejerina-Gaite & Fernández-Temprano, 2021)	87 non-financial companies listed on the Spanish Stock Exchange	2005 – 2015	Generalized Method of Moments (GMM)	-
Gender Diversity	(Brahma, Nwafor, & Boateng, 2020)	100 companies in the UK, integrated into FTSE100	2005 – 2016	Linear regressions with panel data	+
	(Dodd & Zheng, 2022)	213 companies integrated into the ASX200 index	2004 – 2018	Linear regressions with panel data	-
Board Independence	(Mohan & Chandramohan, 2018)	30 companies listed on the Bombay Stock Exchange	2007 – 2016	Linear regressions with panel data	+
	(Herenia & Julián, 2024)	30 manufacturing companies listed on the Amman Stock Exchange	2017 – 2021	Linear regressions with panel data	-
Firm Size	(Mercè, 2023)	Agricultural companies in Spain	2008 – 2020	Linear regressions with panel data	+
Firm Age	(Bettinelli, Bosco, Gentry, & Dibrell, 2023)	172 non-financial enterprises listed on the Italian Stock Exchange	2004 – 2013	Linear regressions with panel data	-
Sales Growth	(Hsu, Lin, Chen, & Huang, 2021)	Non-financial companies listed on the Taiwan Stock Exchange	2000 – 2012	Interaction variable regressions	+
Effective Tax Rate	(Vintilă, 2024)	466 pharmaceutical companies in Europe and the United States	2012 – 2021	Linear regressions with panel data	-
Current Ratio	(Asmaul & Ibnu, 2019)	138 companies listed on the Indonesian Stock Exchange	2013 – 2016	Linear regressions with panel	-
Debt to Capital	(Tripathi, Aziz, & Joshi, 2024)	Non-financial companies listed on the Indian Stock Exchange	2000 – 2021	Linear regressions with panel	-
Pandemic Crisis	(Cho & Saki, 2021)	55 companies listed on the New York Stock Exchange in the textile and apparel industry	2020	Time series analysis	-

Source: Authors' work

The hypotheses guiding this research study are as follows:

- H₁: Board size has a positive effect on profitability.
- H₂: The number of board meetings has a positive effect on profitability.
- H₃: Gender diversity has a positive effect on profitability.
- H₄: Board independence has a positive effect on profitability.

2.2 Methodology

2.2.1 Description of Database and Variables

This study investigates healthcare companies listed in the S&P 500 index from 2014 to 2023. Using data from the Thomson Reuters Eikon platform, the research explores the sector's performance and financial trends over the past decade. Given the sector's critical importance in today's world, this analysis aims to reveal how recent developments have influenced financial and governance indicators in the healthcare industry. Their performance reflects broader trends in healthcare innovation, making them key indicators of economic and social well-being.

Table 2 provides an overview of the research variables, their symbols, and their economic definitions, along with how they are calculated.

Table 2. Presentation of Variables

Dependent variables	Symbol	Meaning	Measurement
Return on Equity	ROE	Represents the yearly profit shareholders earn from their investment in the company's equity.	$ROE = \frac{\text{Net profit}}{\text{Equity}}$
Return on Assets	ROA	Represents the annual financial gain shareholders receive from their investment in the company's assets.	$ROE = \frac{\text{Net profit}}{\text{Total assets}}$

Independent variables	Symbol	Meaning	Measurement
Board Size	BS	Represents the total number of directors serving on the board.	$BS = \sum \text{number directors}$
Number of Board Meetings	BM	Indicates how often the directors meet annually.	$BM = \sum \text{number meetings}$
Gender Diversity	GD	Represents the percentage of women serving on the board of directors.	$GD = \frac{\text{Number of women in board}}{\text{Total members of board}}$
Board Independence	BI	Indicates the percentage of independent directors on the board.	$BI = \frac{\text{Number of independent members}}{\text{Total members of board}}$
Firm Size	FS	Firm size is determined by taking the natural logarithm of sales revenue.	$FS = \ln(\text{Sales Revenue})$
Firm Age	FA	Firm age refers to the number of years the firm has been active in the market.	$FA = \text{Year}_t - \text{Year}_{\text{foundation}}$
Sales Revenue Growth Rate	SRGR	Represents the annual percentage change in sales revenue.	$SRGR = \left(\frac{\text{Sales revenue}_t}{\text{Sales revenue}_{t-1}} \right) - 1$
Effective Tax Rate	ETR	Indicates the ratio of corporate income tax to gross profit.	$ETR = \frac{\text{Profit Tax}}{\text{Gross Profit}}$
Current Ratio	CR	Represents a business's capacity to cover short-term liabilities.	$CR = \frac{\text{Current assets}}{\text{Short term liabilities}}$
Debt to Capital	DC	Represents a company's ability to meet long-term obligations.	$DC = \frac{\text{Long term liabilities}}{\text{Equity} + \text{Long term liabilities}}$
Pandemic Crisis	COVID	Denotes the occurrence of a pandemic crisis within a given year.	Binary variable: 1 if the year is 2020, 2021, or 2022; 0 otherwise.

Source: Authors' work

The calculation formulas listed in Table 2 align with those found in various expert publications.

2.2.2 Description of Econometric Methods

This study uses Stata for econometric analysis, including descriptive statistics and Pearson correlation calculations. It utilizes baseline, linear, and nonlinear regression models, incorporating both fixed and random effects. Model selection follows the Hausman test at a 5% significance level. Interaction variables related to Covid-19 are explored to assess the pandemic's impact on company indicators, with both fixed and random effects models tested. Nonlinear regressions are also explored using the same methodology to find a turning point. The regression models are:

$$\text{Linear Regression Model: } Firm\ profitability_{it} = a_0 + a_1 \text{Governance variables} + a_2 \text{Financial variables} + a_3 \text{COVID}_{it} + \varepsilon_{it} \quad (1)$$

$$\text{Nonlinear Regression Model: } Firm\ profitability_{it} = a_0 + a_1 \text{Governance variables} + a_2 \text{Governance variables}^2 + a_3 \text{Financial variables} + a_4 \text{Financial variables}^2 + a_5 \text{COVID}_{it} + \varepsilon_{it} \quad (2)$$

$$\text{-Interaction Variable Regression Model: } Firm\ profitability_{it} = a_0 + a_1 \text{Governance variables} + a_2 \text{Governance variables} * \text{COVID}_{it} + a_3 \text{Financial variables} + a_4 \text{Financial variables} * \text{COVID}_{it} + a_5 \text{COVID}_{it} + \varepsilon_{it} \quad (3)$$

Where a_0 is the constant, $a_1 \dots a_{11}$ are coefficients, ε represents errors, and firm profitability metrics include ROE and ROA. Financial variables are FS, FA, SRGR, ETR, CR, DC, COVID and governance variables are BS, BM, GD, BI. Also, $i = [1; 64]$ and $t = [2014; 2023]$.

2.3 Findings and Discussions

2.3.1 Descriptive Statistics and Correlation Matrix

Table 3 displays the descriptive statistics for the database. Variables with a standard deviation above the mean are highly volatile, while those below the mean are less volatile. Notably, return on equity, sales revenue growth rate and COVID show higher volatility. The table also includes the minimum and maximum values for the variables analyzed.

Table 3. Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max	Skew.	Kurt.
ROE w	576	.206	.236	-.176	.903	1.489	5.406
ROA w	630	.074	.062	-.042	.215	.507	3.056
BS	603	10.461	1.941	2	17	.162	3.517
BM	594	8.455	3.397	2	25	1.622	6.38
GD	603	24.188	10.264	0	100	.756	7.428
BI	603	85.277	8.112	45.455	100	-1.637	6.044
FS	633	23.074	1.566	17.913	26.641	.109	2.698
FA	608	37.452	30.805	1	136	1.443	4.367
SRGR w	631	10.165	12.281	-8.077	42.612	1.055	3.89
ETR w	583	.201	.113	-.004	.447	.294	2.717
CR w	602	2.162	1.197	.907	5.112	1.152	3.291
DC w	604	.942	.934	.015	3.801	1.876	5.967
COVID	640	.3	.459	0	1	.873	1.762

Source: Authors' work

Skewness measures distribution symmetry. In the database, indicators like board meetings, firm age and debt to capital show significant skewness, indicating highly skewed distributions. Board independence have negative skewness, suggesting left-skewed distributions, while others are positively skewed, indicating right-skewed distributions.

Kurtosis measures distribution flatness. Indicators such as firm size, effective tax rate and COVID have kurtosis below 3, suggesting platykurtic distributions, while others exceed 3, indicating leptokurtic distributions with higher peak and tails.

Table 4 shows the correlation coefficient matrix.

Table 4. Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) ROE_w	1.000										
(2) ROA_w	0.646	1.000									
(3) BS	-0.045	-0.164	1.000								
(4) BM	-0.047	-0.148	0.049	1.000							
(5) GD	0.022	-0.025	0.083	0.022	1.000						
(6) BI	-0.008	-0.070	0.283	0.019	0.193	1.000					
(7) FS	0.003	-0.288	0.508	0.226	0.228	0.142	1.000				
(8) FA	-0.096	-0.059	0.321	-0.033	0.211	0.178	0.164	1.000			
(9) SRGR_w	0.060	0.150	-0.079	0.027	-0.089	0.028	-0.097	-0.174	1.000		
(10) ETR_w	-0.106	-0.170	-0.125	0.142	-0.040	-0.236	0.100	-0.277	0.013	1.000	
(11) CR_w	-0.066	0.326	-0.237	-0.216	-0.102	-0.044	-0.527	-0.148	0.110	-0.110	1.000

(12) DC_w	0.594	-0.062	0.037	0.082	0.039	0.050	0.110	-0.144	-0.053	0.051	-0.259
(13) COVID	0.146	0.125	0.078	-0.033	0.316	0.067	0.056	-0.005	0.107	-0.129	-0.058
Variables	(12)	(13)									
(12) DC_w	1.000										
(13) COVID	0.064	1.000									

Source: Authors' work

In this study, a correlation above 0.6 signifies a strong positive relationship, while below -0.6 indicates a strong negative relationship. No correlation was found for this dataset.

2.3.2 Results

The results of this study are highlighted in the tables 5 and 6. Table 5 shows the linear regression models without effects, as well as the linear regression models with effects. Additionally, the nonlinear regression models are outlined in models 7 and 8. It can be observed that, according to the Hausman test, the regression models suitable are those with random effects.

Table 5. Linear and Nonlinear Regression Models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ROE_w	ROA_w	ROE_w	ROE_w	ROA_w	ROA_w	ROE_w	ROA_w
			<i>fe</i>	<i>re</i>	<i>fe</i>	<i>re</i>		
BS	-0.00855 (-1.75)	-0.00148 (-0.99)	-0.0124* (-2.21)	-0.0126* (-2.42)	-0.00295 (-1.79)	-0.00270 (-1.75)	-0.0098* (-2.02)	-0.00183 (-1.22)
BM	-0.00477 (-1.86)	-0.000907 (-1.16)	-0.00701** (-3.15)	-0.00695** (-3.22)	-0.00211** (-3.23)	-0.00201** (-3.15)	-0.0054* (-2.12)	-0.00109 (-1.39)
GD	0.000433 (0.48)	0.0000313 (0.11)	0.00111 (1.14)	0.000372 (0.46)	0.000445 (1.55)	0.000217 (0.90)	0.0004 (0.49)	0.000032 (0.12)
BI	-0.00162 (-1.52)	-0.000533 (-1.63)	0.00129 (1.02)	0.000852 (0.72)	0.000453 (1.21)	0.000319 (0.91)	0.0335* (2.37)	0.00939* (2.18)
FS	0.00837 (1.08)	-0.00440 (-1.87)	0.0289 (0.85)	0.0176 (1.28)	0.0250* (2.50)	-0.0000621 (-0.02)	0.00995 (1.29)	-0.00401 (-1.71)
FA	0.0000677 (0.24)	0.00000603 (0.07)	0.00235 (0.62)	-0.000095 (-0.14)	-0.00145 (-1.30)	-0.0000292 (-0.15)	0.00013 (0.48)	0.000024 (0.29)
SRGR_w	0.00145* (2.15)	0.000496* (2.40)	0.00258*** (4.93)	0.00245*** (4.86)	0.000695*** (4.51)	0.000737*** (4.95)	0.0014* (2.16)	0.00049* (2.41)
ETR_w	-0.273*** (-3.48)	-0.0728** (-3.02)	-0.329*** (-4.92)	-0.342*** (-5.36)	-0.0931*** (-4.75)	-0.0968*** (-5.13)	-0.278*** (-3.55)	-0.0741** (-3.09)
CR_w	0.0127 (1.57)	0.0111*** (4.49)	-0.00874 (-0.99)	-0.00620 (-0.75)	0.00186 (0.71)	0.00366 (1.49)	0.0115 (1.42)	0.0107*** (4.35)

DC_w	0.147*** (16.60)	0.00136 (0.51)	0.102*** (8.67)	0.109*** (10.31)	-0.00280 (-0.82)	-0.00372 (-1.21)	0.148*** (16.76)	0.00148 (0.56)
COVID	0.0443* (2.48)	0.0145** (2.65)	0.0278* (2.02)	0.0353** (2.79)	0.0102* (2.53)	0.0119** (3.19)	0.0443* (2.49)	0.0144** (2.64)
BIxBI							-0.0002* (-2.50)	-0.0006* (-2.31)
_cons	0.175 (0.96)	0.233*** (4.16)	-0.472 (-0.69)	-0.101 (-0.32)	-0.404* (-2.00)	0.113 (1.19)	-1.209* (-2.07)	-0.157 (-0.88)
Obs	486	488	486	486	488	488	486	488
R-sq	0.406	0.180	0.200	0.368	0.000435	0.123	0.413	0.189
F-stat	29.41***	9.477***	18.37***		8.251***		27.78***	9.210***
Mean VIF	1.33	1.33					1.33	1.33
Wald				230.1***		90.47***		
Hausman				9.17		16.08		
Turning point							75.581	75.005

t statistics in parentheses: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Source: Authors' work

Table 6 shows the regression models with interaction variables.

Table 6. Interaction Variable Regression Models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ROE_w	ROA_w	ROE_w	ROE_w	ROA_w	ROA_w	ROA_w	ROA_w
			<i>fe</i>	<i>re</i>	<i>fe</i>	<i>re</i>	<i>fe</i>	<i>re</i>
BS	-0.0082 (-1.70)	0.000223 (0.13)	-0.0122* (-2.19)	-0.0123* (-2.38)	-0.00123 (-0.69)	-0.00091 (-0.55)	-0.00285 (-1.74)	-0.00262 (-1.71)
BM	-0.008** (-2.82)	-0.00088 (-1.13)	-0.006** (-3.12)	-0.006** (-3.21)	-0.0021** (-3.31)	-0.0020** (-3.21)	-0.00213** (-3.27)	-0.00202** (-3.17)
GD	0.0003 (0.41)	0.00009 (0.03)	0.0019 (1.85)	0.00105 (1.21)	0.00048 (1.71)	0.00026 (1.10)	0.000486 (1.70)	0.000261 (1.09)
BI	-0.0016 (-1.56)	-0.00055 (-1.70)	0.00168 (1.32)	0.00116 (0.99)	0.000424 (1.14)	0.000283 (0.81)	0.000691 (1.79)	0.000573 (1.57)
FS	0.00714 (0.92)	-0.00424 (-1.81)	0.0355 (1.05)	0.0195 (1.42)	0.0236* (2.37)	-0.00047 (-0.12)	0.0255* (2.56)	0.0000618 (0.02)
FA	0.00008 (0.31)	0.000005 (0.07)	0.00255 (0.67)	-0.00011 (-0.18)	-0.0014 (-1.26)	-0.00003 (-0.16)	-0.00150 (-1.35)	-0.000032 (-0.16)
SRGR_w	0.0015* (2.33)	0.00049* (2.40)	0.002*** (4.69)	0.0023*** (4.61)	0.00068*** (4.48)	0.0007*** (4.90)	0.000689*** (4.49)	0.00073*** (4.97)

ETR_w	-0.26*** (-3.36)	-0.073** (-3.05)	-0.33*** (-5.01)	-0.349*** (-5.49)	-0.096*** (-4.91)	-0.099*** (-5.29)	-0.0906*** (-4.64)	-0.0946*** (-5.03)
CR_w	0.0124 (1.55)	0.0112*** (4.53)	-0.0085 (-0.97)	-0.00612 (-0.74)	0.00188 (0.73)	0.00367 (1.50)	0.00186 (0.72)	0.00367 (1.50)
DC_w	0.148*** (16.73)	0.00120 (0.45)	0.104*** (8.86)	0.110*** (10.46)	-0.00241 (-0.71)	-0.00335 (-1.10)	-0.00242 (-0.71)	-0.00347 (-1.14)
COVID	-0.0567 (-1.21)	0.0699* (2.54)	-0.0644 (-1.47)	-0.0528 (-1.25)	0.0544** (2.94)	0.0599** (3.25)	0.0990* (2.54)	0.0997* (2.56)
BSxCOVID		-0.0051* (-2.05)			-0.00414* (-2.45)	-0.0045** (-2.66)		
BMxCOVID	0.0124* (2.32)							
GDxCOVID			0.00330* (2.22)	0.00320* (2.19)				
BlxCOVID							-0.00103* (-2.29)	-0.00102* (-2.27)
_cons	0.230 (1.25)	0.214*** (3.79)	-0.649 (-0.94)	-0.157 (-0.49)	-0.389 (-1.94)	0.108 (1.16)	-0.435* (-2.16)	0.0878 (0.92)
Obs	486	488	486	486	488	488	488	488
R-sq	0.412	0.187	0.183	0.370	0.0000503	0.133	0.000365	0.128
F-stat	27.66***	9.098***	17.41***		8.153***		8.079***	
Mean VIF	2.54	6.25						
Wald				236.8***		98.66***		96.49***
Hausman			12.43		15.21		14.84	

t statistics in parentheses: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Source: Authors' work

Regarding board size, a negative and statistically significant influence of this corporate governance variable on return on equity was discovered, while the influence on return on assets is not statistically significant. Additionally, during the health crisis period, the negative influence of this indicator persisted. This finding does not validate the research hypothesis but is consistent with researchers such as (Augusto, Pascoal, & Reis, 2020). Larger boards can face difficulties in achieving effective coordination and decision-making, resulting in slower and less efficient responses to emerging issues. This inefficiency is particularly critical during crises, such as the pandemic crisis, where timely and decisive actions are essential. For healthcare companies in the United States, the pandemic has intensified these issues, as larger boards may struggle with increased complexity in strategic and operational decisions. The diverse interests and potential conflicts within a larger board can further exacerbate these challenges, leading to diminished financial performance and suboptimal asset management during periods of crisis.

The number of annual board meetings is another indicator investigated in this study. According to linear regression models, this indicator negatively and statistically significantly affects financial performance rates. This finding does not validate the research hypothesis and aligns with the results obtained by (Tejerina-Gaite & Fernández-Temprano, 2021). However, during the pandemic crisis, the influence shifted to become positive. Frequent meetings may lead to excessive administrative overhead and disrupt operational focus, detracting from strategic decision-making and performance. Additionally, increased meeting frequency could signal underlying governance issues, such as lack of alignment or ineffective oversight, further impairing financial performance. During a health crisis, more frequent board meetings can improve financial performance by enabling quicker decision-making and better crisis management, which are critical in rapidly changing situations.

Gender diversity has a positive but statistically insignificant impact on performance, validating the study's hypothesis and aligning with authors such as (Brahma, Nwafor, & Boateng, 2020). However, during the health crisis, this influence became significant, highlighting that this aspect is important during a crisis because it enhances decision-making by incorporating a wider range of perspectives and experiences, which is crucial for effective crisis management.

Board independence has a positive but statistically insignificant impact on financial performance, validating the hypothesis and aligning with researchers such as (Mohan & Chandramohan, 2018). However, during the health crisis, its influence became negative and statistically significant. During a crisis, board independence might negatively impact financial performance due to potential disconnects between the board and operational realities. Independent board members, who may have limited industry-specific experience, could struggle with rapidly changing conditions and fail to make timely, informed decisions critical for navigating the crisis effectively. Additionally, there is a turning point in this case: up to a level of 75, the influence of board independence on financial performance is positive, after which it becomes negative.

In terms of the control variables used in this study, firm size, sales revenue growth rate, current ratio, debt to capital, and the pandemic crisis had a positive impact on financial performance, while firm age and effective tax rate negatively impacted profitability. Thus, this study revealed both positive and negative impacts, and 2 of the study's hypotheses were validated.

3. Conclusions

In this quantitative research, I examined the primary corporate governance variables impacting the profitability of United States healthcare companies from 2014 to 2023, analyzing a sample of 64 firms. All the examined companies are part of the S&P 500 stock index. The aim was to understand the relationships between key independent variables and firm performance. The study utilized a robust methodology, featuring both linear and nonlinear regression models, as well as interaction models that included a dummy variable for the pandemic crisis.

The results show that board size negatively impacted the performance of these companies both during non-crisis and crisis periods. Additionally, the number of annual board meetings had a negative influence, which turned positive during the crisis. The study also highlighted the importance of gender diversity at the company level, with a positive impact, especially during crises. Lastly, board independence showed a positive effect in non-crisis periods, but its impact turned negative during the crisis, with an identified turning point. Control variables improved the specificity of the regression models.

Policy recommendations suggest that healthcare companies should regularly evaluate how external events and financial metrics influence their profitability. Also, firms should carefully calibrate their board size to avoid negative impacts on performance. Regular evaluations of board composition can help ensure it remains efficient and effective, particularly during times of crisis. While frequent board meetings can enhance oversight, companies should balance meeting frequency to avoid excessive administrative burdens. During crises, increasing meeting frequency may be beneficial for agile

decision-making, but it should be managed to prevent inefficiencies. Furthermore, promoting gender diversity on the board is crucial for leveraging diverse perspectives and improving decision-making, especially in crisis situations. Finally, while board independence generally supports unbiased decision-making, companies should assess its impact during crises.

Regarding the limitations of the study, the findings are relevant to the specified period and sample of companies. Future research could expand by including more independent variables and extending the time frame, considering macroeconomic factors and employing advanced regression techniques.

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SECTION 4: LAW

THE IMPORTANCE OF CONCLUSION OF THE CONTRACT ON PAYMENT OF CHILD SUPPORT FOR MINOR CHILDREN IN THE PROCEDURE OF DISSOLUTION OF MARRIAGE THROUGH NOTARIAL PROCEDURE

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Summary: *The contract on payment of child support for minor children is a parental agreement established in the legislation of the Republic of Moldova, giving to the legislator a particular importance in view of respecting the rights of children. This manifestation of will, actually decides the destiny of children, who result from the marriage of the couple, who decided to dissolve their marriage through the notarial procedure.*

This legal instrument authenticated by a notary sets out the rights of children and the obligations of parents regarding the payment of child support, the establishment of the domicile and the manner in which parents participate in the upbringing of their children.

Key-words: *contract, child support, maintenance debtor, maintenance creditor, domicile, education, notary.*

1. Introduction. Following the legislative changes that occurred in March 2019 in the Family Code and the Law on Notarial Procedure No.246 of 15.11.2018, a new way of dissolving a marriage was legislated, namely the dissolution of marriage by notarial procedure, being involved in this procedure a new subject authorized with the right to dissolve marriages, namely the notary.

According to Art. 35 of the Family Code, the modalities for the dissolution of marriage are:

“In the cases referred to in Art. 36, paragraphs (1) and (2), the marriage is dissolved by the civil registrar, in the cases referred to in Art. 36, paragraphs (4) and (5) and Art. 37 – by a court of law, and in the cases referred to in Art. 41 and 42 of Law No. 246/2018 on Notarial Procedure – by a notary” [2].

The content of this article lists only the ways of dissolving a marriage, with a small specification, the legislator referring to which article and in which law each procedure is regulated. While in the case of the first two ways of dissolution of marriage, there are further explanations in the following articles of the Family Code, in the case of dissolution of marriage by a notary, there are no legal provisions in the Family Code that detail it, as they are provided for in the Law on Notarial Procedure. Given this state of facts, we consider that it is not enough just to include the notarial procedure in the modalities of dissolution of marriage, but it is necessary to regulate in details the notarial procedure of dissolution of marriage in a separate article, in order not to encounter difficulties in practice in the application of the provisions of Chapter 7 of the Family Code.

Being focused on the divorce performed before the notary, we must also analyse the rules included in the Law on Notarial Procedure, namely the provisions of Art. 41 of this normative act, which

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provides in para. (1) that: “*The request for the dissolution of marriage by agreement of the spouses may be submitted to any notary on the basis of the agreement of the spouses and in the presence of both spouses or in the presence of one of the spouses if the notary has previously been notified of the authentic agreement of the other spouse to dissolve the marriage and to examine the request in his absence*” [5]. Also, the para. (2) states that “*...The request and, if there is one, the notarized agreement referred to in para. (1) should relate, as the case may be, to the manner in which the parents are to participate in the upbringing, maintenance of the joint minor children, the establishment of their domicile, the payment of maintenance for the spouse or the division of the joint property acquired during the marriage. Accordingly, the parties shall declare to the notary on their own responsibility the existence of minor or conceived children, and if the spouses have minor children, at the same time as the marriage is dissolved, the agreement of the spouses on the establishment of the maintenance of minor children and the establishment of the domicile of minor children after the dissolution of the marriage shall be authenticated*” [5]. Basically, the legal rules set out the conditions necessary for a notary to initiate divorce proceedings.

Based on the above mentioned, the legislator establishes the following conditions for the notarial dissolution of marriage, namely:

- There must be an agreement between the spouses to dissolve the marriage;
- There must be an agreement on the payment of maintenance for the minor child;
- There must be an agreement on the domicile of the minor child;
- There must be an agreement on how the parents will participate in the upbringing of the minor child.

At the same time, the legislator also regulates a number of secondary conditions, the fulfilment of which is left to the discretion of the spouses, namely:

- There must be an agreement on the payment of maintenance to the former spouse;
- There must be an agreement on the division of the joint property.

2. Basic content. The compliance with the legal conditions for obtaining a divorce by notarial means is an essential condition because, couples who intend to divorce through a notary and have children resulting from their marriage, in addition to the fact that they must agree to all the actions resulting from the process of dissolution of the marriage, they must conclude a contract on the payment of maintenance for minor children resulting from the marriage, otherwise they will proceed to another way of dissolution of the marriage, namely the dissolution of the marriage by court.

The contract concerning the payment of maintenance for minor children is a complex legal act in which, in addition to the payment of maintenance, the notary, with the agreement of both parents, stipulates the child's domicile and the parents' participation in the upbringing of the minor child.

This agreement is important because, if no agreement can be reached on maintenance, residence and participation in the upbringing of the child, there will be no notarial dissolution of the marriage. In the case of a notarial dissolution of marriage, the notary is, essentially, just an arbitrator who implements the spouses' wish to dissolve the marriage, and in order to achieve this result it is necessary to conclude a contract through which the rights of the children must be respected, since they will be the final beneficiaries of this contract.

Art. 75 para. (1) of the Family Code sets the maximum ceiling for the receipt of maintenance from

the salary or income of the parent who is the "maintenance debtor", as follows: *“Maintenance for a minor child shall be paid from the parents' salary and/or other income in the amount of 1/4 - for one child, 1/3 - for 2 children and 1/2 - for 3 or more children”*. Meanwhile, the provisions of this Article do not limit the parent - the maintenance debtor - from contributing financially to the maintenance of the child in an amount higher than the amount specified by law.

In terms of the amount of maintenance, the legislator also provided for the hypothesis in which the parent who owes maintenance to his or her child has an irregular or fluctuating salary and/or other income, establishing the possibility of paying a fixed sum of money paid monthly or at a certain period cumulatively for the unpaid period, including the right to offer certain goods as payment on account of maintenance.

Analysing these provisions in the context of the new amendments to the aforementioned legislation, we note that the rules governing the determination of the received maintenance amount, state that the court *“may determine the amount of maintenance in the form of a fixed sum of money paid monthly or, at the same time, in the form of a fixed sum of money and in the form of a proportion of salary and/or other income according to Art. 75”*.

In this case, the following question may arise: "How will the notary assess the amount of maintenance for a minor child established by the parents in the contract?"

We consider that the answer to this question is provided by the provisions of Articles 92-96 of the Family Code, which stipulate that the parties may agree on the amount and method of payment of maintenance, but that it should not be less than the amount set out in Art. 75 of the Family Code. Thus, notaries, like the courts, will take into account the provisions of Articles 74-76 of the Family Code when analysing the amount of maintenance included in the contract concluded by the former spouses.

From the above-mentioned, we consider that there is an obvious need for the family law legislation to be revised and to adjust all the rules of the Family Code to the changes that occurred, so that besides the court, the notary is also authorized to apply the rules related to the determination of the amount of maintenance.

Another worth mentioning aspect is the minimum amount needed for the maintenance of a minor, values established annually by the National Bureau of Statistics, taking into account that the legislator in Art. 75 of the Family Code does not expressly refer to a minimum amount in lei that should be established by the court or by the spouses in the contract. Given the fact that the amount of salary varies from case to case and that a large proportion of citizens have irregular incomes, notaries will have to refer to the data established by the National Bureau of Statistics for the minimum consumption basket to check the correspondence of the amounts included in the contract for child maintenance.

In the table below we present the minimum subsistence level for children by age group for 2021-2023, established by the National Bureau of Statistics.

Table 1. Minimum subsistence level for children by age group, 2021-2023

		Total by country	Big cities	Small cities	Villages
		Annual average	Annual average	Annual average	Annual average
2021	Children-total	2 074,6	2 272,9	2 107,8	2 007,9
	... Children up to 1 year old	835,4	935,9	855,1	796,8

	... Children between 1-6 years old	1 803,2	2 021,8	1 845,8	1 714,1
	... Children between 7-17 years old	2 342,5	2 602,4	2 376,3	2 267,2
2022	Children-total	2 558,3	2 846,4	2 553,2	2 424,4
	... Children up to 1 year old	1 008,9	1 123,9	1 016,8	955,5
	... Children between 1-6 years old	2 197,3	2 471,4	2 232,2	2 059,3
	... Children between 7-17 years old	2 888,6	3 188,6	2 879,9	2 749,2
2023	Children-total	2 822,1	3 176,8	2 810,2	2 650,5
	... Children up to 1 year old	1 110,1	1 253,0	1 111,6	1 041,2
	... Children between 1-6 years old	2 403,1	2 736,1	2 427,4	2 232,3
	... Children between 7-17 years old	3 165,1	3 542,1	3 142,3	2 985,0

Source: https://statbank.statistica.md/PxWeb/pxweb/ro/30%20Statistica%20sociala/30%20Statistica%20sociala_04%20NIV_NIV050/NIV050090.px/table/tableViewLayout2/?rxid=cd9139c8-a3e3-410a-b617-5a26ae1f6fae

Analysing the statistical data presented above, we notice different values of the minimum subsistence minimum for children by age categories, it being clear that each age group has certain needs, and the standard of living is considered higher in urban than in rural areas. We observe that from year to year, the minimum consumption basket of minors regardless of age is increasing, due to several factors including, due to the annually increased prices and the needs that each family has. Thus, according to data provided by the National Bureau of Statistics, in 2022, the minimum consumption basket for a child in the country increased by 483.7 lei compared to the previous year, thus, from 2074.6 lei in 2021 it increased to 2558.3 lei in 2022, and in 2023 it increased by 263.8 lei, being 2822.1 lei [8].

We consider that the size of the minimum consumption basket is an indicator that sets the minimum ceiling for maintenance and, at the same time, is a barrier to the temptation to set a lower amount when the parties agree. In this case, since we do not have clarity from the provisions of Art. 75 of the Family Code regarding the minimum amount that can be attributed for the maintenance of minors, the notary must be guided by the data provided by the National Bureau of Statistics in order to avoid violating the rights of the minor.

Another important aspect is the inclusion in the contract of a clause providing for additional expenses that may arise during the upbringing of the child, such as those arising from health reasons, which require a doctor's examination and expensive treatment, and which will have to be covered by both parents equally.

At the same time, once the amount of child maintenance has been established, the date from which the child maintenance will start to be paid will also be determined, which usually corresponds to the date of signing and authentication of the contract. The contract will also state on what date monthly or at what period the maintenance will be paid and, of course, until when the maintenance will be paid, a period of time which may last until the minor child reaches the age of majority or becomes fully capable of exercising his or her rights under the age of 18.

The maintenance can also be paid after the child reaches the age of 18, under Art. 78 of the Family Code, if the child is unable to work or if he or she continues his or her studies and needs material support, and cannot be employed.

Another important provision concerns the child's domicile with one of the parents. Thus, a general practice of the courts is to establish the domicile with the mother, but the choice is up to both parties, a decision which must be included in the notarized contract. Regardless of the choice made, the parent who will reside with the child is not allowed to prevent the other parent from visiting the child.

If it concerns the establishment of the domicile of the minor abroad after the conclusion of the contract, this procedure can be carried out by an additional agreement or a notarized declaration of consent of the other parent to the change and establishment of residence abroad of the minor.

And, last but not least, the participation of both parents in the upbringing of their children, a family function which, ideally, should be carried out by both parents in equal measure, regardless of their separation after divorce, this being both a subjective right and a principle recognized worldwide by the provisions of Art. 18 para. (1) of the Convention on the Rights of the Child, according to which: *"both parents have joint responsibility for the upbringing and development of the child"* [3]. This principle has also been enshrined in the domestic legislation of the Republic of Moldova.

But, given that every right is necessarily accompanied by an obligation, Chapter 11 of the Family Code enshrines an interleaving of parental rights and obligations, which come to protect the minor through parental cooperation. This cooperation provides security for the child and concerns the right to education and the parents' obligation to accomplish this, by choosing the educational institution and the form of education, by being actively involved in the child's destiny regardless of whether the parents live separately or together, having regard to the best interests of the child, taking into account the child's views and interests.

Art. 62 para. (1) of the Family Code stipulates that: *"The rights of parents cannot be exercised contrary to the interests of their child. Parents cannot harm the physical and mental health of the child"* [2], and para. (2) states that: *"The methods of upbringing the child, chosen by the parents, must exclude abusive behaviour, insults and mistreatment of any kind, discrimination, mental and physical violence, corporal punishment, involvement in criminal acts, initiation into the consumption of alcoholic beverages, the use of narcotic and psychotropic substances, gambling, begging and other illicit acts"* [2].

3. Conclusions. Accordingly, we conclude that the legislation of the Republic of Moldova is aimed at protecting minors in case their parents decide to divorce, stipulating measures that would ensure the right to education of minors, the development of intellectual abilities, freedom of thought and conscience, the protection of their dignity and honour.

A very important aspect is the enforceability of the contract on the collection of maintenance for minor children, at the request of the parties, thus conferring the right to apply to the bailiff, bypassing the court, in order to collect maintenance from the maintenance debtor, who does not comply with his contractual obligations, by the maintenance creditor.

Enforceability is a way of holding the debtor liable and making the work of the court easier for the judges by its effect between the parties, as *res judicata*, giving the creditor the right to collect maintenance through the bailiff without suing the maintenance debtor.

Referring to the main idea, namely the importance of the Agreement on the payment of child support in the notarial procedure for the dissolution of marriage, we conclude that this agreement is particularly important in the case of couples who have children and intend to divorce by notarial procedure, being a manifestation of will that expressly stipulates parental rights and obligations, providing security for the minor's future, and from a procedural point of view it is one of the basic conditions required for the dissolution of the marriage before a notary, of major importance in terms of the time optimized by the parties in the maintenance collection procedure, because the needs of

minor children do not have time to wait, and the harmonious cooperation of both parents helps to maintain a stable psychological state of the child, when everything is solved quickly, peacefully and without depressive states.

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THE EVOLUTION OF INTERNATIONAL HUMANITARIAN LAW AND ITS APPLICATION IN MODERN ARMED CONFLICTS

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Abstract:

International Humanitarian Law (IHL), traditionally referred to as the "law of war," has undergone significant evolution since its inception. Its primary objective has been to mitigate the effects of armed conflict by limiting the means and methods of warfare, while also protecting those who do not participate in hostilities. The foundation of IHL lies in treaties like the Geneva Conventions and their Additional Protocols, which outline the rights and responsibilities of both state and non-state actors during conflicts. Over time, the nature of warfare has changed dramatically, shifting from traditional state-centric wars to complex non-international armed conflicts, including civil wars, insurgencies, and conflicts involving non-state actors like terrorist groups. This evolution in warfare has posed considerable challenges to the applicability of IHL, necessitating constant adaptation of its rules and principles.

One significant development in modern armed conflicts is the rise of asymmetrical warfare, where state military forces confront irregular or insurgent groups. This has raised new questions about the classification of conflicts, the status of combatants, and the protection of civilians. The principle of distinction, a cornerstone of IHL, which mandates the differentiation between combatants and non-combatants, has become more difficult to enforce as armed groups increasingly blend with civilian populations. Furthermore, the use of new technologies such as drones, cyber warfare, and autonomous weapons systems has complicated the application of existing IHL frameworks, prompting calls for updates to legal definitions and protocols to address these emerging realities.

Another challenge has been ensuring compliance with IHL in conflicts involving non-state actors, who may not be signatories to traditional treaties. The international community has responded by developing soft law mechanisms and international tribunals, such as the International Criminal Court (ICC), to prosecute war crimes and ensure accountability. However, ensuring universal adherence to IHL remains a pressing issue, particularly in regions where state authority is weak or where non-state actors refuse to recognize the legitimacy of international legal norms.

Despite these challenges, IHL continues to serve as a vital framework for regulating armed conflicts. Recent developments, such as the adoption of new treaties to protect cultural property and the environment during war, indicate the international community's ongoing commitment to adapting IHL to modern challenges. However, the future of IHL will depend on the ability of states and international organizations to address the gaps in the legal framework and enhance the enforcement of its rules in an increasingly fragmented and complex global landscape.

Key words: *International Humanitarian Law, modern armed conflicts, asymmetrical warfare, non-state actors, Geneva Conventions, technological warfare*

1. Introduction

International Humanitarian Law (IHL), also referred to in specialized literature as the law of armed conflict or the law of war, consists of a set of rules and principles designed to reduce the harm that war can inflict on people and property. Its primary objective is to protect civilians, medical personnel, and prisoners of war, and to regulate the conduct of hostilities by imposing limits on the methods and means of warfare. The evolution of IHL can be traced back to ancient customs and treaties, but it

began to take its modern form in the 19th century, particularly with the adoption of the Geneva Conventions of 1864 and their subsequent updates (International Committee of the Red Cross, 1949). These legal instruments established fundamental principles governing the conduct of war, including the protection of civilians, the treatment of combatants, and the distinction between military targets and civilian objects.

As warfare has evolved, so too has IHL. Traditional wars between states, characterized by formal declarations of war and conventional battlefield engagements, have largely been replaced by more complex conflicts. These conflicts, which often blur the lines between combatants and civilians, present significant challenges for the application of IHL (Roberts, 2008). Furthermore, the rise of new technologies such as drones, cyber operations, and autonomous weapons systems has introduced additional complications, raising questions about the adequacy of existing legal frameworks. The ongoing evolution of IHL reflects the need to address these new realities while upholding the humanitarian objectives of the law (Schmitt, 2017).

This paper aims to highlight the evolution of IHL and its application in modern armed conflicts, focusing on essential issues such as the difficulties of distinguishing between combatants and non-combatants in asymmetric warfare, the legal implications of emerging technologies, and the challenges of enforcing IHL in conflicts involving non-state actors. It also examines recent developments aimed at strengthening IHL and analyzes prospects for its future adaptation to ensure its continued relevance in an increasingly complex global conflict landscape.

2. Basic content

The history of IHL's development is closely linked to the changing nature of warfare. Initially designed to regulate conflicts between states, IHL has progressively expanded its scope to include non-international armed conflicts, particularly in response to the proliferation of civil wars and insurgencies in the post-World War II period. The Geneva Conventions of 1949 and their Additional Protocols of 1977 were significant milestones (**Henckaerts and Doswald-Beck, 2005**). These treaties not only reinforced the protection of civilians but also addressed the status of combatants in internal conflicts, recognizing that wars are no longer confined to interactions between nation-states (International Committee of the Red Cross, 1949).

The development of IHL is shaped by the evolving nature of warfare. Initially created to regulate conflicts between states, IHL expanded its scope to include non-international armed conflicts, particularly in response to the proliferation of civil wars and uprisings in the post-World War II period. The Geneva Conventions of 1949 and their Additional Protocols of 1977 were key milestones (Henckaerts and Doswald-Beck, 2005). These protocols, in addition to strengthening civilian protection, addressed the status of combatants in internal conflicts, acknowledging that battles are no longer confined to interactions between national states (International Committee of the Red Cross, 1949).

Table 1. Comparison of Traditional Warfare vs. Modern Armed Conflicts and Challenges for IHL

Aspect	Traditional Warfare	Modern Armed Conflicts	Challenges for IHL
Nature of Combatants	State actors, formal armies with clear uniforms	Non-state actors, insurgents, terrorists, militias	Difficulty in distinguishing combatants from civilians
Type of Conflicts	Inter-state wars (e.g., WWII, Korean War)	Asymmetrical warfare, civil wars, internal conflicts	Blurring of lines between combatants and non-combatants
Means of Warfare	Conventional weapons (tanks, planes, infantry)	Drones, cyber warfare, autonomous weapons	Technological advancements outpacing legal frameworks
Legal Framework	Geneva Conventions, Additional Protocols	Geneva Conventions, ICC, Customary IHL	Need for new interpretations and updates to protocols
Compliance and Accountability	State actors held accountable through treaties and conventions	Non-state actors may not recognize or follow IHL	Difficult enforcement and accountability mechanisms
Civilian Protection	Clear distinction between military targets and civilians	Civilians increasingly affected due to urban warfare	Increased civilian casualties, infrastructure damage

While states are bound by international treaties such as the Geneva Conventions, non-state actors often do not sign these agreements, leading to challenges in enforcing legal accountability. In response to this issue, the international community established the International Criminal Court (ICC) in 2002 to enable the prosecution of individuals for war crimes, including leaders of non-state groups. However, the ICC faces political constraints and resistance from powerful states that refuse to recognize its authority, and many non-state actors deny the legitimacy of international courts, undermining the enforcement of International Humanitarian Law (IHL) (Gill & Fleck, 2013).

Technological advancements, such as drones and autonomous weapons, have introduced new legal and ethical dilemmas. For instance, drones enable precise strikes, but they also endanger civilians in situations where combatants are hard to distinguish (Melzer, 2009). Cyber warfare further complicates the application of IHL, given its potential to cause humanitarian harm without direct casualties. Therefore, the international community must adapt legal standards to address these emerging risks (Sassòli & Bouvier, 2011).

Despite these challenges, IHL remains crucial for mitigating the impact of armed conflicts. Recent initiatives, such as the 1999 Protocol to the Hague Convention for the Protection of Cultural Property, highlight the ongoing commitment to adapt IHL to modern realities. Nevertheless, the effectiveness of IHL hinges on the cooperation of states and non-state actors, as well as the ability of international institutions to enforce compliance with these norms.

3. Conclusion

IHL has shown resilience in the face of evolving warfare, adapting to new challenges while maintaining its core humanitarian mission. However, the rapid pace of technological change and the rise of asymmetric warfare test the limits of its applicability. The clash between state forces and irregular non-state groups, along with the difficulty of distinguishing between combatants and civilians, necessitates an update of the legal framework to better protect civilian lives. Technological advancements, including drones and cyber operations, require revisions to IHL to ensure its humanitarian objectives remain relevant in modern conflict scenarios.

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SUCCESSOR REPRESENTATION AS A CIVIL LAW INSTITUTION IN THE NEW REGULATIONS OF THE CIVIL CODE

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Abstract: *The civil law branch includes several legal institutions, each of which has its role and relevance. Whether they belong to the civil law of obligations, contracts, or civil law of succession, they assert their major importance in legal reports that are born, modified, extinguished, and transformed every day and every second in society.*

Within the framework of civil law, the successor has affirmed its importance, among the multitude of legal institutions, the Institution of Successor Representation;

Succession representation as an institution of civil law and other institutions of civil law of succession is always current, as long as people are mortal and some subjects inherit them.

Even more so, if we are to go from the general to the special, the institution of succession representation, through its specifics, asserts its importance in the protection it offers to the heirs of deceased heirs, who for objective reasons cannot inherit.

Keywords: *successional capacity; successional representation; heir classes; descendants; successional indignity, vacancy*

JEL: K15

Introduction

Legal successional devolution represents the process of establishing a circle of persons, according to legal provisions, that is called to collect the patrimony of the bequeath. It is based on kinship ties and marriage relationships between eventual heirs and those who leave the inheritance.

In general, successional transmission is based on the traditional practice of blood ties, which exist between members of the same family. Thus, kinship is a relationship based on the descent of a person from another person or the fact that several people have a common ancestor. Kinship can be in a straight line: ascending or descending (Băieșu, Chibac, 2010). Similarly, kinship can also be collateral. The degree of kinship is the distance between two relatives, which is established as follows: in a straight line according to the number of births, and in a collateral line according to the number of births ascending from one of the relatives to the common ascendant and descending from it to the other relative (Macovei, 1993).

Although the law establishes a circle of people called “collecting inheritance,” they are not allowed to collect the inheritance estate. It is obvious that if it had been done in this way, it would have resulted in an excessive fractionation of the inheritance estate.

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Succession representation is the institution that allows certain legal heirs (as a rule descendants) to rise to the place and rank of a deceased ancestor before the opening of the succession to collect in his place the part of the inheritance that would have been due to him if he had been alive.

The predeceased ascendant is called represented, and the heir who inherits through representation is representative.

Being a separate legal institution, which, apart from the common resonance of the name, has nothing to do either with the conventional representation of the principal by his/her agent, or with the legal representation of the minor, or is legally prohibited by parents or guardians after legal acts. Indeed, if in the case of conventional representation and the incapacitated by their legal representatives, it is a matter of concluding legal acts (from which rights and obligations arise) by the representatives in the name, and for those represented, successional representation only confers on the representative its successional rights.

For example, assume that after D's death, potential heirs who could reap the estate are F (the living son of the deceased) and two grandchildren N1 and N2 (children of F2), who is the deceased's predeceased son. Thus, F will collect 1/2 of the inheritance, while the grandchildren of the deceased, N1 and N2, will ascend to the place and rank of their predeceased father F2, collecting the part that would have belonged to him if he had been alive, i.e., 1/2 from the inheritance, which they will divide between them in equal parts, respectively, 1/4 of the inheritance each.

Successor representation is presented as a "benefit" or a "favor" of the law toward representatives who rise to the place and rank of the represented, thereby inheriting the deceased.

Representation can allow the representatives to inherit alongside the successors in a closer degree of kinship with the deceased, in which case, indeed, it constitutes a favor as it grants succession rights to relatives in a more distant degree of kinship with the deceased (by way of derogation from the principle of proximity degree of kinship), but it can also operate when the successors in a more appropriate degree of kinship with the deceased are all predeceased, the inheritance being divided among the stems, so that the representatives, even though they are relatives of the same degree, reap unequal shares of the inheritance, some of them receiving less than they would have received if they had not operated the representation.

For example, if the deceased D had two children, F and F1, both predeceased, and the two children of F come to his inheritance, namely N1, N2, and the only child of F, N3, In this case, the inheritance table will be shared in the following way: the inheritance will be divided into two stems (the number of predeceased children of the deceased), F and F1, and the descendants of the children the deceased's predeceased will each go up their stem in the place and degree of their predeceased parent, dividing the part of the inheritance belonging to that stem according to their number, so that the children of F N1 and N2, will divide between them into equal parts the half of the inheritance returning to their parent (1/4 of the inheritance each), and the child of F1 - N3, will collect the other half of the inheritance by himself, returning to his parent. From this, it follows that N1 and N2 will receive less from the inheritance than they would have received if the representation did not operate and the inheritance would be divided equally, according to the rule of dividing the inheritance into equal parts between relatives of the same class and the same degree of kinship (1/4 instead of 1/3 each), and N3 will receive more (1/2 instead of 1/3).

According to art. 1500 paragraph 3, amended Civil Code, the succession representation operated in two cases:

- a) descendants to infinity;
- b) collaterals up to and including the 4th degree of kinship (privileged collaterals- grandchildren and great-grandchildren from siblings; ordinary collaterals-primary cousins).

Regarding the previous regulation of the Civil Code, the institution of representation is the only way that grandchildren and great-grandchildren of direct descendants can inherit their grandparents. Although they were members of the first class of legal heirs, grandchildren, and great-grandchildren in the direct line to infinity could not inherit in their names. In contrast to the current regulation of the civil code, which includes them even in Class I, with the possibility of collecting the inheritance mass in their names and not only through inheritance representation.

According to the provisions of the old regulation, the representation is applied in a straight line descending to infinity. This means that in a straight descending line, the representation operates regardless of the representative's degree of kinship with the deceased.

In this case, a nephew of a son, a second-degree relative of the deceased, can inherit the share of his predeceased parent, the son of the deceased, in competition with his uncle (son of the deceased), who is still alive. Likewise, a great-grandson of son B2, a third-degree relative of the deceased, can inherit his great-grandfather D alongside a surviving son of the deceased A if the conditions of degree-to-degree representation between him are met on the stem he represents and his grandfather B, whom he represents in his great-grandfather's inheritance. Similarly, a great-great-grandson inherits by representing his great-great-grandfather, and so on. To operate the representation in such cases, conditions required by law must be met at each intermediate level through which the representative must pass to reach the place and level of the representative, the representation not being able to operate per saltum or omisso medio.

Succession representation operates if the descendants of a more distant degree inherit together with the descendants in a closer degree to the deceased and if the descendants in a closer degree to the deceased are all predeceased, the descendants of a more distant degree from kinship with the deceased come to the inheritance having the same degree of kinship or different degrees.

An example that shows the last hypothesis is the one in which the deceased, D, had two sons, A and B, both predeceased; A had two sons, A1 and A2, the first alive at the opening of the inheritance, and the second predeceased leaving in turn two sons, A3 and A4, alive at the opening of the inheritance, B leaving one son, B1, alive at the opening of the inheritance, case in which the inheritance will be divided in the following way: the inheritance will be divided between two stems, A and B, each of which will receive 1/2 of the inheritance; on stem A, if there are two descendants of this predeceased son of the deceased, the stem will be divided into two sub-stems, A1 and A2, each of which will receive 1/4 of the inheritance, but A2 being predeceased, his share of the inheritance (1/4) will go to his descendants, A3 and A4, who will divide it in two, each of them will get 1/8 of the inheritance, they will rise through representation to the place and rank of A2, and from here, together with A1, to the place and the grade of A; on the stem B, the 1/2 part of the inheritance will go to B1, who in the place and degree of B.

The representation also works if the descendants who inherit are of equal degree of kinship and in equal numbers. Thus, if the deceased D had two children, A and B, both predeceased, and on the date

of the opening of the inheritance, two children of A, A1, and A2, and two children of B, B1, and B2, are alive, the inheritance will be divided in the following manner: the four grandsons of the deceased's sons, although they are relatives of the same degree, will not collect the inheritance in their name but through the representation of their deceased predecessors. Although in this case, the successors reap the same share from the inheritance as they would have reaped had they inherited in their name, the fact that they inherit by representation and not in their name has practical consequences. So, if one of them renounces the inheritance, his share will not be divided equally between the other three accepting heirs (as would happen if the grandchildren of the deceased inherited in their name), but will return entirely to the co-heir the strain to which the renouncer belongs; also, the four grandchildren of the deceased who inherit by representation, and not in their name, must report to the inheritance the donations received without an exemption from reporting from the deceased during his lifetime by their represented predecessors.

Representation in the case of collaterals up to the 4th degree of kinship inclusive (privileged collaterals-grandchildren and great-grandchildren from brother and sister; ordinary collaterals-first cousins).

For the descendants of the deceased's brothers and sisters up to the fourth degree inclusive (grandchildren and great-grandchildren), the representation operates under conditions similar to those of the deceased's descendants (Bloşenco, 2003).

Representation in the collateral line produces effects both in the case of descendants of good (good) brothers and sisters who have both parents in common and in the case of consanguineous or uterine ones who have only one parent in common with the deceased, either the father or the mother, specifying that the representatives of the latter cannot inherit more than the representative can inherit in the place and degree to which they inherit, i.e., either only in the maternal line or only in the paternal line.

The current regulation of the Civil Code does not establish any restrictions on the operation of succession representation. Within all five classes of legal heirs, succession representation can be performed if the conditions required by law are met.

At the same time, the current regulation of succession representation is rather vague and limited to a single paragraph that covers all five classes of heirs, establishing an essential rule for the sharing of the succession mass through legal inheritance.

Article 2178. First-class legal heirs

(5) Children who replace the deceased parent according to the provisions of para. (3) inherit in equal shares the inheritance share to which the deceased parent would have been entitled.

Only paragraph 5 of Art. 2178 of the Civil Code of the Republic of Moldova regulates the operation of the inheritance reserve, both within class I of legal transferees, and establishes the same operation of the inheritance reserve for class II, class III, class IV, and class V.

Article 2179. The second class of legal heirs

(3) If at the time of opening the inheritance, one of the parents of the deceased is not alive, instead of the deceased's parent, his descendants are called to the inheritance by the rules applicable to first-class heirs.

Article 2180. The third class of legal heirs

(5) To the extent that the descendants take the place of their parents or more distant ancestors, the legal provisions regarding first-class heirs shall be applied accordingly.

For the institution of successor representation to be applicable, it is imperative to meet certain conditions both in the person of the represented (deceased) and in the person of the representative (successor).

Conditions required by the representative

The representative, on the one hand, must have predeceased his *de cuius*, and on the other hand, he must have had an effective claim to the inheritance if he had been alive.

1. The representative must be predeceased by the *de cuius*.

Representation always assumes that the representative has died before the opening of the succession because only dead persons are represented".

Since the missing persons are considered to be alive as long as there has not been a definitive judicial decision declaring the death, After the judicial declaration of death, depending on the date established as the date of death, the representation will be admitted or not, according to the rules of common law. Regarding the case of the comorientes, the doctrine persists that representation is allowed in the case of the son who died together with his father because "being presumed dead at the same time as the person whose inheritance is in question, he no longer exists at the time of the opening of the succession, so it is a dead person, not alive"(Fr. Deak, Succession Law Treaty, Ed. Actami, Bucharest, 1999). In reality, however, in the case of the deceased, it is assumed that they died at the same time, any "establishment" of an order of deaths is not only arbitrary but even contrary to both the legal regulation in the matter and the definition of the institution. Therefore, the succession of each co-orientant will be resolved "as if the other did not exist". For that reason, in the given example (the deceased father together with his son), none of the co-heirs can come to the inheritance of the other, neither in his name nor by representation, since the inheritance of each will be deferred to his heirs as if the other were not existed.

Art. 725-1 French Civil Code provides in the first two paragraphs the same rules in the matter of comorientes, but in the last paragraph expressly provides that if one of the co-deceased leaves descendants, they can come to the inheritance by representing their author. Analyzing the mentioned regulation, the doctrine emphasized that "this solution enshrines a presumption of predecession of the represented". However, our law not providing for such a presumption of exception applies in all situations (including the deceased father together with one of his children) the rule according to which co-heirs cannot inherit each other.

2. The representative must have had an effective call to the *de cuius*' inheritance if he had been alive (he meets all the conditions to be able to inherit the deceased).

For the representation to be able to produce its effects, the represented person must have inherited the deceased if he or she was alive at the time of opening the inheritance.

Thus, the unworthy, even the predeceased *de cuius*, cannot be represented by his descendants. The previous regulation expressly stated that - "the representation of the person whose inheritance was renounced, the person who renounced the inheritance, as well as the unworthy" is not accepted. We can deduce that people who renounce their inheritance or are alive and unworthy of the

deceased cannot be represented. Representatives of renouncers or unworthy persons can no longer inherit in their name or through successor representation.

The previous regulation of succession representation determines an inequitable and abusive situation regarding the descendants of the deceased who, in the previous example, can no longer inherit the succession, thus becoming vacant and being taken over by the state.

In Romanian civil law, the solution is similar to the current regulation of this institution - *"the children of the unworthy coming to the succession, by their right, without the help of representation, are not removed for the mistake of their father"*, which means that per a contrario, they are not entitled to inherit through representation. Descendants of renouncers or unworthy persons can inherit in their names if there are no heirs of a preferable rank. For example, if deceased D leaves at his death two sons, A and B, both renouncers, A has two sons, A1 and A2, and B has a son, B1. The three grandchildren of the deceased, A1, A2, and B1, will come to their grandfather's inheritance in their names, each getting 1/3 of the inheritance.

The heir who renounces his/her inheritance is considered to have never been an heir and can never be represented.

Non-reserved legal heirs (such as the deceased's brothers and sisters) who were disinherited cannot be represented by their descendants because as a result of the disinheritance, they are deprived of the ability to inherit the deceased (Fr. Deak, Succession Law Treaty, Ed. Actami, Bucharest, 1999). In the case of partial disinheritance of non-reserved heirs, as in the case of reserved heirs who cannot be fully disinherited but only within the limits of the available quota of the inheritance, representation remains possible for the part of the inheritance that does not fall under the scope of the ex-inheritance of the represented person.

Starting from the reasons underpinning the institution of successional representation, the doctrine criticizes the current legislative solution that conditions its application on the ability of the represented to inherit his *de cujus*, demonstrating that unworthiness and renunciation of inheritance should not have consequences on their descendants, as currently occurs, but only on the unworthy or the renouncer, the imperative of equality between the strains demanding this solution.

Conditions required by the representative

Coming to the inheritance of *de cujus*, the representative ascends by the will of the law in the place of the represented but inherits for himself and not for the represented. From this, it follows that the representative must have the aptitude to inherit the deceased.

Being called by law to inherit the deceased, the representative must inherit the deceased. In this sense, the representative must be alive or at least conceived on the date of the opening of the inheritance, not be renouncing or unworthy of the deceased, and have his/her vocation in the inheritance of the deceased.

Therefore, to operate the representation, the representative must inherit both the principal and the represented.

Effects of successional representation

Successive representation produces effects consisting of placing the representative in place of the represented and dividing the succession into stems. If the conditions required by law are met, the representation operates by law.

The representative takes the place and degree of kinship of the representative.

Because of representation, the representative takes over the place and degree of kinship of the represented, collecting the part that would have belonged to him from the inheritance if he had been alive. "representation has the effect of placing the representatives in the place and the right to the represented".

However, this does not mean, as we saw above, that the representative inherits for the represented; he inherits in his name but acquires the rights and obligations that would have belonged to the representative if he had been alive at the time of opening the inheritance. Successor representation therefore allows the representative to prevail over the rank of the represented, inheriting what would have been his/her inheritance if he/she had been alive, but for himself, and not for the represented.

The division of inheritance in successional representation is performed on stems.

If successional representation operates, the division of the successional mass is performed on stems. This means that the inheritance will be divided into as many parts as there are children (descendants of the legal heirs with a preferential rank to reap the inheritance table), who come to the inheritance or who, being predeceased, are represented by their descendants and not on their heads, regardless of whether the heirs who inherit the succession are in different or equal degrees of kinship with the deceased.

Within each stem, the division of the part that belongs to it will be done evenly (depending on the number of heirs being part of it), unless one of the descendants of the stem of the one represented is in turn predeceased. In the latter case, if the representation conditions are met, a new division into stems is performed between the branches (sub-stems) of the respective stem.

The representation operates by law.

No one has to accept the inheritance; any heir is free to accept or renounce the inheritance at his/her discretion. However, once inheritance is accepted, successional representation operates by right, that is, under the law, without the need for any manifestation of will on the part of the representative.

Successional representation operates only within the framework of legal inheritance; therefore, the question of changing the rules of representation through the will of the deceased cannot be raised in the sense of applying it in other cases than those provided by law or of changing the inheritance quotas going to the heirs as a result of it. Of course, within the limits of respecting the rights of reserved heirs, the acts of disposition mortis causa made by the deceased are valid, including those that would "derogate" from the rules of representation, only that these, in reality, are not changes to the legal regime of representation successions but acts of testamentary disposition (ex-inheritance or institutions of legacies) that exceed the scope of legal inheritance.

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SECTION 5: POSTDOCTORAL RESEARCH

SMEs RESILIENCE AGAINST THE BACKDROP OF THE CURRENT CRISES

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Abstract

This paper considers the role of small and medium sized enterprises (hereafter, SMEs) within an economy and their capacity to adapt during the crises. Although SMEs represent one of the largest groups of companies in most countries capable of contributing to the growth and development of economic activities, these enterprises are most seriously harmed in crises.

The most recent crises, which affected the whole world, had a rippling effect across businesses especially SMEs. The health crisis and the global war crises followed by rising inflation and increasing food insecurity shows that this is the right moment to think about coping strategies for the future crises. The impact of the current crises has emphasized the need to support and increase the resilience of SMEs.

Moreover, health and military crises are not just leaving an impact on the economy, the higher threat is that they might come back, and a strong SMEs sector should be prepared to meet them or other new challenges. In this regard, policy recommendations for strengthening SMEs resilience in the future crises will be proposed. This paper has been drawn up, using the official statistical data, the most recent data and references in this field of research and own reflections of the authors.

Key words: SMEs; health crisis; resilience.

JEL: G00; G30

Introduction

Small and medium-sized enterprises play essential roles in driving growth, creating jobs, and opening new markets for sustainable development through domestic trade liberalization (Puriwat et al., 2021). Although, SMEs are well known for their important role in economy, these enterprises are most seriously harmed in crises due to their lower knowledge levels, more susceptibility, greater reliance on government and local authorities, and greater financial reliance on owners (Runyan, 2006). Moreover, SMEs usually suffer from high losses, reduced sales volume, inability of meeting contract terms, reduction in staff numbers, and even close down of the business during or after crises (Abriham, 2022). Therefore, protecting small business from economic shocks is the prime concern for policymakers because the output degradation in SMEs has spillover effects on other segments in the economy (Miocevic, 2020).

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Furthermore, SMEs face significant challenges that hinder their development and, in some cases, their survival. They face barriers accessing finance, attracting talent, reaching markets and innovating, among other areas. Because of these constraints on resources and capacity, they tend to be more vulnerable to crises and disasters (Regional Guidelines for ASEAN Governments, 2020).

One of the most recent crisis, that affected SMEs is the health crisis caused by the Covid-19. No country in the world was prepared for a shock of the magnitude, duration and impact of the pandemic. Policymakers and researchers have looked for ways to improve SMEs resilience to the health crises. Experience from Covid-19 shows that this has become a lesson to be learned for future health crises. Moreover, the global health crisis has been followed by the global war crises, which first effected the Europe and then the Middle East. All these lead to: increased inflation, homeless refugees, oil and food insecurity. The chief economist of the World Bank believes that “Policymakers will need to be vigilant. If the conflict were to escalate, the global economy would face a dual energy shock for the first time in decades—not just from the war in Ukraine but also from the Middle East.” (Wright, 2023).

The development of this paper stems from the need to protect the business environment in this uncertain times, underlining the right policies that will be able to rump up the development of SMEs sector.

Discussions

The health crisis has exposed SMEs to greater vulnerability than their larger counterparts have, in many cases, placed SMEs at a disadvantage (Erđiaw-Kwasie et al., 2023).

We also noticed that health crisis affected small business branches differently. During the pandemic, the most affected SMEs were from key activities such as accommodation, food services, transport, real estate, entertainment and recreation activities, their activity being periodically suspended due to the establishment of the lockdown, because of the increase number of diseases.

Agriculture was also among the most affected branches. The main challenge faced by the agriculture sector is related to the draught and climate change. These two negative factors, pandemic restrictions and insufficient rainfall have pushed small farmers and agricultural producers into economic vulnerability. Food supply chains have been affected by the confinement measures, which have reduced demand from tourism and restaurants, closed open markets, and led to a lack of export demand and restrictive procedures (UNDP report, 2020). Furthermore, the ongoing Russian full-scale military invasion in Ukraine seriously affected the supply chains. Port blockades and damaged of critical infrastructure followed by increased cost of transportation and logistics hinder the movement of goods, causing the increase of the poverty in the world. SMEs face shortages of materials and some of them even have to stop production.

The [Food Security Information Network](#) highlights the war as a key force – alongside the pandemic, other conflicts and extreme weather – behind a staggering rise in the number of people who are food-insecure. Nearly 258 million people in 58 countries/territories were in food crisis or moderate-to-severe acute food insecurity in 2022 – up from 193 million in 53 countries/territories in 2021 (Kilfoyle, 2023).

At the same time, the health and war crises boost e-commerce adoption and increased sales for SMEs in IT. Furthermore, it is very important to identify measures that might be applied during these crises. It is important to realize that pandemic or military conflicts are not just leaving an impact on the

economy; the higher threat is that they might come back, and a strong SMEs sector should be prepared to meet them and face new challenges.

There were different measures of supporting SMEs adopted in Europe. In the United Kingdom, the government implemented the Coronavirus Job Retention Scheme (CJRS) for waged workers. The CJRS covers 80% of employee salaries up to a maximum of 2500 pounds per month. The measures supported by the German government intended to protect businesses and start-ups affected by the Covid-19 crisis included taxation support, state supported, short-time work compensation schemes, improved measures at guarantee banks, loans and special programs (UNDP report, 2020).

These pandemic lessons may suggest that thinking hard in the after math of health crisis can save lives and businesses. In the post-Covid world, agile and resilient new businesses will be able to take advantage of their entrepreneurial orientation and find opportunities in the upheaval that the pandemic has caused globally (Zahra, 2020).

However, there is no post-crisis recovery strategy yet in place. Therefore, it is essential for the sustainability of SMEs to apply policies at this recovery stage from the crisis that will be able to boost their growth and protect them from future crises.

In this regard, according to the Regional Guidelines “Enhancing the Resilience of MSMEs to Crises and Disasters”, the crisis risk management should include four phases:

I. Prevention. “Activities and measures to avoid existing and new disaster risks. While certain disaster risks cannot be eliminated, prevention aims at reducing vulnerability and exposure in such contexts where, as a result, the risk of disaster is removed.” (Regional Guidelines for ASEAN Governments, 2020).

II. Preparedness. “The knowledge and capacities to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current disasters.” (Regional Guidelines for ASEAN Governments, 2020).

III. Response. “Actions taken directly before, during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.” (Regional Guidelines for ASEAN Governments, 2020)

IV. Recovery. “The restoring or improving of livelihoods and health, as well as economic, physical, social, cultural and environmental assets, systems and activities, of a disaster-affected community or society, aligning with the principles of sustainable development and ‘build back better,’ to avoid or reduce future disaster risk.” (Regional Guidelines for ASEAN Governments, 2020).

Table 1. Crisis risk management policy goals

I. Prevention	II. Preparedness
<ul style="list-style-type: none"> ▪ Reduce the exposure of MSMEs to hazards ▪ Enhance occupational safety and health in SMEs; ▪ Reduce the vulnerability of the self-employed and entrepreneurs; ▪ Strengthen SMEs’ financial resilience; ▪ Improve social and economic infrastructure. 	<ul style="list-style-type: none"> ▪ Improve the understanding of the risks faced by SMEs; ▪ Develop SMEs’ disaster planning capabilities; ▪ Strengthen public disaster risk management governance and capacity.

III. Response	IV. Recovery
<ul style="list-style-type: none"> ▪ Understand the emerging impacts; ▪ Ensure the availability of critical supplies; ▪ Support the continuity of SME operations; ▪ Ensure the subsistence of SMEs’ employees and owners; ▪ Ease SMEs’ financial pressures; ▪ Build capacity for responsive and agile public-service delivery. 	<ul style="list-style-type: none"> ▪ Expand SMEs’ access to markets; ▪ Increase the adoption of digital technologies among SMEs; ▪ Support SMEs’ “green” transformation; ▪ Upskill and reskill employees; ▪ Make innovation and entrepreneurship more inclusive; ▪ Improve the financial sustainability of MSMEs; ▪ Strengthen SMEs’ innovation capacity.

Source: Regional Guidelines for ASEAN Governments “Enhancing the Resilience of MSMEs to Crises and Disasters” United Nations Office for Disaster Risk Reduction, UNDRR (2020).

Previous crises and disasters, has exposed the vulnerability of SMEs, as well as their key role in stimulating domestic demand. While countries move forward from the pandemic, it is important to leverage the learning from this and previous crises to support a sustainable and inclusive recovery for SMEs (Regional Guidelines for ASEAN Governments, 2020).

These increasing numbers of crises and external shocks underline the need for the business and SMEs in particular to become more resilient. In this case, resilience is the ability to adapt to changing situations, rather than bouncing back to a previous equilibrium (Böhme et al., 2022).

Around the world, the social protection policies introduced in response to the Covid-19 pandemic pursued two main goals: to limit hardship caused by the pandemic and to ensure rapid and sustainable post-pandemic economic recovery (The World Bank report, 2022).

According to the World Bank’s latest Poverty and Shared Prosperity Report, the world is unlikely to meet the goal of ending extreme poverty by 2030. The study finds that Covid-19 dealt the biggest setback to global poverty-reduction efforts since 1990 and the war in Ukraine threatens to make matters worse (The World Bank report, 2022).

By allowing firms to jumpstart their operations immediately after pandemic restrictions are lifted, job protection measures could promote faster short-term recovery. However, such recovery might come at the cost of subsidizing inefficient businesses, reducing the rate of creative destruction, and ultimately hindering long-term recovery (Barrero et al., 2020).

In contrast, generous unemployment benefits and cash transfer programs could slow recovery in the short run but facilitate the reallocation of workers to the most productive sectors of the economy, securing sustainable long-term recovery.

Both policy approaches directly improve the welfare of beneficiaries by smoothing their consumption, thereby reducing poverty. Unemployment insurance, cash, and in-kind transfers help households mitigate the impact of negative income shocks. Such measures could directly affect economic growth through the fiscal multiplier effect of increased consumption (McKay et al., 2016). Job protection programs also have a direct consumption-smoothing effect on the well-being of formal workers who would have been laid off without such programs. They may play a dual role of preserving productive job matches and protecting workers’ incomes. Unemployment insurance and other transfers primarily protect vulnerable groups, such as youth and people with little education;

employment protection programs tend to protect mostly insiders and better-educated workers (Cahuc et al., 2011).

In countries with large informal sectors, income protection programs could be the dominant mode of social protection because they can reach a broader share of the population, particularly the vulnerable (Bottan et al., 2021). Job protection measures can be effective at the national scale in countries with primarily formal economies. The generosity of unemployment insurance, direct cash transfers and job protection policies also affects labour market tightness, unemployment, and job participation rates (Giupponi et al., 2020).

Conclusion

There are many discussions and arguments proclaiming that nothing-in business will be left unchanged after the health and war crises. We should not neglect the variety across SMEs, their different size, stages of development, branches where they operate. There are also differences in Governments and industry capacity to support SMEs. Still, despite all these differences the problems SMEs are confronting with are very common.

The most salient pandemic risks that SMEs suffered were logistical challenges - the commercial activity of coordinating the transportation of goods to customers. Technology adoption and digital transformation topped the list for coping strategies, demonstrating the strong need for SMEs to begin thinking of digital technologies' inevitable role in modern business survival and continuity. This is especially true if SMEs are to cope with any future global shocks (Erdiaw-Kwasie et al., 2023).

Still, due to resource restrictions, restricted access to expertise, and an ever-changing technology landscape, SMEs frequently face specific obstacles in keeping up with digitalization (Khan, 2022). All small businesses must be prepared for the “new normal” of a digitally driven economy (Meurer et al., 2021).

Entrepreneurship in the post-crises world will further fuse with the digital economy. This will take the form of entrepreneurs increasingly selling products on digital platforms. These changes probably will make SMEs more resilient to future shocks.

The lack of information and advisory assistance infrastructure and the development of entrepreneurial potential, insufficient staff qualification, low level of training and culture of entrepreneurship in SMEs, continue to be an obstacle to small business development (Erhan et al., 2022). Therefore, expanding consulting and training services for micro and family business is an important policy in reducing SMEs vulnerabilities.

In addition, the Government and policymakers need to design financial policies to diminish the negative economic impact of the crises. Providing preferential interest loans and governmental guarantees for SMEs is also essential. Together with the deferral of tax, deferral of social contributions payments and credit payments deferral for SMEs, getting access to credits with pre preferential interest and/or to governmental guarantees will be strong financial measures meant to support SMEs, allowing their survival throughout the crises and their development.

The development of the SMEs in terms of innovations will increase the competitiveness of the small business and, consequently, will promote the intensification of growth rates, market expansion, export development, increasing sales and thus profit. Moreover, it is necessary to fostering cooperation between Universities, research centers and local economic actors capable of increasing innovation of

SMEs. Business associations can also play a key role in disseminating information on hazards and their impacts, as well as reaching out to SMEs in crises and disasters (Regional Guidelines for ASEAN Governments, 2020). It is essential to highlight that SMEs have a moderate research and development capacity due to the limited innovation of many companies especially in more traditional sectors such as manufacturing, making the products of SMEs less competitive in foreign markets (Alessandrini, 2019).

As we saw, some branches were affected more in times of overlapping crises, especially the agriculture sector that was already affected by the increasing incidence of drought. Therefore, efforts need to be made to adapt to climate change and not just to compensate for its consequences with public money, but also to stimulate supporting research in agriculture, and introducing controls on annual crop rotation within the subsidy framework (Expert Group report, 2022). Regarding the energy field, the financing of energy efficiency measures and the stimulation of investments in renewable energy resources must remain a priority. Energy efficiency is one of the key factors for sustainable development.

The swift implementation of these measures can maintain SMEs confidence in economy against the backdrop of multiple uncertainties. For the coming years, the main assumptions for growth are the stabilization of the security situation in the Europe, improved energy, sustainability and innovation for SMEs. Future measures to support SMEs growth should focus on internationalization, access to finance and innovation, including the transition to the green market and entrepreneurial learning (Erhan, 2023).

SMEs remain the backbone of any economy and significantly contribute to employment and economic growth. However, they remain highly vulnerable in time of crises. Health and military crises never just appear and disappear; they leave long-terms effects on the economy and the society. The biggest threat is that they reaper from time to time causing new economic shock waves and SMEs should be prepared to face future challenges.

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CHARACTERISTICS OF THE APPLICATION OF ARIMA-SVM METHODS IN THE FORECASTING OF NON-SCHEDULED PASSENGER AIR TRANSPORTATION

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Abstract: *The article examines the independent application of ARIMA (Auto Regressive Integrated Moving Average) and SVM (Support Vector Machine) methods for forecasting non-scheduled passenger air transportation. Based on the SVM model, the data is classified based on different kernel functions, and the best prediction results are determined. The autoregression (ARIMA) model is applied to identify linear trends and regularities within time series data. Based on the analysis, the results show that ARIMA and SVM models offer superior forecasting accuracy and reliability. Nevertheless, the relative error of the prediction results compared to the actual indicators is smaller in the SVM model. This also shows that the identification of non-linear relationships between data in non-scheduled passenger air transportation makes forecasting results more effective and optimal. The obtained results will serve as an effective tool in forecasting the demand for non-scheduled passenger air transportation. As a result, substantial support will be observed in the planning of operations in the mentioned field, preparation of the existing infrastructure according to the demand, etc.*

Key words: *forecasting, statistical methods, autoregressive method, time-series analysis, statistical analysis, air passenger demand.*

JEL: R41

1. Introduction.

Unlike scheduled air transportation, the demand for non-scheduled air transportation is usually formed on the basis of orders and outside the schedule. It is clear from this that a large number of internal and external factors affect the mentioned air transportation. This leads to the creation of ambiguous relationships between the data. For this reason, when forecasting models are examined, factors that may have an active influence on the model should be taken into account. Each of the ARIMA and SVM models was applied in both independent and hybrid form in forecasting the demand for air transportation. Both models have negative and positive aspects depending on the field of application and the number of influencing factors. The ARIMA model is well regarded for its ability to model and predict linear patterns among input data. This makes it a valuable tool for understanding major trends and anomalies. The SVM model is a machine learning technique capable of identifying complex, non-linear relationships between data [1]. This paper examines the individual characteristics and applications of ARIMA and SVM methods in the context of non-scheduled passenger air transportation forecasting. By applying the mentioned methods independently, a thorough evaluation of their respective strengths and weaknesses, irregularities, and suitability for this forecasting problem was provided. With the application of ARIMA and SVM models in regular air passenger and freight transportation, it was investigated how appropriate their predictions are for the mentioned area. [2-3]

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2. Related works.

The issue of air transport demand forecasting has been investigated by various researchers. Forecasting indicators are given in the short and long term, depending on the field of application. When forecasting models are built, one or more variables are considered. In the context of statistical forecasting of regular passenger and cargo air transportation, the main issue to be considered is the verification of stationarity between the data. In order to build an autoregression model, the autocorrelation relationship between the data must not change over time. The models applied based on this method can be ARIMA, which takes into account trends and other factors, and SARIMA models, which take into account seasonal factors. [1-3]

Forecasting of non-scheduled passenger air traffic by the SVM method was investigated by researchers. In this study, calculations were made based on different kernel functions, and short-term forecast results were obtained. [4]

Another study considered the forecasting of air cargo transportation based on the SVM method. The statistics covered the volume of cargo transported from Beijing to Shanghai. The obtained prediction results were compared with the Brown cubic exponential smoothing method. It was found that the results based on the SVM method have more effective prediction accuracy. [5]

The SVM method has also been applied to predict the demand for passenger air transportation. [6-7] In another study, combined Bootstrap aggregation (Bagging) and Holt Winters methods were used to more effectively forecast air transportation demand. During the application of the methods, trend, seasonal, and other components were taken into account as basis. The Holt Winters method was applied for time series modelling, and the final forecast results were obtained. Errors were identified by comparing the forecast results with the actual data of different countries. It was determined that the forecast results obtained by combined Bagging Holt Winters methods are more optimal and efficient. [8-10]

3. Problem statement.

Construction of forecasting models of non-scheduled passenger air transportation based on ARIMA-SVM methods and comparative analysis of the obtained forecasting results.

4. Method and methodology.

The differential autoregressive moving average model (ARIMA) is an important method for studying time series. In ARIMA (p, d, q) , p is the number of autoregressive items, q is the moving average item number, and d is the number of differences made to make it a stationary sequence. The ARIMA (p, d, q) model is an extension of the ARMA (p, q) model. [5]

The ARIMA model in the following form:

$$Y_t = y_t + z_t \quad (1)$$

where, y_t is trend and z_t is errors.

$$y_t = c + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \dots + \phi_p y_{t-p}, \quad (2)$$

$$z_t = \varepsilon_t + \theta_1 \varepsilon_{t-1} + \theta_2 \varepsilon_{t-2} + \dots + \theta_q \varepsilon_{t-q}, \quad (3)$$

We apply the method of least squares to find the unknown coefficients. For this, the following issue should be resolved:

$$\sum_{t=1}^N [(\bar{Y}_t - Y_t)]^2 \rightarrow \min \quad (4)$$

The solution to problem (4) is reduced to the following matrix equation:

$$A\varphi = B \quad (5)$$

The SVM kernel is considered a function that takes low-dimensional input space and transforms it into higher-dimensional space, usually it converts non-separable problems to separable problems. It is mostly useful in non-linear separation problems. Consider the following formulas:

- Linear: $K(w, b) = w^T x + b$ (6)

- Polynomial: $K(w, x) = (\gamma w^T x + b)^N$ (7)

- Gaussian RBF: $K(w, x) = \exp(-\gamma \|x_i - x_j\|^n)$ (8)

- Sigmoid: $K(x_i, x_j) = \tanh(\alpha x_i^T x_j + b)$ (9)

5. Experimental results.

Statistical data covering the years 2020-2023 of non-scheduled passenger air transportation were collected to build the calculation model. Statistical indicators are given in Fig 1. The forecast results of each of the ARIMA and SVM models for 2023 will be calculated based on the indicators of 2020-2022. In order to check the accuracy of the forecast results, the actual indicators of 2023 were not included in the calculation models. This information will be used to determine the error of the forecast results based on the actual indicators.

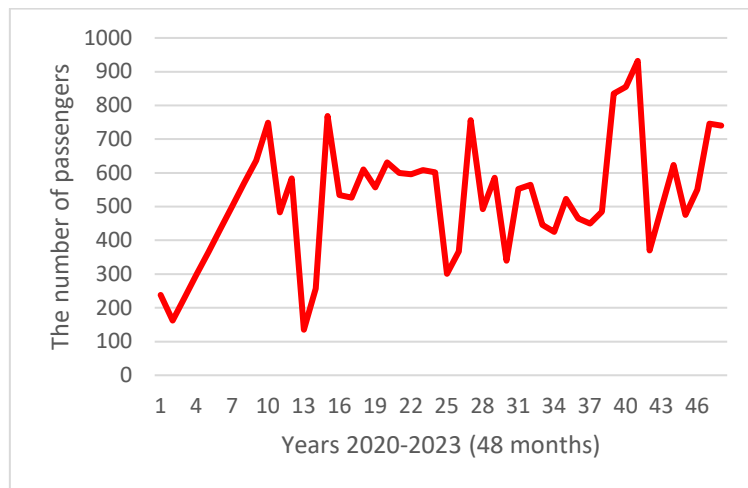


Fig 1. Monthly statistics of non-scheduled passenger air transportation for 2020–2023

Source: From author own investigation

Fig 2 shows the forecast results of ARIMA and SVM models for 2023 based on the statistical indicators of 2020-2022. As observed from Fig 2, the results of the SVM model provide linear solutions. As we mentioned earlier, this model is designed for classification. Our analyses show that this model creates limitations in expressing the process of non-scheduled air transportation in all cases. The results of the ARIMA model indicate an unscheduled passenger air transportation process, but there are anomalous deviations at several points. The main reason for this is that non-scheduled

passenger air transport is subject to random fluctuations. Various smoothing methods are usually applied to avoid such errors. Data are smoothed, and calculations are performed before entering the model. In our calculation, these cases did not have a serious effect on the final results.

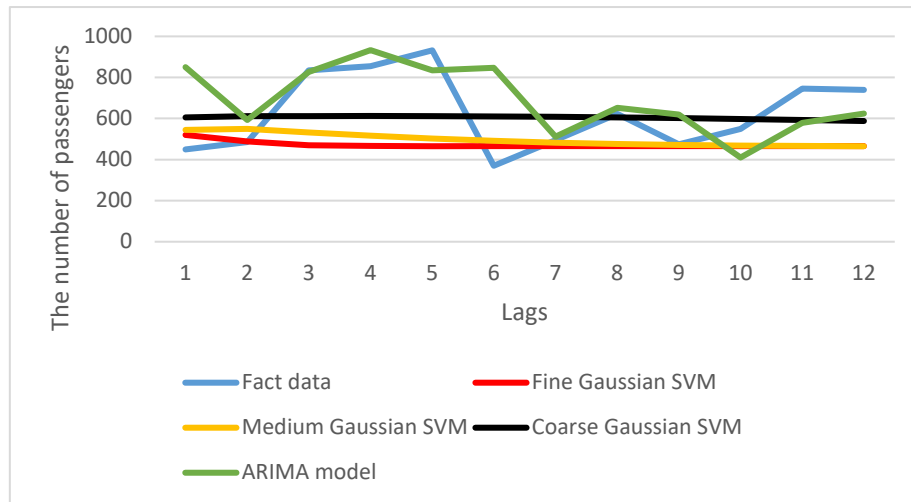


Fig 2. Forecasting results of non-scheduled passenger air transportation based on ARIMA-SVM models

Source: From author own investigation

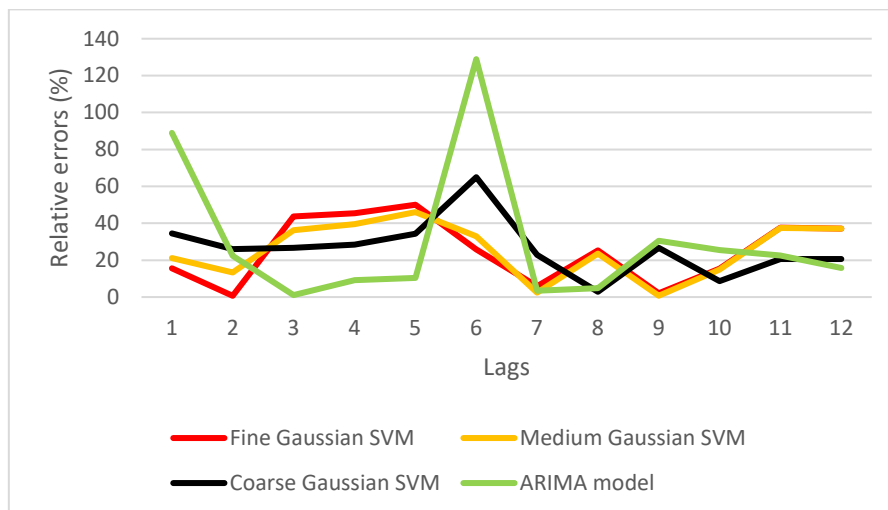


Fig 3. Relative error of ARIMA-SVM models forecasting results based on actual indicators

Source: From author own investigation

Fig 3 shows the variation of the relative errors of the forecasting results obtained based on the ARIMA-SVM models with respect to the actual indicators. As can be seen from Fig 3, the relative errors of the models are, respectively, ARIMA (19.8%), Fine Gaussian SVM (25.2%), Medium Gaussian SVM (24.7%), and Coarse Gaussian SVM (28.1%).

6. Conclusions.

To conclude, it should be noted that ARIMA and SVM (fine, medium, and coarse) methods have been applied to predict non-scheduled passenger air transportation. The results show that the ARIMA

model represents the process better. The reason is that this model captures the process based on trend and autocorrelation relationships. In the SVM method, the relative error is greater. The forecast results obtained based on the ARIMA model are more optimal compared to the actual indicators, and the relative error is smaller than other models. When comparing the results of the ARIMA model, we observe that the model expresses the general trend of the actual indicators. It is recommended to apply smoothing methods to avoid sudden deviations in the results obtained during forecasting. The application of these methods varies depending on the characteristic features of the process. We can use the results of our independently applied models as a basis for obtaining more accurate and effective forecast results in the forecasting of non-regular passenger air transportation. This basic part is considered one of the important elements in building machine learning models.

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CHALLENGES AND OPPORTUNITIES IN DEVELOPING AN INFODEMIC MANAGEMENT COURSE

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Abstract:

Infodemic affects all of us at different levels, starting with an individual who may adopt risky behaviour, influence his/her family, spread misinformation into society, increase the burden on the health system, and impact society as a whole. Infodemic management comes to prevent and/or diminish this impact. Health authorities are increasingly recognizing the need to expand their capacities for infodemic management in their efforts to better prepare for future health emergencies, and one of the most important roles here is played by public health and healthcare managers. The aim of this paper is to identify the challenges and opportunities in developing an Infodemic Management course in the Republic of Moldova and come up with recommendations for course continuity. This experience can also be useful to other countries, with local languages other than English. At the School of Public Health Management (SPHM), in partnership with UNICEF, a 25-hour Infodemic Management course was developed. The focus of the course is to prepare public health managers for current and future infodemics. The course was tested on 25 participants in March 2024 to gather feedback and make improvements. The results showed that test scores almost doubled after the course, indicating that the objectives were successfully met. Also, the course was highly appreciated in the evaluation questionnaire. In developing the Infodemic Management course, each of the identified four challenges has brought an opportunity. Thus, limitations regarding time, costs, interaction, and little awareness could be solved by adapting available content, building partnerships, digitising the course, and applying proper promotion techniques. Taking into account the above, we can conclude that Infodemic Management is a successful, extremely current, and useful course for managers in the health system, which needs to be implemented in the Continuing Medical Education offer of the SPHM.

Key words: *infodemic management, course development, resilience, misinformation, disinformation*

JEL: I12,H12, I23.

1. Introduction

Infodemic means „too much information, including false or misleading, in digital and physical media during an outbreak”, and it is a notion that was widely used since the Covid-19 pandemic. It causes

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confusion and risky behaviours, because people may try treatments heard from friends or influencers, that may be harmful, it also leads to distrust of health authorities, by eroding public trust, and undermining the public health response because people won't listen to the recommendations (WHO website). Infodemic affects all of us at different levels, starting with an individual who may adopt risky behaviour, influence his/her family, spread misinformation into society, increase the burden on the health system, and impact society as a whole. To prevent and/or diminish this impact, infodemic management comes to ensure that people have „the right information at the right time in the right format so that they are informed and empowered to make behavioural changes during the epidemic to protect their health, the health of their loved ones and the health of their communities” (World Health Organization, 2021).

Infodemic management is about listening to community concerns and questions, promoting risk understanding and expert health advice, increasing resistance to disinformation, engaging and empowering communities to take positive action. An infodemic management framework begins with social listening to understand public questions and concerns and ends with enhancing preparedness (Purnat, 2020). Global, regional, and local health authorities are increasingly recognizing the need to expand their capacities for infodemic management in their efforts to better prepare for future health emergencies (Purnat, Nguyen and Briand, 2023). One of the most important roles in infodemic management is played by public health and healthcare managers. This is the focus of our course: to prepare public health managers for current and future infodemics, because future challenges are yet to come.

The aim of this paper is to identify the challenges and opportunities in developing an Infodemic Management course in the Republic of Moldova, and come up with recommendations for course continuity. This experience can be also available for other countries, with local languages other than English.

Since 2020, WHO and its partners have developed an innovative global blended training program and created a network of over 1300 infodemic managers from 142 countries. Also, WHO has created a series of free safe-paced online courses (Purnat et al, 2023). We think this effort can be continued at the local level, especially by adapting content and make it accessible in different languages.

The main motivations for developing a local infodemic management course are:

- Emerging topic – it is increasing the importance of infodemic management for vaccination programmes.
- Need to motivate professionals to learn more – by providing various opportunities, including by offering study credits (continuing medical education) and certificates.
- Adapted information for local context – examples have to illustrate the local experience and specific.
- Relevant topics for public health managers – the topics have to be of interest for the target audience, not too general and not too specific.
- Expanding the accessibility of information – there are courses in English, for example offered by Open WHO, but not all of our target audience speak English, that is why we have decided that offering a course in Romanian would be impactful.

2. Basic content.

At the School of Public Health Management of *Nicolae Testemitanu* State University of Medicine and Pharmacy of the Republic of Moldova, in partnership with UNICEF, a 25-hour Infodemic Management course was developed. The course was tested on 25 participants in March 2024 to gather feedback and make improvements.

The scope of the course is to develop to the course participants the skills of managing the infodemic, detecting misinformation and countering rumours in health. Beneficiaries are managerial staff (medical and non-medical) from medical institutions in the country and specialists in the field of public health.

At the application level the following objectives were set:

1. apply the six fundamental elements of person-centred interventions
2. describe how an infodemic affects public health
3. identify the roles of different actors in managing the infodemic
4. describe the concept of risk perception in relation to health emergencies
5. identify challenges related to risk communication and community engagement
6. explain the importance of social marketing in creating messages
7. understand and identify false information and misinformation
8. identify tactics used by malicious actors to create misleading information
9. analyse the nature, origins and spread of disinformation
10. describe the relevant expertise needed to structure an infodemic report

At the level of integration the objectives are:

1. learn to adapt to different operating environments to ensure measurement of the impact of interventions
2. identify how and why risk perception varies
3. test messages before and after implementation
4. identify mechanisms for using social listening and engaging key actors and communities
5. verify health information and visual content online
6. identify effective methods of debunking and amplifying credible health information
7. use free social listening tools to identify information gaps
8. apply tips and tools to increase resistance to misinformation among peers and family
9. develop institutional capacities to increase resilience to disinformation and contribute to increasing correct information of the population
10. streamline report production to meet timely dissemination to relevant stakeholders.

The course consists of five topics, each with about five academic hours (courses and seminars), focusing on the most important aspects that our public health managers need to know (see Table 1). Each topic is developed and taught by a professional and experienced lecturer. Sometimes, adapting the content to the experience and expertise of the available lecturer could also be a solution.

Table 1. Subjects of the Infodemic Management course, and number of hours

		Courses	Seminars	Total
1.	Introduction to infodemic management	2	2	4
2.	Risk communication and community engagement. Social listening. Social Marketing and Message Testing Methods	2	3	5
3.	Risk perception in public health emergencies	2	3	5
4.	Verification of information. Contextual analysis of messages. Debunking and inoculation	2	3	5
5.	Data analysis and reporting	2	3	5
	Evaluation		1	1
Total (academic hours):		10	15	25

Source: Infodemic Management Curriculum, School of Public Health Management

The evaluation is a combined one, focusing on the creation of an infodemic management project based on a case study from the curriculum. Participants have to imagine that a measles epidemic was declared in the Republic of Moldova. The exercise implies that in the last month, 50 cases were detected in adults and children, as well as 5 deaths. The Ministry of Health ordered the mobilisation of an infodemic management team.

The project requires teamwork and consists of six assignments to be completed based on what was learned during class: creating the team, developing interventions, applying Design thinking, analysing Social Listening results, designing a Social Marketing strategy, and reporting.

The course is also available online, in the learning management system of SPHM. It comprises the presentations, written text that explains the presentations, discussions (chats), exercises, assignments and an evaluation test. By digitalizing the course we provide the opportunity for self-learning, asynchronous interaction between participants and long-term access to information.

A 10-question test was given to assess participants' knowledge before and after the course (Figure 1). Each question focused on a different course topic. A total of 25 people took part in the course, and while completing the test was voluntary, 21 participants took the test before the course began. The average score for the pre-course test was 3.31 out of 10, with the lowest score being 1 and the highest score 7. After completing the course, 20 people participated in the test again on the fifth day. This time, the average score improved to 6.95, which was nearly double the average from the pre-course test. Three people scored the lowest at 4, two people scored the highest at 10, and two more scored 9 points.

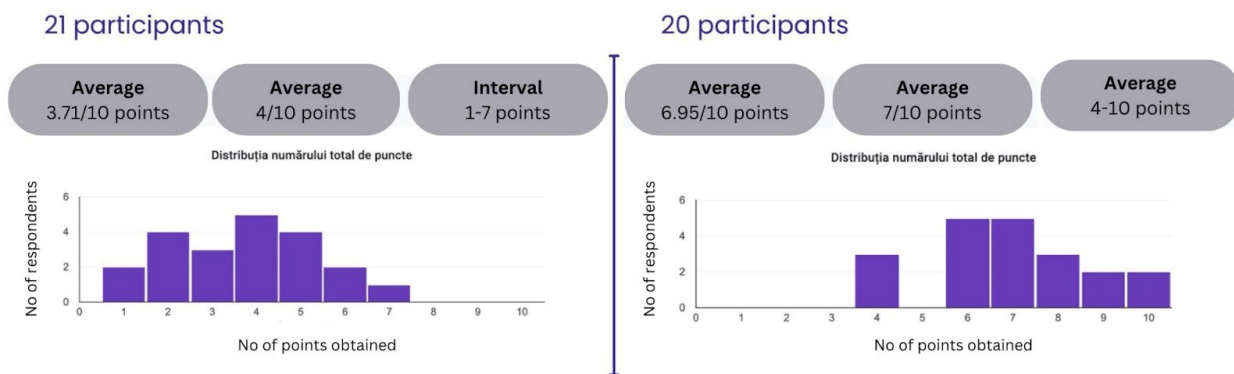


Figure 1. Pre and post-test results for the Infodemic Management course

Source: Developed by the authors

An evaluation questionnaire was conducted to assess opportunities for course improvement. The results indicated that the course difficulty was rated as average, and the majority of participants found it to be valuable for their professional development, with 33.3% giving it a mark of 9 and 66.7% giving it a mark of 10.

Strengths identified by participants:

- *Current subject with modern exposition and interactive methods*
- *Informative, useful, and interesting*
- *Introduction to the actuality, importance, and scope of the impact of the infodemic*
- *Identifying and promoting ethical communications and behaviours online*
- *Providing knowledge and techniques to identify and manage false or manipulative information*
- *Useful, clear, interesting, and interactive*
- *Informative, relevant, and inspirational*
- *Focuses on the current problem and contributes to strengthening everyone's ability to operate with information*
- *Creates a warm atmosphere and provides useful things*
- *Development of critical information evaluation skills*
- *Promoting informed behaviours and practices.*

Here are the revised responses from the participants when asked to identify three aspects to improve:

1. *More work needs to be done on preventing infodemic risks.*
2. *Allocate more time to the given topic, considering its relevance and impact on society.*
3. *Increase discussions on ways to counter infodemic and manage the spread of false or manipulative information.*

In developing the Infodemic Management course, the identified challenges are closely linked to the arising opportunities (Figure 2). The first challenge concerns the time limit: the course had to be developed on time and cover the most important aspects of infodemic management within a small number of hours. An opportunity in this case is to use and adapt the already available content, including the resources offered by Open WHO.

The second challenge pertains to high costs, which can be addressed by establishing partnerships with other organisations that could offer support. In the case of SPHM, the course was developed in partnership with UNICEF.

Participants may be hesitant to engage, so it is essential to provide practical examples for them to share their opinions and experiences. Additionally, it is necessary to incorporate group work and case-study solving into the final assignment. Also, digitalizing the content will make it more accessible and interactive.

Given the abundance of available courses and the busy schedules of public health managers, it may be necessary to actively encourage their participation. This can be achieved by providing well-prepared and experienced lecturers for each relevant subject, focusing on online dissemination, and leveraging word-of-mouth marketing.

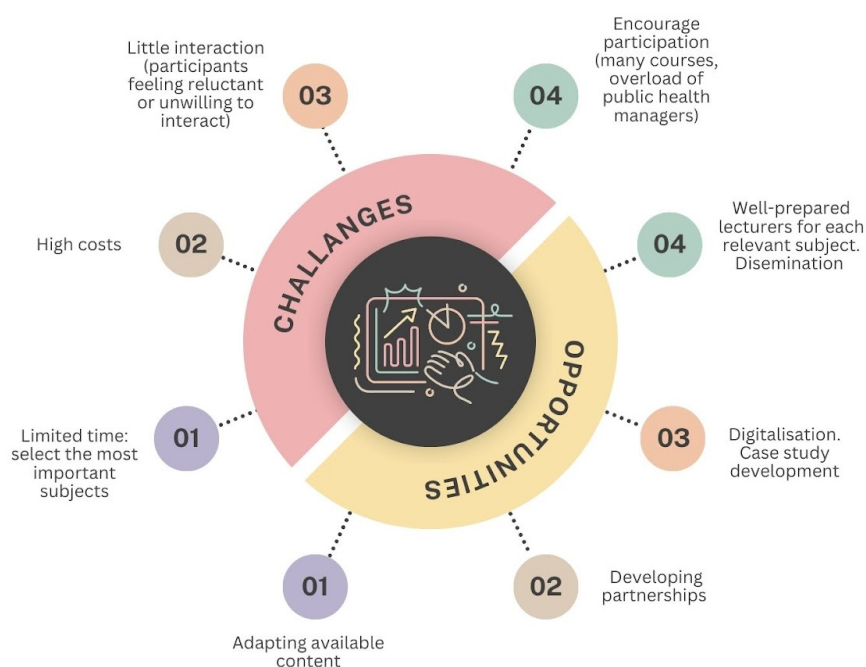


Figure 2. Challenges and opportunities in developing an Infodemic Management course

Source: Developed by the authors

3. Conclusions.

In developing the Infodemic Management course, each of the identified four challenges have arisen an opportunity. Thus, limitations regarding time, costs, interaction and little awareness could be solved by adapting available content, building partnerships, digitising the course and applying proper promotion techniques.

The results showed that test scores almost doubled after the course, indicating that the objectives were successfully met. Also the course was highly appreciated in the evaluation questionnaire.

Taking into account the above, we can conclude that Infodemic Management is a successful, extremely current and useful course for managers in the health system, which needs to be implemented in the Continuing Medical Education offer of the SPHM.

The key takeaways are as follows:

1. Ensure continuity by institutionalising the course, including it into curriculum or permanent training offer.
2. Increase awareness by promoting the course to attract participants and raise awareness regarding infodemic.
3. Piloting the course is crucial for producing a polished final product, it has to be adapted and relevant for local context and the target audience.
4. Evaluate results and course impact with pre- and post-tests, based on the subjects included in the curriculum.
5. Transform every challenge into an opportunity!

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RISK-ORIENTED APPROACH TO MANAGING THE CRITICAL INFRASTRUCTURE DEVELOPMENT IN COUNTRIES OF THE WORLD

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Abstract: *The changing, dynamic and unpredictable development of the external institutional environment, crisis phenomena, natural disasters, cyberattacks and wars, armed conflicts and active hostilities are the reasons for the emergence of various types of risks to the functioning and activity of critical infrastructure facilities in various countries of the world.*

In this regard, the issue of forming a risk management system is currently being updated with the aim of finding a fundamentally new toolkit and methods of risk assessment, management approaches to their levelling and minimization. All this requires an in-depth analysis of the essence and content of the risk-oriented approach in order to understand the dynamic laws of managing the development of critical infrastructure.

The article summarizes and systematizes the existing approaches to defining the meaning of the concept of "risk management". The author's interpretation of the terms "risk" and "risk management" from the standpoint of critical infrastructure development is provided.

It is proposed to consider the risk as a situation of uncertainty, possible danger that is perceived and accepted by critical infrastructure objects, which arises as a result of changes in the relevant production, marketing, innovation, technological processes and is evaluated by the probability of loss of profitability, damage, destruction, threat of protection and security. Risk management refers to the modern paradigm of anti-crisis management of the development of critical infrastructure, taking into account the consequences of crisis phenomena, emergency situations and armed conflicts.

As a result of the study, the relationship between risk, threats, risk-oriented approach, risk management and development of critical infrastructure using a bibliometric approach was revealed. The expediency of applying a risk-oriented approach to managing the development of critical infrastructure in Ukraine, taking into account the best world practices, is substantiated. The implementation of this approach will make it possible to systematically diagnose and assess the risks caused by the conditions of war, with the aim of forming an adaptively oriented management system for the development of critical infrastructure facilities on the basis of risk management, which will contribute to the implementation of successive changes in the organizational and resource provision of their security activities with taking into account the threats and challenges of the war and post-war periods.

Key words: *national economy, critical infrastructure, risk, development management, risk-oriented approach, risk management.*

JEL: D 81, H 54, H 56.

1. Introduction.

An effective national strategy for the protection of critical infrastructure facilities should be based on the concept of risk management and crisis management. Regardless of the institutional model chosen,

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stakeholders involved in the protection of critical infrastructure should be familiar with these concepts and consistently apply them in their respective sector and areas of competence. This is also due to the fact that critical infrastructure facilities in countries around the world are exposed to real or potential threats and risks created by natural disasters, environmental and man-made disasters, terrorist attacks, cyberattacks and information wars, military conflicts (V. Khaustova et al., 2023a).

In view of this, the need for theoretical and methodological substantiation of the expedient use of a risk-oriented approach to managing the development of critical infrastructure and the development of appropriate mechanisms for its effective functioning in the risk management system determine the conduct of further research in this direction.

2. Basic content.

Risk is an abstract and complex concept. In general, risk can be defined as the impact of uncertainty on goals. According to other approaches, risk is defined as the combination of the probability of an event and the extent of damage it can cause, or as the combination of the probability and impact of any event. The terms „threat”, „vulnerability” and „risk” are often confused, sometimes even used as synonyms. However, ensuring compliance with risk management standards requires a clear understanding of the difference between these terms, which can be difficult due to differences in standards. Therefore, it is important to adopt one definition and use it consistently.

Critical analysis of foreign scientific sources (J. Arlinghaus et al. (2021); T. Andersen et al. (2010); K. Cormican (2014); M. Crouhy et al. (2014); L. Haar et al. (2021)) shows that today there is no single theoretical approach to defining the essence of risk management. This is due to the fact that scientists are representatives of various economic theories and schools with their own scientific approaches and features, as well as the ambiguity and multifacetedness of this concept. After all, the term „risk management” is considered as an object of research from the standpoint of public administration, economic and financial security, insurance, investment, financial, strategic, marketing, and logistics management. Therefore, many scientific works indicate the interest of researchers in studying various aspects of risk management.

On the basis of theoretical analysis, it was established that researchers mostly understand the concept of „risk management” as science; methodology; art; process; system; structural components of the system; factor; managerial paradigm; a specific branch of management; a set of methods, techniques and measures.

So, based on the generalization of conceptual approaches to the definition of the concepts of „risk” and „risk-management”, the author's interpretation of their content is proposed. Under risk, it is proposed to understand a situation of uncertainty, possible danger, perceived and accepted by critical infrastructure objects, which arises as a result of changes in the relevant production, marketing, innovation, technological processes and is evaluated by the probability of loss of profitability, damage, destruction, threat of protection and security. The term „risk management” is proposed to be considered as a modern paradigm of anti-crisis management of the development of critical infrastructure, taking into account the consequences of crisis phenomena, emergency situations and armed conflicts.

Using bibliometric analysis, it was established that the international scientometric database Scopus contains 495 publications that contain the words „Risk” and „Threats” and „Critical Infrastructure

Development”. The scientific works of such scientists as A. Gheorghe (2004); X. Zhang (2005); P. F. Katina, et al. (2016); Yes. Brezhnev (2019); A. Fekete (2019); A. Fekete & J. Rhyner (2020); O. Korystin et al. (2022). As a result of the search, keywords related to the risk-oriented approach to managing the development of critical infrastructure were revealed. These words include: Risk Assessment (153 documents), Critical Infrastructures (103), Risk Management (72), Cybersecurity (65), Network Security (58), Security of Data (45), Risk Analysis (37), Computer Crime (30), Security Systems (29), Security (29), Risk Perception (29), Resilience (29), Vulnerability (28), Sustainable Development (28), Terrorism (23), Safety Engineering (21), Cyber-attacks (21), Climate Change (21), Risk (19), National Security (17), Hazards (16), Disasters (16), Threat (10 documents) and others. This is confirmed by the results of the bibliographic data analysis using the VOSviewer software (Fig.).

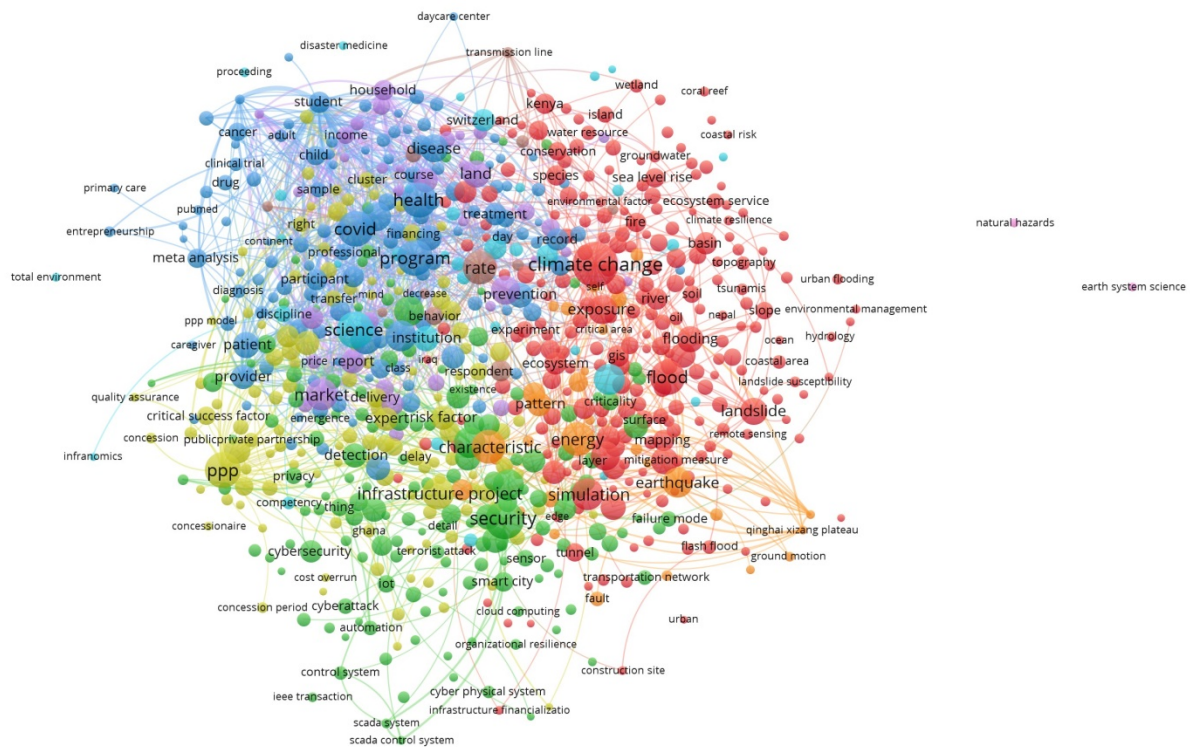


Figure. Network visualization of citations of articles on risk-oriented approach to managing the development of critical infrastructure, implemented using the VOSviewer toolkit

Source: built on the basis of the international scientometric database Scopus.

Various principles and measures are necessary for effective risk management of the organization. In order to apply a structured approach to risk management, it is necessary to combine all the necessary aspects and describe them within the framework of one comprehensive system designed to help organizations effectively manage risks. The individual structure of the risk management system depends on the size of the organization and the complexity of the organizational structure, its propensity to risk, legal regulations, as well as on the already existing elements of risk management or management systems.

The United Nations Office for Disaster Risk Reduction (UNISDR) defines risk management as a systematic approach and practice of managing uncertainty to minimize potential damage and loss.

Risk management involves assessing and analyzing risks, and implementing strategies and specific actions to control, reduce and transfer risks.

In the context of risk management processes as they relate to critical infrastructure protection, it is important to have a clear understanding of key concepts that are often used interchangeably, namely:

- Threat: anything that exploits a vulnerability of critical infrastructure;
- Vulnerability: a weakness in critical infrastructure that can be exploited by a threat;
- Risk: the probability of damage, injury, destruction or interference with the ability of critical infrastructure to provide its services as a result of a vulnerability exploited by a threat.

There is no unique or universal standard for risk management across the world. The use of different “authorities” by different stakeholders responsible for this task can lead to inconsistent results. At the national level, the use of different methodologies can make it difficult, if not impossible, to compare results within and across sectors, potentially impacting the reliability of operations as a whole. It is therefore important for countries to support the establishment of risk management processes that cover, at a minimum, the following elements:

- Establishing the context – the scope and parameters of the risk assessment;
- Risk assessment (definition, analysis, evaluation) – transforming risk data into information for decision-making;
- Risk mitigation – transforming risk information into decisions and actions to reduce risk;
- Communication and consultation – defining the methods of communication used by all stakeholders involved in the process;
- Monitoring and review – conducting regular reviews or oversight to improve risk management, identify changes in the context of existing risks and identify new risks.

To ensure that appropriate preventive security measures are identified, the risk management system should detail the mechanisms for obtaining reliable threat information and conducting risk assessments, taking into account international, national and regional situations and conditions. Security measures and procedures must be flexible and proportionate to the risk assessment, which may fluctuate depending on various changing factors. This system must be implemented in a timely and effective manner so that the resulting risk assessment is always up-to-date, accurate and complete. Internationally, ISO has created a recognized paradigm in this area with the ISO 31000 standard. This belongs to a family of standards that ISO defines as a set of components that provide a framework and organizational mechanisms for developing, implementing and monitoring, reviewing and continually improving risk management throughout an organization. Taking the same approach to risk management as ISO 31000, the ISO 27000 series provides a reference standard in the field of information security systems. ISO 27000 thus offers a useful guidance framework for protecting critical information infrastructures. It is important to note, however, that ISO 31000 is not industry or sector specific.

Some countries, notably the United States and Canada, have created government programs specifically to encourage critical infrastructure operators to adopt a common assessment framework. These programs are also designed to provide technical assistance in conducting assessments under a “soft approach” based on incentives and voluntary plans.

Consider the Canadian Regional Resilience Assessment Program (RRAP) as a comprehensive risk assessment program for owners and operators of Canadian critical infrastructure. The program

includes site assessments to help organizations assess and improve their resilience to all hazards in Canada, such as cyber threats, accidental or intentional man-made events, and natural disasters. These on-site assessments are voluntary, non-regulatory, free, and confidential.

RRAP uses three primary tools to improve the resilience of critical infrastructure:

- 1) Critical Infrastructure Resilience Tool (CIRT): an on-site survey tool that measures a site’s resilience and protective measures;
- 2) Critical Infrastructure Multimedia Tool (CIMT): a multi-platform software tool that generates an interactive visual guide to a critical infrastructure asset, featuring a spherical photograph;
- 3) Canadian Cyber Resilience Review (CCRR): an on-site survey tool that measures an organization’s cybersecurity posture.

The program may include workshops, meetings, geospatial products, and subject-matter expert interviews. The results of RRAP assessments are designed to help owners and operators identify dependencies and vulnerabilities within their organizations. On-site assessments also identify a number of optional, cost-effective actions to help owners and operators reduce risks and improve their ability to respond to and recover from disruptions.

Specifically, RRAP provides for: improved risk management (increases an organization understands of its vulnerabilities through the use of robust assessment tools); strengthened government relationships; strengthened relationships with multiple government departments, including response agencies; increased cybersecurity awareness (better understanding how well an organization is prepared for cyber-attacks and other cyber threats). Other key factors for critical infrastructure owners and operators include: minimal time and resource investment (RRAP is a fast and free service); security (Public Safety Canada will protect the confidentiality of documents and information provided in confidence by critical infrastructure owners and operators to the department).

Taking Sweden as an example, it can be noted that, according to national legislation, all public authorities are required to develop and submit a risk and vulnerability analysis to the National Contingencies Agency (MSB). Based on such reports, the MSB has been producing national risk assessments since 2011. These documents (the most recent of which was released in 2016) are intended to provide a strategic basis for the direction and further development of civil contingencies. The 2016 assessment identifies five development areas that the MSB considers particularly important for improving disaster preparedness (and thus are of particular relevance to the protection of critical infrastructure): efforts in the field of disaster preparedness and civil defence should be given higher priority by responsible stakeholders in Sweden; knowledge and awareness of roles and responsibilities related to disaster preparedness must be increased, in particular when it comes to responsibility for geographical areas; risk and vulnerability analysis conducted at local, regional and national levels require improvements so that they can be used as a basis for disaster preparedness and civil defence planning; the scenarios provided by the MSB can become a supporting tool for disaster planning and development; clearer requirements for protective measures for critical infrastructures need to be established.

The MSB highlights the need to further develop capabilities in the following areas: Ability to respond to power outages; Ability to prevent and respond to interruptions in the supply of drinking water; Information and cybersecurity; Ability to prevent and respond to interruptions in the supply of medicines; Ability to prevent and respond to radiological and nuclear events.

Crisis management defines the processes that need to be activated when threats do materialize. The stages of crisis management include: crisis identification; planning an appropriate response to a crisis; Confronting and resolving a crisis.

When it comes to crisis management terminology, countries sometimes refer to “contingency plans” and “emergency plans” interchangeably. Strictly speaking, however, emergency plans are reactive in nature, while contingency plans are more proactive. While contingency plans are designed to limit the consequences or impact of an incident, contingency plans are designed to anticipate events and prepare all stakeholders for an emergency, as well as to ensure a prompt return to normal operations. A single entity designated by the state should be given primary responsibility and authority for determining the course of action to be taken in the event of a crisis. This entity should coordinate all actions with all participating and affected entities. As part of the crisis management plan, an effective emergency response plan should be developed, including ensuring the interoperability of communication systems and adequate response times, as well as evacuation plans to limit the impact. The response of the emergency response team must be planned, tested and assessed in advance to mitigate the impact of an attack.

When developing their critical infrastructure protection strategies from a risk management perspective, countries should consider a number of guiding principles.

Determining the nature and levels of threats to critical infrastructure and the associated vulnerabilities is necessarily a collaborative and coordinated product of assessments conducted at multiple levels. However, a critical infrastructure protection strategy must be able to integrate multi-level threat, impact and vulnerability assessments. These levels are represented schematically as follows:

1) National level; 2) Sector level; 3) Infrastructure/company level.

The purpose of a national risk assessment is to provide an overview of the threat facing the country's critical infrastructure as a whole, its vulnerabilities and the consequences of a successful attack. An important contribution of national assessments is that they show how multiple sectors interact with each other. By developing documents of this type, recommendations and conclusions can be made based on the intelligence that has supported the development of national security and counter-terrorism strategies.

It is essential to develop sector-specific risk profiles for critical infrastructure. These profiles are critical to assessing existing mitigation practices, outcomes and vulnerabilities. Depending on the sector in question, risk assessments may be conducted for specific sub-sectors and subsequently fed back into broader sector risk profiles.

For example, Australia's Critical Infrastructure Resilience Strategy breaks down the transport sector into the following sub-sectors: aviation, land passenger transport (including bridges and tunnels), land freight and marine transport (shipping and ports).

According to the same strategy, the energy sector consists of electricity systems, offshore oil and gas fields, onshore oil and gas and coal supplies.

The assessment at the infrastructure level is that critical infrastructure operators are often the ones who know best how their infrastructure operates in terms of systems and processes. Consequently, they have a specific understanding of their internal vulnerabilities.

In addition, companies often conduct risk management cycles independently of the institutional role they are called upon to play in protecting critical infrastructure. Corporations primarily engage in risk

management to minimize damage that may impact the company’s objectives in order to ensure business continuity or limit the impact of a threat. Without focusing on protecting critical infrastructure, this type of risk management aims to identify risks to business continuity and implement mitigation measures. As a result, this can directly benefit companies’ infrastructures and enhance their resilience.

Therefore, countries should carefully consider the role that company-managed risk management processes should play in the context of critical infrastructure protection strategies. Ways to integrate corporate-level assessments into decision-making processes for the development of appropriate infrastructure support should also be included.

Consider the features of a risk-oriented approach to the management of energy infrastructure development (V. Khaustova et al., 2023b; 2024; A. Kwilinski et al., 2024; N. Trushkina, 2021; D. Wang et al., 2022). The energy infrastructure risk management system is designed to identify and eliminate vulnerabilities in the energy sector and ICT. It should provide responsible parties in the energy sector with a standardized approach to risk quantification and risk management during international electricity supplies. The risk management system is based on the analysis of the measures already used by operators in the energy sector and the governments of the Member States, as well as the actions that will be required in the future to eliminate existing gaps in the security of the system. In other words, it sets a minimum standard, but can be adapted by individual states and operators according to their needs and characteristics.

The risk management system is built in such a way as to be as useful as possible to the maximum number of interested parties. For this purpose, it is made quite flexible. It allows each interested person to take into account the risks that exist in their own area of responsibility. For example, at the EU level, the main advantage of using this system is risk management in international electricity supplies. At Member State level, the network operator may need to perform risk management across other, not necessarily national, borders. The general approach to risk management developed by the International Risk Management Council (IRGC) is based on a template framework for this process. This template breaks down activities within the process into the following elements: 1) preliminary assessment of obtaining a general attitude to risk; 2) assessment of the definition of knowledge, necessary judgments and decisions; 3) definition and analysis to assess risk acceptability; 4) managing the definition of the roles of process participants; 5) communication of the development of the information exchange process.

As explained in the study of the European Commission, the risk management system in energy/ICT includes four stages: preliminary monitoring; assessment; definition and analysis; management. At each stage, it reminds users of the need to consider the fifth element – communication. These steps can be repeated to provide a basis for continuous improvement. In addition, within the framework of this system, each country and organization is recommended to appoint an expert responsible for the implementation of the risk management system and the implementation of its objectives for the elimination of identified vulnerable parties.

When implementing a risk management system, the aspect related to public-private partnerships should also be considered (M. Kyzym et al., 2023). In September 2010, the Anti-Terrorism Unit of the OSCE Secretariat published a thematic overview, which provides the main recommendations for the development of energy infrastructure facilities. These recommendations were developed at the

seminar of public-private experts “Protection of the most important objects of non-nuclear energy infrastructure from terrorist attacks” held under the auspices of the OSCE. Some main recommendations can be given: 1) adherence to an integrated approach based on risk assessment (energy infrastructure protection measures must be dynamic and based on an up-to-date and regularly updated assessment of all hazards); 2) expanding the framework of multilateral cooperation (a comprehensive approach to the protection of the most important energy infrastructure facilities involves the coordinated participation of numerous stakeholders representing various government bodies, the public and private sectors, as well as foreign stakeholders); 3) development of flexible security measures that guarantee protection at the minimum adequate level (vulnerable parties and the risk environment of each energy infrastructure facility have their own specifics and dynamics; they must be taken into account when providing security to ensure the cost-effectiveness of protection and its compliance with established risks); 4) paying more attention to ensuring preparedness and general stability (preparedness requires advance planning of actions in an emergency situation, testing and control, including the development of plans for informational interaction with the public - consumers and energy markets. To ensure the level of stability, it is necessary to increase the volume of investments in inter-network interaction and alternative supply routes, as well as storage capacity/strategic stocks); 5) identification and elimination of vulnerabilities of the energy sector in cyberspace (today, in a world increasingly computerized and dependent on ICT, traditional physical security measures are no longer sufficient. It is necessary to significantly increase the level of public and corporate awareness and understanding of cybersecurity issues, and the development of special skills in matters of cybersecurity should also be encouraged); 6) development of an effective public-private partnership (it is necessary to clearly define the roles and responsibilities of stakeholders in the private sector and public authorities in ensuring security. The partnership can be developed for the purpose of joint assessment of the security of the most important energy infrastructure facilities, review of measures security, development of action plans in emergency situations and preparation for response to incidents); 7) strengthening of cross-border and international cooperation (the consequences of a failure in the operation of one energy infrastructure complex can spread far beyond the state borders of the country where it is located, whether it is a supply interruption or other damage, including economic (for example, an increase in prices on unstable energy sales markets) or environmental (countries should carefully consider these direct and indirect dependencies, leading to a justified interest in cooperation to ensure the integrity of the energy infrastructure).

3. Conclusions.

At present, in the global world, multifaceted issues of the development of critical infrastructure in the conditions of the formation of a security environment have become especially relevant. Modern threats to national security and changes in the international security system must be taken into account by all countries of the world (and especially Ukraine) in their national policies and development strategies. Therefore, the development of Ukraine's critical infrastructure must be considered from the standpoint of ensuring national security and post-war economic development, taking into account world practice (the experience of South Korea, Japan, China, Germany, Great Britain, Bosnia and Herzegovina, Croatia, Poland, etc.).

In view of this, it is currently necessary to create a security environment as a basis for ensuring the protection and stability of critical infrastructure within the framework of the implementation of the measures of the National Plan for the Protection and Security and Stability of Critical Infrastructure, approved by the Order of the Cabinet of Ministers of Ukraine dated September 19, 2023 No. 825 -y., as well as the National Security Strategy of Ukraine, approved by the Decree of the President of Ukraine dated September 14, 2020 No. 392/2020.

For this, first, it is proposed to justify the feasibility of using a risk-oriented approach to managing the development of critical infrastructure:

identification of possible threats, risks, crisis situations and their systematization by different groups; ranking of exogenous and endogenous factors influencing the development of critical infrastructure; development of a comprehensive approach to risk management of critical infrastructure development in crisis situations;

development of the order or algorithm of actions for operational response to crisis situations and adaptation of the operation of critical infrastructure objects (especially in the field of energy) in the conditions of military operations;

development of recommendations on anti-crisis management of critical infrastructure development). The implementation of a risk-oriented approach will make it possible to systematically diagnose and assess risks caused by the conditions of war, with the aim of forming an adaptive-oriented management system for the development of critical infrastructure facilities on the basis of risk management, which will contribute to the implementation of successive changes in the organizational and resource provision of their security activities taking into account the threats and challenges of the war and post-war periods.

In further studies, it is planned to justify and develop the Concept of the Nationwide target program for the post-war development of critical infrastructure within the framework of the implementation of the Recovery Plan of Ukraine.

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THE IMPACT OF NON-GOVERNMENTAL ORGANIZATIONS ON THE RESILIENCE POTENTIAL OF TERRITORIAL COMMUNITIES IN UKRAINE

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Abstract. *The relevance of studying non-governmental organizations (NGOs) in Ukraine is determined by their significance in enhancing the resilience potential of local communities within limited timeframes and constrained resource availability. The purpose of the article is to reveal the impact of NGOs as an effective tool for improving the adaptive capacities and self-organization abilities of community groups on the resilience potential of territorial communities, mitigating destructive consequences, and accelerating their recovery during and after the Russian-Ukrainian war.*

With the escalation of the Russian-Ukrainian conflict into a full-scale war in 2022, significant shifts have been observed in the prosocial behavior of citizens and the social structure of Ukrainian civil society. These shifts are characterized by increased cohesion and consolidation among the population, driven by the transformation of individual perspectives and institutional adaptation in high-risk conditions, as well as a revitalization of cooperation among civil institutions.

The study of the impact of NGOs on the resilience potential of territorial communities was conducted using the systemic approach method, techniques of abstraction and generalization, functional and comparative analysis, statistical methods and data analysis, as well as the graphical method. Correlation-regression analysis was also applied: indicators that determine the resilience potential of the country's local communities were selected based on the criteria of significance and the presence of a cause-and-effect relationship, including local budget revenues per capita, household monetary incomes, and the number of informally employed individuals as an indicator of the shadow economy. The results of the correlation-regression analysis confirmed the existence of a positive dependence between the amount of local budget revenues per capita and the number of public and charitable organizations. This finding allows for the assertion that local budget revenues increase as the number of organizations grows, due to the heightened public activity of residents, increased social responsibility of businesses, reduced corruption, and decreased mistrust among community members. It was substantiated that a low level of civic engagement, formed based on closed networks and information communications, exacerbates material gap, status differentiation, and income inequality in the community.

In the conditions of war, residents' affiliation with formal and informal communication channels of public organizations increases citizens' employment opportunities. As the number of NGOs in a territorial community increases, the communication network and trust among residents become more developed, and socially responsible behavior among the population rises. It enhances the probability of official employment for the unemployed, as confirmed by the results of the correlation-regression analysis between the number of informally employed individuals and the number of public and charitable organizations.

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Keywords: *non-governmental organizations, public and charitable organizations, territorial community, resilience.*

JEL: L31, D73, O18, O19

1. Introduction. Since the beginning of the Russian-Ukrainian war, most of the territorial communities of Ukraine are in the zone of high financial, security, environmental, and social risks. In response, non-governmental organizations (NGOs) have been actively working to minimize human, environmental, and economic losses. With their flexible organizational structures and proximity to potential service recipients, NGOs are characterized by higher efficiency and effectiveness in their activities at the local level and their ability to enhance the resilience potential of local communities within limited timeframes and constrained resource provision. This underscores the relevance of studying NGOs as an effective tool for the recovery of territorial communities during wartime and in the post-war period.

The increased influence of the civil sector encourages local authorities to recognize the agency of NGOs and involve them in the process of community recovery. Establishing cooperation between local authorities and NGOs, and delegating certain social tasks to them, allows for a more rational use of the community's limited resources under the extreme conditions of war and contributes to enhancing the community's resilience potential. While in European Union countries NGOs are integrated into public life and receive financial support from both national and local governments, the involvement of NGOs in Ukrainian territorial communities in cooperation with local authorities is minimal. It has decreased even further under wartime conditions – the proportion of NGOs receiving funding from state or local budgets has been reduced by nearly threefold.

Ukraine is in the zone of influence of various international public associations, including the Red Cross, UNICEF, Right to Protection, Save the Children, Doctors Without Borders, Greenpeace, and others. Notably, the international environmental organization Greenpeace actively defends Ukraine's interests by blocking oil and gas tankers in various countries to reduce the financial potential of the Russian army and exerting pressure on companies and governments whose actions at the Kakhovka Hydroelectric Power Plant, Zaporizhzhia and Chernobyl Nuclear Power Plants threaten environmental security. The NGO "Right to Protection" actively provides legal assistance to internally displaced persons, identifies violations of their rights, and helps restore pension payments. Conversely, the active use of the Ukrainian Orthodox Church of the Moscow Patriarchate by Russian agents has a destructive impact on the resilience of territorial communities and poses a threat to Ukraine's national security.

Domestic and foreign scientists have repeatedly emphasized the issue of ensuring the resilient recovery of territorial communities in war conditions and the potential of public organizations as an effective tool for increasing the adaptive capacity of the public community. The problem of resilience in Ukraine is studied thoroughly by specialists from the Institute for Demography and Life Quality Problems of the NAS of Ukraine: E. Libanova (Portnikov, 2024), T. Zaiats (Zaiats et al., 2019), V. Zvonar (Zaiats et al., 2019; Zvonar, Dyakonenko, and Kotenko, 2023), S. Aksyonova and P. Shevchuk (Aksyonova & Shevchuk, 2024), H. Kraievska (Kraievska, 2020), as part of research into institutional mechanisms for balancing social responsibility, public activity in territorial communities in the conditions of military operations, self-organization and responsibility in

community development, population resilience during COVID-19, and social capital as a means of ensuring resilience in Ukrainian society (Dyakonenko, 2023). T. Birkland and M. Warnement investigated the problem of resilience potential in the conditions of disasters in non-democratic countries. In particular, on the example of Nicaragua, they analyzed the decrease in the resilience of the reconstruction of a settlement after an earthquake caused by government corruption (Birkland, & Warnement, 2014). The influence of international non-governmental organizations on the development of declining countries was studied by Y. Bradshaw and M. J. Schafer. In their opinion, international NGOs have a productive effect on the development of such countries, in particular on housing construction, the sphere of health care, the sanitary and epidemic situation, and act as a significant source of financial resources (Bradshaw, and Schafer, 2000). While acknowledging the contributions of scientists, there is a notable lack of research on the potential of public organizations in the resilient recovery of Ukraine’s territorial communities during and after the war.

The purpose of the article is to reveal the influence of public organizations, as an effective tool for increasing the adaptive capacity and self-organization of the public community, on the resilient potential of territorial communities, mitigating the destructive consequences and speeding up their recovery in the war and post-war periods of the Russian-Ukrainian war.

The study was conducted using general scientific methods: the systemic approach, techniques of abstraction and generalization, functional and comparative analysis – to substantiate the main functions of NGOs in ensuring the resilience of territorial communities; statistical methods and data analysis – to assess the impact of NGOs on the resilience-based recovery of territorial communities during wartime and the post-war period; and the graphical method – to visualize the obtained results. Correlation-regression analysis was used to examine the impact of NGOs on the resilience of territorial communities. Specifically, indicators were selected and tested for multicollinearity, paired correlation relationships were evaluated, linear regression analysis was conducted, and dependency equations were constructed. Based on significance and cause-and-effect criteria, three indicators were selected that directly impact the resilience potential of the country’s territorial communities: local budget revenues per capita, household incomes, and the number of informally employed individuals as a shadow economy indicator.

2. Basic content. The resilience potential of NGOs is the aggregate of available resources, capabilities, and means that these voluntary associations of territorial community residents can mobilize to meet their interests and public demands for recovery and adaptation in the face of external threats and internal challenges during wartime and the post-war periods. The resilience potential of NGOs is determined by the size of the organization and its social capital, the scale of its activities and sphere of influence, the efficiency of resource utilization, and the ability to realize its inherent potential. With the escalation of the Russian-Ukrainian war into a full-scale one, significant shifts have been observed in the prosocial behavior of citizens and the social structure of Ukraine’s civil society, characterized by increased cohesion and consolidation among the population. This is driven by the transformation of individual perspectives, institutional adaptation under high-risk conditions, the revitalization of cooperation among civil institutions, and the heightened activity of charitable and volunteer organizations.

The effectiveness of cooperation depends on the motivation of the participants in this process, the solidarity of government representatives’ views in the community, and publicity is the key to effective

decision-making. The community sector’s influence on the processes of local budget funds allocation in order to strengthen social ties and increase the social capital of territorial communities is undeniable (Sova, 2023). Currently, the public sector of Ukraine is developing in the context of modern global trends with target orientations for the social integration of all subjects of local development and a harmonious combination of private and public interests. The social integration of efforts by various actors into a cohesive whole is a global trend in civil sector development, alongside the relative autonomy, openness, and mobility of institutions. Achieving integration goals relies on shifting values, developing new institutional forms, and transforming informal civil groups into structures aligned with public demands.

In the context of the Russian-Ukrainian war, NGOs have shown increased integration into the social space of the country’s territorial communities and have intensified volunteer activities. This has enabled them to compensate for the unpreparedness of state structures to conduct military operations on the country’s territory by providing assistance to the Armed Forces of Ukraine, evacuating populations from areas under constant shelling, patrolling territories, delivering humanitarian aid to those in need, rebuilding destroyed housing for free, and more. There was a significant surge in civic activity in the communities of the Dnipropetrovsk, Kharkiv, and Odesa regions, which rank among the leaders in civic engagement. In contrast, in the frontline territorial communities of the Kherson, Donetsk, Chernihiv, Sumy, and Mykolaiv regions, the civic movement was minimal following the onset of the full-scale invasion. There was a decline in the number of official NGOs, with the creation of new ones primarily occurring in regional centers, focusing mainly on supporting the military and war victims.

From 2013 to 2023, the civil sector experienced significant growth in the charity index (by 2,6 times) and in the level of donations (by 8,8 times) (Figure 1). As a result, in the 2023 World Giving Ranking, Ukraine rose to 2nd place from 102nd (in 2013), effectively becoming the only European country in the top-10, surpassing the Baltic states (Estonia – 49th place, Lithuania – 83rd, Latvia – 90th), Georgia (104th), Moldova (101st), and Poland (142nd place).

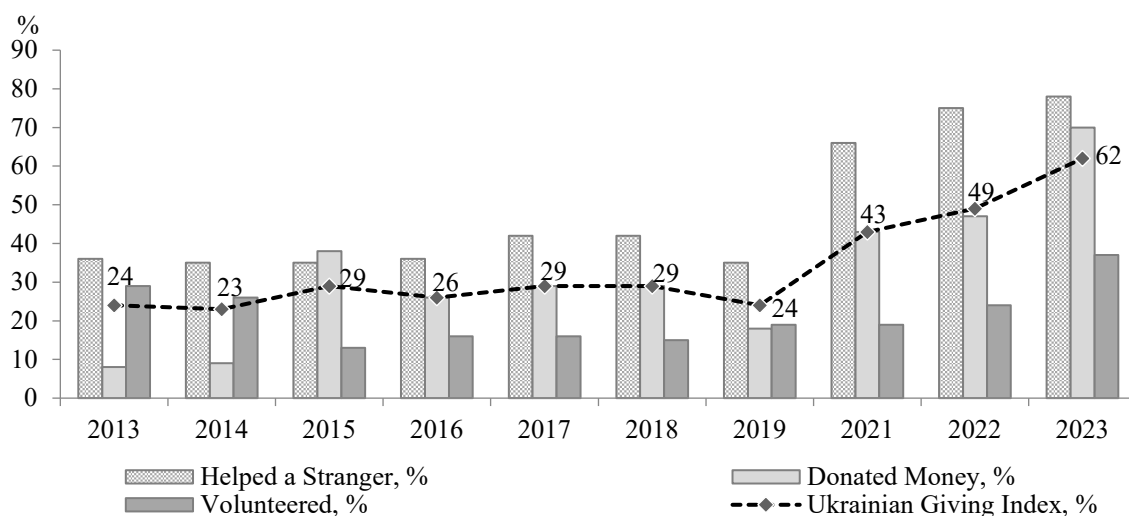


Figure 1. Ukrainian Giving Index, 2013-2023, %

Source: built by the authors on the bases of (Charities Aid Foundation, 2024)

From the first months of the full-scale invasion, NGOs have performed a wide range of socially significant functions (Figure 2), actively responding to threats and public demands.



Figure 2. The main functions of NGOs in ensuring the resilience of territorial communities

Source: compiled by the authors

The social function of NGOs, particularly in providing social services to the population (such as education, healthcare, and legal assistance), is crucial for the resilience of territorial communities (Zaiats, et al., 2024). This includes the involvement of financial resources from international donors, which has reduced the financial burden on the state/local budget and created the opportunity to allocate the saved resources to other urgent needs, including defense and military-strategic purposes. Thanks to their flexible organizational structure and proximity to potential recipients of administrative and social services, public organizations are able to effectively organize their delivery. For example, in developing countries, NGOs are a significant source of financial resources, ensuring the inflow of several million dollars to improve the living conditions of impoverished populations (construction of housing and healthcare facilities, improvement of sanitary and epidemiological conditions, implementation of programs for children, etc.) (Bradshaw, and Schafer, 2000).

The NGOs' active work and the delegation of administrative and social tasks by government bodies to these associations will contribute to the efficient use of budgetary resources and their growth due to the attraction of financial resources from international donors, the development of entrepreneurial

activity and residents’ education, the enhancement of the community’s social capital, etc. In particular, the results of the correlation-regression analysis confirm the existence of a positive relationship between the average local budget revenue per capita and the number of public and charitable organizations in the community (Figure 3). Accordingly, we can assert that an increase in the number of NGOs will contribute to the rise in per capita local budget revenues as a result of heightened civic engagement, increased social responsibility of businesses, reduced corruption, and greater trust among residents.

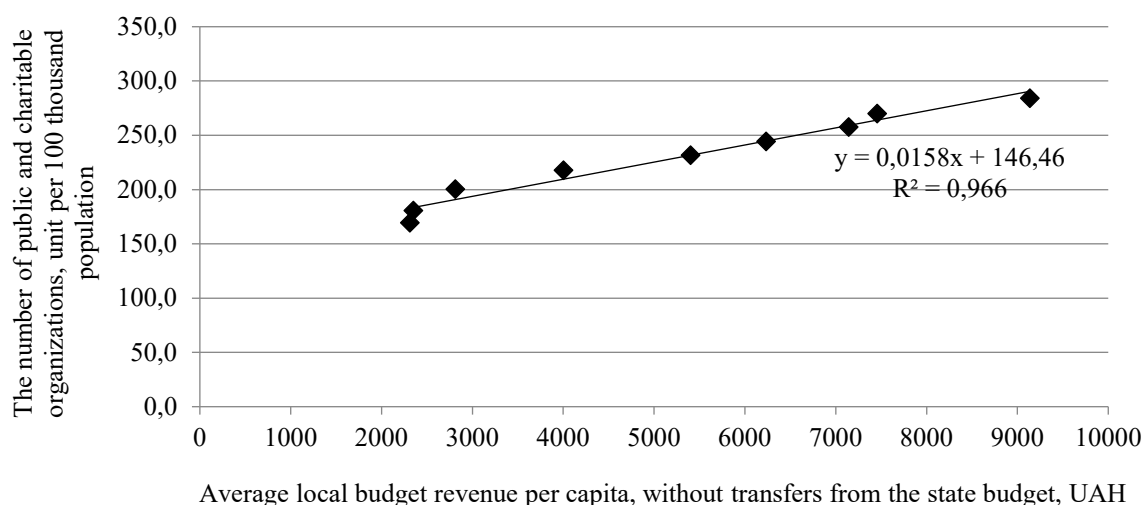


Figure 3. Dependence of local budget revenues on the number of public and charitable organizations

Source: built by the authors on the bases of (Ministry of Finance of Ukraine [MFU], 2022; MFU, 2019; State Statistics Service of Ukraine [SSSU], 2024)

Conversely, a low level of civic engagement, which is shaped by closed networks and information communications, exacerbates material disparities, status differentiation, and income inequality within the community. On the other hand, increasing public activity creates favorable conditions for the growth of income among interacting entities, diversifies the sources of their income, and enhances existing assets, including by mitigating the risks of resource loss through formal and informal connections. This is supported by the results of the correlation-regression analysis of the relationship between household monetary incomes and the number of NGOs and charitable organizations in the community (Figure 4).

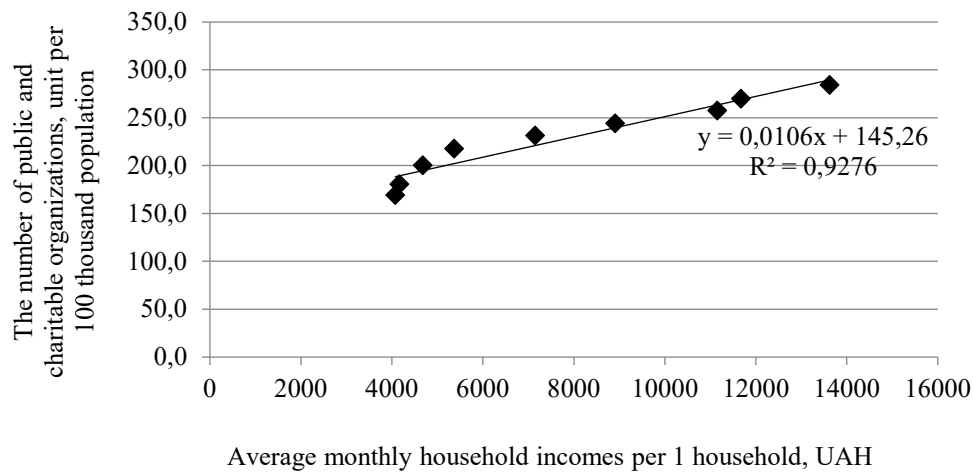


Figure 4. Dependence of households’ monetary income on the number of public and charitable organizations

Source: built by the authors on the bases of [SSSU, 2024]

One of the primary reasons for the shortfall in financial revenues to the local budget is the presence of a shadow economy and informally employed population. In wartime conditions, residents’ affiliation with formal and informal communication channels NGOs enhances their opportunities for official employment. Undoubtedly, the greater the number of NGOs in a territorial community, the more developed the communication network and trust among residents, leading to an increase in socially responsible behavior and raising the likelihood of officially employing unemployed individuals. This is confirmed by the results of the correlation-regression analysis of the relationship between the number of informally employed individuals and the number of NGOs and charitable organizations in the community (Figure 5). Conversely, excessive closeness of the community network, limited contacts, biased attitudes towards residents, and restricted access to information negatively affect the efficiency of the labor market.



Figure 5. Dependence of informally employed population on the number of public and charitable organizations

Source: built by the authors on the bases of [SSSU, 2024]

The social function of NGOs in the post-war period may come under the pressure of reconciliation policies between nations. Given the hostile attitudes between Ukrainians and Russians, rooted in endured suffering and pervasive Russian propaganda, the reconciliation process will be prolonged and painful for both nations and will require the use of various tools. For example, a German NGO focused on issues of understanding and reconciliation between the German people and former concentration camp prisoners and victims of repression in Eastern Europe employed instruments such as providing financial assistance, offering medical treatment to survivors, and collecting testimonies and memories from eyewitnesses.

The integrative function of public organizations is aimed at consolidating residents around a common goal, stimulating civic engagement, and promoting socially responsible behavior. To ensure the resilience of territorial communities, it is crucial that the cooperation between NGOs and other stakeholders is built on the principles of dialogue and the pursuit of new opportunities for interaction based on subsidiarity, safety, social efficiency, and responsibility (awareness of the social consequences of their activities). Currently, the activity of Ukrainian NGOs in establishing communication with authorities and business structures remains low, which is due both to the challenges of adapting to wartime conditions (only 50,4 % of NGOs were able to fully or significantly adapt to working under war conditions; only 57,6 % of organizations were able to secure funding after the full-scale invasion) and to the low level of civic culture in society.

In ensuring the resilience of territorial communities, the intermediary and expert-consultative function of NGOs plays a crucial role, as it allows for the consideration of the expectations and attitudes of various population groups in specific management decisions, strategic documents, and successful social projects. During wartime, its significance increases in the context of preparing the population for potential disasters and preventing and mitigating possible negative consequences. The Ukrainian NGO «*Euromaidan-Warszawa*» (based in Warsaw), aimed at unblocking border checkpoints on the Polish-Ukrainian border, organized several forums with the participation of Polish officials. As a result, a proposal was made to Polish Prime Minister Donald Tusk to include border crossings on the Polish-Ukrainian border in the list of critical infrastructure objects, and the need for a systematic approach to solving this issue was substantiated, as other professionals, incited by Russian propaganda, might follow Polish farmers in blocking the border (Bodnaruk, 2024). Such mediation and expert-consultative participation of public organizations, often based on informal relationships, helps accelerate the process of restoring relations to pre-crisis levels, preventing or reducing the scale of damage and losses.

The ability of a territorial community to recover largely depends on the controlling and opposition functions of NGOs, which involve monitoring the observance of citizens' rights and freedoms, tracking the corruption component in public relations, and preventing the usurpation of power. The recovery of a territorial community can be significantly complicated by a high level of corruption in the country, as vividly demonstrated by the recovery experience of the city of Managua after the earthquake, where resilience was undermined by the corruption of the Nicaraguan government (Birkland, & Warnement, 2014).

The resilience of a community in combating corruption and power usurpation is determined by the resources and persistence of NGOs, which find it challenging to operate at the national level and even more so at the local level. In Ukraine, there are several NGOs actively fighting corruption, among

which the most effective are: the human rights organization "Human Rights" (counteracting corrupt schemes, assessing corruption risks in public procurement), the Anti-Corruption Action Center (fighting corruption during state procurements, lobbying anti-corruption legislation, and establishing anti-corruption bodies like NABU and SAPO), and Transparency International Ukraine (anti-corruption research, including the Corruption Perceptions Index).

In the near future, the influence of NGOs on the potential for enhancing the resilience of Ukraine's territorial communities will continue to grow, driven by the institutionalization of their activities and the qualitative renewal of their methods of interaction with partners. Leading positions will be held by charitable and volunteer organizations, which will not only increase in number but also expand the range of tools at their disposal. The most effective tools for NGOs in ensuring the resilience of territorial communities will include active measures (promoting citizen mobility, shaping public opinion, public oversight) and segment-specific tools (targeting particular population categories, infrastructure objects, territories, etc.) with fixed effects (providing legal assistance to internally displaced persons, restoring destroyed housing and healthcare facilities, improving living conditions to prevent epidemics, ensuring the operation of humanitarian centers, and collecting necessary information). Among the priority areas of activity for newly established and pre-invasion public and charitable organizations planning to participate in the country's post-war reconstruction, infrastructure rebuilding (80,0 % of organizations) and the provision of humanitarian aid (87,7 %) will be key (The Ukrainian Center for Independent Political Research, 2023).

Implementing contemporary global trends in the development of the public sector within territorial communities, in the context of building a resilient economy in Ukraine during wartime and post-war periods, will require:

- adaptation of domestic legislation to European standards regarding NGOs and their cooperation with local authorities such as European Fundamental Principles on the Status of Non-Governmental Organizations, Recommendation № CM/Rec(2007)14, and the Convention for the Protection of Human Rights and Fundamental Freedoms (1950). This will necessitate the regulation of a three-tier territorial status for public organizations in Ukraine (international, nationwide, local) to align with the two-tier system in the EU (international, national status);
- implementation of Resolution of the Cabinet of Ministers of Ukraine № 976 dated 05.11.2008 "Procedure for facilitating the conduct of public expert examination of executive authorities' performance", which provides for the involvement of public control as a tool for establishing and maintaining close communication and control over the activities of executive authorities and ensuring their transparency functioning, including for the purpose of preventing the unauthorized use of charitable aid by the authorities in the war and post-war periods of territorial community recovery;
- enhancing current anti-corruption legislation to strengthen public anti-corruption oversight; legislating increased legal protection for whistleblowers; ensuring legal frameworks for interaction between public anti-corruption organizations and citizens; implementing public monitoring of compliance with normative legal acts in the field of corruption prevention and counteraction;
- development of sector-specific and thematic legislative acts for the functioning of NGOs to ensure more competent regulation;

- legislative restriction or termination of the activities of Ukrainian public organizations that are used by foreign agents and pose a threat to national security, or that engage in active resistance with manifestations of national intolerance and xenophobia towards the Ukrainian population;
- development of effective cooperation programs between NGOs and local authorities based on a comprehensive assessment of the community’s resilience, which will promote the active involvement of public organizations in joint projects aimed at addressing community issues;
- optimization of financial support for the activities of public organizations by supporting their institutional development, reforming the taxation system, exemption from taxation of charitable assistance for treatment, prosthetics, social support for children, etc.;
- active support for public organizations from local entrepreneurs, donors, and benefactors to restore community infrastructure and reduce the financial burden on the local budget;
- establishing close cooperation between local and international public organizations, which will facilitate a better understanding by international donors of local needs when providing humanitarian aid;
- increasing the awareness of local public organizations regarding collaboration with international organizations and reducing the language barrier;
- involving the public sector in the processes of transforming the value-based orientations of residents in a territorial community, and reassessing values that have developed over decades and hinder the formation of civil society.

3. Conclusions. Non-governmental organizations are one of the most effective forms of resident participation in the local governance. NGOs serve as a powerful tool for the resilient development of territorial communities by enhancing the adaptive capacities and self-organization abilities of the community, mitigating destructive consequences, and accelerating recovery after shocks. With greater efficiency and effectiveness in their activities at the local level compared to the national level, NGOs are capable of strengthening the adaptive and transformational potential of territorial communities within limited timeframes and resource constraints, as well as in the face of the inflexibility and hyper-coherence of local authorities.

The resilience potential of NGOs in Ukraine’s territorial communities is defined as the aggregate of available resources, capabilities, and means that can be utilized for recovery and adaptation in the face of external threats and internal challenges during the wartime and post-war periods. Currently, Ukrainian NGOs are characterized by limited financial capital and a shortage of human and material resources, which have undergone significant transformations and reductions due to the war. The number of organizations, particularly charitable and volunteer groups, tended to increase at the onset of the full-scale war, but subsequently, the dynamics of civic activity have shown a decline. This downturn is due to the difficulties of adapting to work under high-risk conditions, a decrease in donations resulting from declining trust in these structures, and the overall drop in living standards. In frontline areas, there has been a shutdown or freezing of projects, a reduction in the number of official NGOs, and the creation of new ones has occurred mainly in regional centers, focusing primarily on assisting the military and war victims. Military actions have forced many NGOs to relocate to safer regions, leading to a drop in revenue and operational difficulties due to the lack of office space and equipment.

The main functions of public organizations in ensuring the resilience of territorial communities include social, integrative, mediation, expert-consultative, and controlling. Correlation-regression analysis has confirmed the significance of public and charitable organizations for local budget revenues, resident income, and informal employment indicators. It has been established that an increase in the number of NGOs will contribute to higher local budget revenues per capita, driven by civic engagement, business social responsibility, reduced corruption, and increased trust. It has been substantiated that the growing number of NGOs and their activities create preconditions for increasing the income of interacting entities, diversifying their sources of income, and reducing the risks of losing existing assets and resources, as evidenced by the results of the correlation-regression analysis of the relationship between household monetary income and the number of public/charitable organizations in the community.

Using correlation-regression analysis, a negative relationship between the number of public/charitable organizations and the informally employed population was also established. It is argued that as the number of public organizations increases, the communication network and trust among residents develop, socially responsible behavior among the population grows, thereby increasing the likelihood of official employment for the unemployed. Conversely, excessive closure of the public network and restrictions on contacts and access to information negatively affect the efficiency of the labor market.

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ERP SYSTEMS AND THEIR ROLE IN CORPORATE SUSTAINABILITY MANAGEMENT

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Abstract: *ERP systems play a crucial role in the sustainable development of an organization as a result of the many functions and modules that these systems offer. Thus, more and more organizations tend to implement these systems to ensure that the activity carried out is sustainable. The purpose of ERP systems is to integrate a multitude of business processes to ensure the correct collection, analysis and reporting of data. By leveraging real-time data and analytics, ERP systems empower companies to make informed decisions that align with sustainability goals.*

The article discusses how ERP systems facilitate the tracking of resource consumption, waste management, and carbon emissions, thereby enabling organizations to identify areas for improvement and implement sustainable practices. Additionally, the article addresses the challenges companies face in implementing ERP systems for sustainability management, including data integration issues and the need for organizational change.

Integration of ERP systems within organizations allows better compliance with regulatory requirements and enhances transparency in reporting to stakeholders. Thus, the stakeholders are much more satisfied with the data processed with these systems, as well as with the reports prepared by accounting professionals. Organizations that implement ERP systems have sustainability initiatives, demonstrating measurable improvements in operational efficiency and reduced environmental impact.

Sustainability refers to the ability to meet present needs without compromising the ability of future generations to meet their own needs. Sustainable practices in business can lead to reduced environmental impact, improved community relations, and enhanced profitability.

The case study proposed in this article is based on a bibliometric analysis using VOS viewer application using a sample of 286 Web of Science indexed articles published between years 2010 and 2024, used with the aim of highlighting the advantages of implementing ERP systems on the organization's sustainability management.

ERP systems are not only a tool for operational efficiency, but also a catalyst for the sustainable transformation of organizations, helping to create a greener and more responsible future.

Key words: *ERP systems, corporate sustainability, management, progress, opportunities*

JEL: M21, M41, Q01.

1. Introduction

In this paper, we tried to highlight the main role of ERP systems in an organization from the point of view of development and adoption of decisions in a sustainable way. According to Al-Abrow et al. (2018), ERP systems are defined as that information system that ensures the replacement of redundant and manual processes with automated processes. Thus, more and more organizations were motivated to implement ERP systems in order to comply with data collection and analysis, saving time and resources. Providing precise and updated information, these ERP systems ensure the consolidation of the reputation towards the interested parties, but also an organizational culture oriented towards

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sustainability (training of employees in the field of sustainability and their involvement in ecological projects) (Anaya et al., 2023).

The implementation of ERP systems ensures competitiveness and responsibility of organizations towards the environment, "valuing the best practices and benefiting from numerous organizational advantages" (Anaya et al., 2023).

The main purpose of this paper is to explore how ERP systems contribute to the management of corporate sustainability, highlighting not only the economic benefits, but also the social and ecological impact of these solutions.

2. ERP systems and corporate sustainability management – literature review and case study

Chofreh et al. (2018) consider the implementation of ERP systems a complex process because it requires a wide range of knowledge regarding management and technology. It is also necessary to know the organizational architecture to ensure that the modules correspond to the main departments of the organization.

The plan regarding the implementation of an ERP system to ensure sustainability involves 3 stages presented in figure 1:

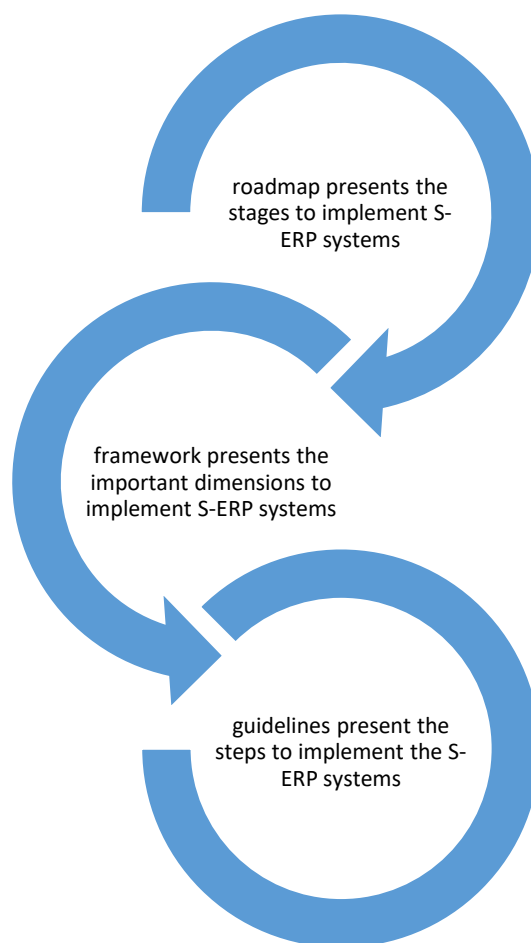


Figure 1. Implementation stages of sustainable ERP systems (S-ERP systems)

Source: Chofreh et al., 2019; Hack and Berg, 2014

Table 1. Relationship between "Sustainable development" (SD) and the main concepts of the paper

Relationship	Description
SD - systems	Facilitates sustainable development with the help of ERP systems that offer a series of functions that allow more efficient management of resources
SD - management	Involves strategies and practices that ensure the responsible use of resources. ERP systems support sustainable management by providing data and analytics that help make informed decisions.
SD - performance	Evaluating the impact of the organization's activities on the environment and society. ERPs enable real-time performance monitoring and reporting, thus facilitating continuous improvement.
SD – corporate social responsibility (CSR)	The responsibility of companies to act ethically and to contribute to the welfare of society. ERP systems can integrate CSR initiatives into business processes, ensuring transparency and accountability.
SD - framework	Provides guidelines for the implementation of sustainable strategies
SD - governance	Sustainable governance refers to the structures and processes by which organizations are run. ERP systems contribute to better governance by ensuring regulatory compliance and facilitating reporting.
SD – environmental policy	Environmental policies are essential for promoting sustainable development. ERPs can help organizations implement and monitor these policies, ensuring that environmental standards are met.
SD - implementation	Implementing sustainable development requires a well-structured plan. ERP systems facilitate this implementation by automating processes and providing tools for resource management.
SD – ERP implementation	Implementing ERP systems in the context of sustainable development involves integrating the principles of sustainability into the design and use of these systems. It ensures that organizations can track and improve their impact on the environment and society.
SD - impact	The impact of sustainable development refers to the long-term effects of the organization's activities on the environment and the community. ERPs enable the assessment and reporting of this impact, helping organizations adjust their strategies to maximize social and environmental benefits.

Source: Author's own creation, 2024

ERP systems play a crucial role in corporate sustainability management, facilitating the integration and implementation of sustainable development principles in all aspects of business operations. This interconnection between key words emphasizes the importance of a systemic approach in promoting sustainability in the business environment.

3. Conclusions

As a result of digital and climate changes, managing corporate sustainability has become an essential priority for organizations around the world. Thus, the optimal solution adopted by the organizations was the ERP system which plays a crucial role in facilitating this transition towards more sustainable business practices.

The most important function of the ERP system is to centralize and analyze data from various departments of the organization, allowing better visibility on the resources used, carbon emissions and other environmental performance indicators.

The implementation of an ERP system facilitates compliance with environmental regulations and international sustainability standards, automating reporting processes and avoiding financial penalties, thus protecting the organization's reputation. At the same time, ERP systems can provide analysis of resource consumption trends, allowing a more rigorous analysis of suppliers that meet sustainability standards.

In conclusion, ERP systems are an essential tool in managing corporate sustainability. By centralizing data, facilitating compliance, optimizing the supply chain, supporting innovation, and promoting internal collaboration, ERPs significantly contribute to creating more environmentally and socially responsible organizations. As companies continue to face sustainability challenges, the adoption and integration of ERP systems will become increasingly important. Investing in these technologies will not only help organizations meet their sustainability goals, but will also help build a more sustainable future for society as a whole. Thus, ERPs are not only a tool for streamlining business processes, but also a catalyst for positive change in the direction of sustainability.

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BEHAVIOURAL ECONOMICS: EVOLUTION OF DEVELOPMENT AND FORMATION OF THE CONCEPT

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Abstract: *The article presents the main concepts and theories of behavioural economics. This area has been extremely popular and relevant in recent years in the economic sphere due to its novelty and change in the management and marketing paradigm, namely, consumer orientation.*

Economic theory is a science that studies the maximum satisfaction of human needs with limited resources, which contains many current economic models and laws built mainly with a limited view of both the producer (seller) and the consumer. This article examines concepts mainly related to how people interact in the economic sphere, and compares the views of representatives of modern behavioural economics on this aspect.

Today, behavioural economics is one of the most popular and in-demand economic areas, because it is closest to the behaviour of real economic agents. Theories of behavioural economics are used everywhere nowadays, so it is necessary to conduct more in-depth research in this area.

In this regard, the purpose of the article is to review the main stages of the formation of behavioural economics and determine the essence of this area. The main objectives: to determine the prerequisites for the formation of behavioural economics; to make a brief overview of the postulates of the main economists and their concepts; to define scientific views on the subject of behavioural economics; to consider the stages of transformation from traditional economic views to improved modern approaches.

Thus, as a result of the study, the main stages of the formation and development of the theory of behavioural economics were determined, and the fundamental differences of scientific points of view were revealed through the prism of evolutionary and historical development.

Key words: *behavioural economics, stages of formation, concept, theories, management, consumer.*

JEL: D11, D12.

1. Introduction.

The development of social relations and the growth of the human factor in modern economic systems necessitated the elimination of the existing contradictions of traditional economic theory, which arise as a result of a simplified understanding of the driving forces and factors of economic behaviour.

For a long time, based on ideas about man as a rational being who should maximize utility, in modern conditions, traditional economic theory is no longer able to provide a sufficient level of probability in the forecasts of his economic behaviour, and therefore – in the forecasts of the dynamics of economic systems, an integral a component of which is economic behaviour.

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Bridging the gap between traditional economic theory and the real behaviour of economic agents was facilitated by the emergence of an interdisciplinary field of knowledge that uses the knowledge and approaches of social sciences to explain and predict economic behaviour, and which received the name “Behavioural Economics”.

Its task is to clarify economic models that determine the real behaviour of economic agents by taking into account the action of cognitive, emotional and social factors. This, in turn, determines the need to form ideas about the system of factors of economic behaviour, to master the tools and methodology of their assessment, modelling and forecasting.

The priority direction of modern behavioural economics is the methodology of identifying systemic errors, both of the person making the decision and of those persons whose economic behaviour is predicted. Knowing the factors and conditions that lead to characteristic cognitive distortions allows you to build reliable prognostic models. Also, they make it possible to prevent or use systematic errors of people, thereby increasing the level of control in socio-economic processes.

The ability to predict the likely occurrence of system errors allows you to take measures to prevent them in advance, take into account existing patterns when forecasting the economic behaviour of various market entities, and thus improve the quality of management decisions and ensure the improvement of the efficiency of activities both at the individual level and at the levels of organization.

2. Basic content.

In practice, it turns out that, contrary to the opinion of the classics, in most cases the consumer acts irrationally, guided by some emotions, marketing tricks and other subjective feelings. In the conditions of the modern post-industrial and information society (O. Harmash et al., 2024; N. Trushkina, 2019), which is characterized by a large amount of information and a huge number of goods, it is quite difficult to make a truly reasonable and rational choice. Many outstanding economists (G. Becker (1976); C. Camerer (2003); R. Cyert & J. March (1962); E. Higgins (1998); D. Kahneman & A. Tversky (1979); A. Maurice (1953); J. Neumann & O. Morgenstern (1944); H.-R. Pfister & G. Bohm (2008); H. Simon (1955); D. Scharfstein & J. Stein (1990); H. Shefrin & M. Statman (2000); R. Thaler (1980, 1985, 2015); X. Wang, F. Simons & S. Bredart (2001)) have contributed to the development of behavioural economics, but it should be remembered that this area of research affects both economic and psychological science.

The basis of behavioural economics is that, unlike economic theory, behavioural economics emphasizes the fact that a person has his own psychological characteristics and sometimes they are driven not by rational calculation, but by motives that can only be explained from the point of view of psychology and sociology. This explains the fact that a significant portion of economists studying behavioural theory in their main profile are psychologists. Some of the most famous are D. Kahneman and A. Tversky (1979). However, it should be noted that adherents of this area of research do not reject the concept of “homo economicus”, but only refute its absolute effect in most cases of economic behaviour. Below, we will consider the main theories and concepts of such a promising and relevant area as behavioural economics.

For many years, several basic principles of behaviour of such economic agents as the consumer (buyer) and the producer (seller) dominated economic science. One of the concepts was proposed by

J. S. Mill (1848, 1871) and was called “homo economicus”, which in Latin means “economic man”. This model was followed by many economists. In particular, the “invisible hand of the market”, founded by A. Smith (1776), was based on the fact that not only the consumer, but also the producer, satisfying their personal interests, consciously or unconsciously take into account the interests of the opposite side. The basis of this “law” is internal egoism and rational calculation of utility for the buyer and profit for the seller. Paradoxically, Adam Smith also recognized that the consumer is guided not only by “cold calculation”, but also by certain moral qualities and emotions. In his work “The Theory of Moral Sentiments” (1759), A. Smith described the meaning of such concepts in economics as “fairness” and “justice”.

If we talk about the global goal of behavioural economics, we can say that it is designed to find an answer to the question of how changes in physical quantities in the external world affect their perception by the subject. In other words, there are specific and measurable physical quantities (speed, amount of money, time), the values of which can be subjectively perceived by people (speed, value, elapsed time).

It is necessary to formulate laws that link subjective sensations in the human brain with the objective values of these quantities in the real world. One of the first to formulate such a pattern was the Swedish scientist D. Bernoulli (1738). In 1738, he came to the conclusion that the value of money is determined by a logarithmic function of its quantity. Thus, with an increase in money, its value for the subject gradually decreases. From the point of view of the classical approach, the value of money should increase proportionally to its quantity, but the perception of value by the person himself is not always rational. Also, Bernoulli, one of the first scientists, who determined that people are absolutely not inclined to take risks, since there is a probability that the worst outcome will occur.

Later, A. Maurice (1953) conducted an experiment in which he confirmed that people are more likely to choose a less risky option than a more profitable one. The essence of the experiment was that respondents were offered two options to choose from: winning a million with a 100% probability or winning 2 million with a 50% probability. From the point of view of rational calculation, both of these options are equivalent, but almost all respondents choose the first option.

Thus, people are not always guided by logic and mathematical calculations; sometimes they make a choice intuitively and prefer to have a guarantee of a minimum win than to take a risk for a large one. This paradox was named after its creator – “Allais's Paradox”. The author himself was awarded the Nobel Memorial Prize in Economics in 1988 for his work “In Search of an Economic Discipline” (A. Maurice, 1943).

At the end of the 20th century, Bernoulli's theory of the subjective value of wealth was further developed. D. Kahneman and A. Tversky (1979) significantly expanded his theory by explaining that the starting point of wealth is also important. For example, if the owner of four million wins 2 million instead of 8, he will most likely be upset. If this happens to the owner of one million, he will certainly be happy, because his wealth has increased threefold. In particular, Kahneman and Tversky explained in Prospect Theory that a person simply likes to win and does not like to lose. And this does not depend on the amount of winning or losing. Moreover, the effect of losing is felt much more vividly than from winning, all other things being equal. D. Kahneman and A. Tversky cite a ratio of 2.5 to 1. For Prospect Theory, developed by D. Kahneman and A. Tversky in 1979, the former received the Nobel Prize in Economics.

The theory itself consists of three provisions. The first proposition is that the attitude towards money is determined not simply by the presence of this sum in the subject's pocket, but by the circumstances under which this sum was received. To better understand their theory, let's give a simple example: a subject has a certain sum in his account, let's say 500 conventional units. From the point of view of economic theory, the consumer evaluates this sum in connection with the quantity and quality of goods that he can buy with it. In the course of experiments, A. Tversky and D. Kahneman found out that this is not all that the subject determines the value of money by. What is important is how he received this sum. If, for example, he played the lottery and expected to receive 10,000 conventional units, but received 500 conventional units, then he will probably be upset than happy, even if he spent 100 conventional units on the ticket.

The second proposition states that people feel losses more emotionally than gains. D. Kahneman and A. Tversky (1979) give the ratio of the effect of losses to the effect of gains as 2.5 to 1.

The third proposition of their theory is called the “Illusion of Sunk Loss”. It states that the more money we spend, the less we feel its additional losses. Let's give another example: a young man goes to a store with the intention of buying a new car. He talks to the manager, studies each car in detail and, finally, makes his choice. Then he goes to the checkout and here the manager offers him an additional service: installation of a Hi-Fi audio system. The buyer, without much thought, agrees to the purchase and buys the audio system along with the car. A year later, the happy owner of the vehicle comes to the same store and meets the same manager, who this time offers him to cover the seats of his car with leather. The cost of this service is equal to the cost of the audio system, moreover, our hero is a fan of leather goods and the presence of leather seats will bring him more pleasure than the audio system he bought earlier. But this time he does not agree to the purchase. What happened? The costs of these services are equal, while leather seats are preferable to the audio system for the client, but he bought the latter, while refusing to spend money on the former. From the point of view of “homo economicus” this is an insoluble paradox. However, D. Kahneman and A. Tversky (1979) found an explanation for this phenomenon from the point of view of psychology. According to them, in the first case, due to spending a large sum of money on a car, the buyer perceived the purchase of an audio system as less expensive. Indeed, in comparison with the price of a new car, the price of an audio system seems almost insignificant. In the second case, the buyer compares the cost of leather upholstery with virtually zero, because there is nothing else to compare the price of this service with. Accordingly, the purchase seems to him not so necessary and cheap. The effect of this effect is actively used by marketers in order to sell related products. A. Tversky and D. Kahneman are considered the founders of behavioral economics as a separate field of research. In 2002, cognitive psychologist D. Kahneman received the Nobel Prize in Economics “for his application of psychological methods to economic science, especially to the study of judgment and decision making under uncertainty”.

The next Nobel laureate who contributed to the development of behavioural economics was R. Thaler, Professor Emeritus of Behavioural Science and Economics at the University of Chicago Graduate School of Business. Thaler was an advisor to US President Barack Obama. Together with Cass Sunstein, he authored the book *Nudge: The Architecture of Choice* (2008), which discusses the Nudge Theory. C. Sunstein and R. Thaler (2008) definite nudge as an action that gently guides a buyer to make a certain choice. The concept also consists of several provisions. The main one is that

quite often the consumer makes purchases automatically, without thinking much about the usefulness of this purchase. Moreover, the consumer can be persuaded to make a certain choice, which is regularly used by sellers and marketers. For example, cheap candies or gum in grocery stores are most often located on the shelves near the checkout. This is done with the expectation that the consumer will definitely pay attention to these products when going to the checkout, due to their convenient location. In most cases, sweets and chewing gum are quite cheap, and the consumer, without thinking, buys them in addition to his main purchase.

In this example, we can identify the effect of two theories at once. From the “nudge theory”, the provisions on the inability and unwillingness of people to thoroughly plan their expenses and the effect of the nudge itself (in this case, the placement of products in a visible place) on the consumer demonstrate their effect.

But here we can also track the effect of the “Prospect Theory” developed by Thaler's colleague D. Kahneman et al. (1982), because if the consumer buys a chocolate bar in addition to a full basket of products, the provision on reducing sensitivity to losses will apply. "Nudge Theory", as well as all the above theories, makes up behavioural economics. Of course, there are many more theories themselves, but it was the concepts presented above that had a significant impact on the formation of behavioural economics as an independent discipline.

Thus, behavioural economics is a branch of economic theory that takes into account explicitly the psychological characteristics of human perception, judgment, and action when making certain economic decisions. Taking these characteristics into account makes it possible to improve the explanatory power of economic theory by introducing additional assumptions about the behaviour of agents, moving from the “hackneyed” assumption of rational agents maximizing utility as the only possible basis for economic theory to more realistic situations and, accordingly, to constructing models with higher explanatory power.

3. Conclusions.

Based on the above, we can come to the following conclusion. One of the approaches existing in modern theory, studying the irrational behaviour of various economic agents, is considered to be a relatively new science – behavioural economics, created at the junction of two sciences: psychology and economics, and has already formed into an independent direction.

Behavioural economics is one of the promising and actively developing areas in economics and management. Fundamental importance it is given to human actions in real life in real situations, and not to theoretical models or laws. Most of the concepts of behavioural economics have been tested and obtained experimentally.

At the moment, they are actively used by marketers in order to increase sales of products or services, as well as to transform the customer relationship management system (A. Kwilinski et al., 2020, 2022, 2023; Trushkina & Patlachuk, 2023). Of course, in addition to adherents, behavioural economics also has critics. They argue that in real conditions, a person, at least, strives for rationality. Another major criticism from traditional economists is that the concepts of behavioural economics are nothing more than a group of disparate phenomena identified in practice. There is no clear basic theory, yet that could generalize and build a unified system that would incorporate all the effects and cognitive biases. The development of behavioural economics itself is a fairly long process that lasted for three centuries. It

began with Bernoulli's theory. Subsequently, through the efforts of Daniel Kahneman, Amos Tversky, Richard Thaler and other economists, behavioural economics evolved to its current state.

The emerging and practically applicable directions of development of behavioural economics are very promising, and the results obtained from their application help to hope for a fairly successful solution to many pressing problems of humanity. It has been proven that it is impossible to refuse to consider and understand behavioural economics at the current stage of development, since the behavioural approach: is appropriate for considering the activities of various entities at different levels of management: as an individual and an organization, as well as markets and regions;

allows us to identify those manifestations of the underlying motives of the activities of various agents that cannot always be described from the standpoint of the accepted canons of traditional economics. In further studies, it is planned to perform a bibliometric and trend analysis of research on the behavioural economics' problems.

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