FACULTY OF ECONOMIC SCIENCIES AND LAW

THE JOURNAL CONTEMPORARY ECONOMY

Volume 10, Issue 2/2025

REVISTA ECONOMIA CONTEMPORANĂ

Vol. 10, Nr. 2/2025

”Independenţa Economică” Publishing
2025

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Piteşti, Calea Bascovului no. 2A, Argeş County, Romania, Phone/Fax: +00248-216427.
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EconPapers (RePEc), IDEAS, BASE, SCIPIO, OAJI, ResearchBib,
CEEOL (Central and Eastern European Online Library),
Index Copernicus International – ICI Journals Master List.

ISSN 2537 – 4222, ISSN–L 2537 – 4222

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AN EMPIRICAL ANALYSIS ON THE INCIDENCE OF SOME CATEGORIES OF TAXES ON INCOME REDISTRIBUTION IN THE EUROPEAN UNION

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Abstract. *Studying the effect of taxation on income inequality is an increasingly pressing issue, as fiscal policies directly influence the distribution of resources in an economy, and the role of fiscal policies in the context of increasingly frequent crises has increased both from the perspective of their ability to adjust economic and social aspects, and from the perspective of research concerns regarding their efficiency. Fiscal policy instruments such as taxes and expenditures, but also a series of institutional aspects, play an important role in the redistribution of resources. Through an appropriate methodology and a wide range of economic and social variables, their influence on income inequality in the European Union countries was examined during the period 2000-2023. The results of the models used highlight a significant relationship between certain fiscal variables and income inequality, measured by the GINI coefficient.*

Keywords: *taxes, public spending, inequality, GINI coefficient.*
JEL Classification*: H30; H5; I38.*

1. Introduction

Fiscal policy can significantly influence the GINI coefficient, by using appropriate fiscal instruments, governments can reduce or, in some cases, increase income inequality.
The specialized literature describes general mechanisms by which fiscal policy influences the GINI coefficient, mechanisms that we briefly present below.

Through the mechanism of the fiscal regime, namely through progressive taxation, income inequality can be reduced, decreasing the value of the GINI coefficient, by the fact that incomes are taxed progressively, on income levels, thus resulting in a higher tax for higher incomes and vice versa. These fiscal systems that have progressive taxation regimes contribute to a redistribution of income from people with high incomes to those with low incomes, which can significantly reduce economic inequality.

Through the mechanism of social transfer policies, which can include poverty alleviation aids, pensions, child allowances, a direct impact on the GINI coefficient can be generated.

A fiscal policy that allocates funds for social assistance and education for low-income families will reduce income inequality and influence the GINI coefficient in the direction of its decrease.

Subsidies for basic consumption (energy, public transport, housing) and investments in infrastructure (education, health, public housing) can reduce costs for low-income people and thus help reduce economic inequalities. For example, providing subsidies for education can help people from low-income families access quality education, improving their long-term income prospects, which can contribute to reducing inequalities and the GINI coefficient. Tax cuts for vulnerable groups, namely by reducing indirect taxes (e.g. VAT) on essential consumer goods, can help low-income people keep a larger proportion of their income. Also, tax exemptions for low-income people or providing tax deductions can support households in this situation, contributing to reducing inequality and, implicitly, the GINI coefficient.

The mechanism of taxes on wealth and capital (such as property, inheritance, and capital taxes) can contribute to the redistribution of income, as people with high incomes usually also own valuable assets or properties. For example, imposing a progressive wealth tax (higher for those who own more capital) can reduce the concentration of wealth and help reduce economic inequality, influencing the GINI coefficient in a downward direction.
These fiscal policy guidelines highlight the important role that it plays in influencing the GINI coefficient by regulating the distribution of income and wealth. A progressive and well-designed fiscal policy, which includes progressive taxes, targeted social transfers, and investments in public services, can contribute significantly to reducing inequalities and, implicitly, to lowering the GINI coefficient. On the other hand, a regressive fiscal policy, which does not support the redistribution of resources or does not address the needs of the most vulnerable social groups, can lead to increased inequalities and a higher GINI coefficient.

2. Problem description

The literature provides arguments for and against the above. For example, Clifton et al. (2020) demonstrated that income taxes and social contributions marginally reduced inequality in Latin American countries, providing a model for progressive fiscal policy. Similarly, Salotti and Trecroci (2018) showed that income and property taxes in OECD countries had a positive effect on income equalization.

In addition, government spending on education and health can influence inequality, being a way to support vulnerable populations. Odusola (2017) shows that in Africa, low levels of taxation and social spending reduce the redistributive impact of fiscal policy, highlighting the importance of health and education spending in reducing economic inequalities. However, Malla and Pathranarakul (2022) observed that in developed countries, increasing government size and public investment in education and health can, surprisingly, increase inequality. This contradictory effect can be explained by differences in the structure and efficiency of institutions, which cause the effective distribution of resources to vary significantly between developed and developing countries.

Institutional capacity also plays a very important role in how tax policies influence income inequality. Effective institutions can support equitable income distribution by properly implementing tax policies and allocating tax revenues to social programs targeting vulnerable groups. Albertus and Menaldo (2014) argue that a lack of institutional capacity can hinder the fair redistribution of resources, thereby amplifying inequality. Furthermore, Huynh (2021) notes that strong institutions moderate income inequality by ensuring a stable environment that favors investment and supports the equitable distribution of economic benefits.

Starting from the described mechanisms and the benchmarks in the specialized literature regarding the incidence of fiscal policy on income redistribution, in our approach we include a series of fiscal-budgetary variables, but also other economic-social variables, thus having the possibility of a more pronounced analysis, the possibility of not exclusively attributing the results of income redistribution to fiscal variables alone and of observing the contribution of other variables to income redistribution, so that the results obtained are consistent.

3. Methodology and data

The variables and sources used to study the impact of taxation on income inequality in European Union countries over the period 2000-2023 are listed in Table 1. The data include a wide range of economic and social indicators, which allow a detailed examination of the factors influencing income inequality. These indicators include the GINI coefficient, GDP per capita, inflation rate and unemployment rate, degree of openness of the economy, degree of urbanization. The variables come from internationally recognized sources, such as The Global Economy and Eurostat, thus ensuring the accuracy and comparability of the data across European Union member states.

Tabel 1. Dates description

Variable	Description	Variable
GINI	The GINI coefficient indicates the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households in an economy deviates from a perfectly equal distribution. The Lorenz curve plots the cumulative percentages of total income received by the cumulative number of beneficiaries, starting with the poorest individual or household. The GINI coefficient measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under this line. Thus, a GINI coefficient of 0 represents perfect equality, while a coefficient of 100 implies perfect inequality.	The Global Economy
L1. GINI	The lag of the GINI indicator to capture the persistence of inequality	The Global Economy
GDPpc	GDP per capita, a measure of economic prosperity	The Global Economy
INF	Inflation rate, impact on purchasing power and income distribution	The Global Economy
SOM	Unemployment rate, reflects the level of employment in the economy	The Global Economy
Opening	The degree of economic openness, defined by the volume of foreign trade	The Global Economy
Urban	Percentage of urban population, indicator of urbanization	The Global Economy
VAT	Value added tax, indicator of indirect taxation	Eurostat
Labor_Tax	Labor tax, which reflects contributions and taxes applied to wage income at the level of a single person, without children, who earns 50% of the average wage, who earns 127% of the average wage and for a couple with two children, in which one earns 100% of the average wage, and the second 67% of the average wage.	Eurostat
Profit_Tax	Corporate tax, which indicates the taxation of profits	Eurostat

The GINI coefficient values shown in Figure 1, which measure income inequality across European countries, vary considerably, illustrating important differences in income distribution. Countries with the lowest levels of inequality, such as Slovakia (21.6), Slovenia (23.4) and Belgium (24.2), indicate a more equitable income distribution, suggesting either effective redistribution through fiscal policies or a more pronounced balance of income between social segments.

At the opposite end, countries such as Bulgaria (37.2), Lithuania (35.7) and Latvia (34) have higher GINI coefficient values, indicating more pronounced income inequality. These differences reflect both variations in economic structure and social policies, as well as the impact of redistribution measures implemented in each country. In general, Western European countries tend to have lower inequalities, while in Eastern and Southeastern European states, inequality is more pronounced, highlighting the importance of economic interventions and policies tailored to the local context to reduce income disparities.

Figure 1. Income Inequality in 2023

Source: The Global Economy

A first step in data analysis is to examine the correlation matrix to identify potential multicollinearity issues between the explanatory variables. Multicollinearity occurs when independent variables are highly correlated with each other, which can negatively impact the precision and stability of coefficient estimates in regression models. This phenomenon can lead to increased standard errors and decreased statistical significance, making it difficult to interpret the individual effects of variables on the final result. Correlation analysis thus allows the detection of redundant or highly correlated variables, allowing for appropriate adjustments to reduce multicollinearity and obtain more robust models and more reliable conclusions.

As can be seen in Figure 2, the correlation coefficients between the explanatory variables are relatively low, suggesting that there is no strong correlation between the variables that could lead to multicollinearity issues. For example, the correlation between GDP per capita (GDPc) and the unemployment rate (SOM) is approximately -0.35, indicating a weak inverse relationship but not strong enough to cause concerns about multicollinearity. Another example is the correlation between the degree of urbanization (Urban) and labor taxation, which is only -0.02, demonstrating an almost non-existent relationship between these variables. These values suggest that the variables can be included together in the econometric model without generating distortions in the estimation of the coefficients, confirming the stability and interpretability of the results.

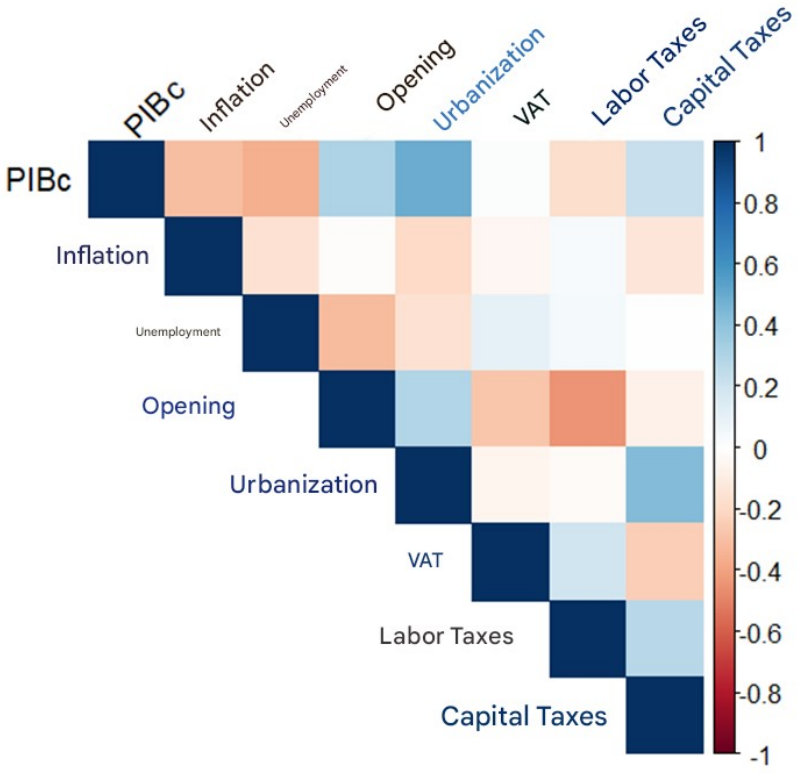

Figure 2. Correlation matrix of explanatory variables

Source: own processing in Python

The second step in our analysis is testing the stationarity of the time series in the context of panel data. This step is fundamental to avoid erroneous estimates and spurious relationships between variables, thus ensuring the robustness and relevance of statistical conclusions. In this sense, the use of the Levin-Lin-Chu (LLC) test is applicable and appropriate for the structure of panel data with a large number of units (countries) and periods, as it allows the estimation of a common AR parameter, adjusting for the specific characteristics of each unit. Through the LLC test, we evaluate the stationarity hypothesis in a way that takes into account the specific heterogeneity of the panel, providing a solid basis for further analyses.

The results of the Levin-Lin-Chu test presented in Table 2 indicate that all series used are stationary at the 99% significance level. Thus, the stationarity of the variables is ensured, allowing us to run the estimates without the risk of obtaining distorted results due to the presence of unit roots. This finding supports the validity of the econometric analysis, facilitating the obtaining of robust and consistent relationships between the variables included in the model.

Table 2. Stationarity testing

Variable	t-test value*	p-value
GINI	-3.2444	0.0006
GDP	-6.9724	0.0000
INF	-5.1817	0.0000
SOM	-4.3656	0.0000
Oppeness	-7.3255	0.0000
VAT	-4.6545	0.0000
Labor_tax	-4.1274	0.0000
Profit_tax	-4.0440	0.0000

4. Results

The results of the Arellano-Bond estimations are presented in Table 3. The choice of this dynamic model is justified by the need to control for endogeneity issues and individual fixed effects, given the panel structure of the data, which covers 27 countries over a 24-year period. The Arellano-Bond method is particularly appropriate in the context of data series that include lags of the dependent variable, as in the present case, where the lag term of the GINI (L1.GINI) is included to capture the persistence of inequality. Also, the tax variables (VAT, labor tax, corporate tax) are included separately in each of the models, to avoid the problems of multicollinearity that could arise if all were included simultaneously. Since these tax variables reflect different aspects of tax policy and have the potential to influence inequality and other economic factors in distinct ways, using them in separate models allows for a clearer understanding of the impact of each type of tax on income inequality.

Table 3. Regression results

Variable	Model 1	Model 2	Model 3
L1.GINI	0.2449***	0.2399***	0.2430***
GDPpc	-0.3990	-0.1592	-0.2769
INF	-0.0501**	-0.0538**	-0.0552**
SOM	0.1076***	0.1040***	0.1123***
Opening	-0.0139**	-0.0138**	-0.0122**
Urban	0.0053	0.0598	0.0232
VAT	0.0375		
Labor_tax		0.0949*	
Profit_tax			0.0223
Constanta	27.3338***	18.2293**	24.8926***

*Note: *,**,*** indicate statistical significance at the 10%, 5% and 1% thresholds, respectively*

The results of the regression models highlight a significant relationship between certain tax variables and income inequality, as measured by the GINI coefficient. First, the labor taxation in Model 2 presents a positive coefficient and is statistically significant ($p < 0.10$). This result suggests that higher labor taxation may contribute to increasing income inequality, by reducing the disposable income of middle and low-wage earners. From an economic point of view, this result suggests that a high tax burden on wage income may affect lower-income categories more, thus contributing to increasing inequality.

Second, the coefficient for corporate tax in Model 3 is not statistically significant, suggesting that corporate taxation does not have a clear effect on income inequality in this model. This result could indicate that the impact of profit taxation is either too small to influence income distribution, or that these revenues are concentrated in a narrow segment of the population, without significantly affecting the overall income distribution.

In addition to these fiscal variables, other economic variables included in the model – such as inflation (INF) and economic openness (Openness) – have significant effects and influence income inequality. The negative influence of inflation suggests that an increase in prices can reduce inequality, which can be explained by the implicit redistribution of income from higher income categories to the most vulnerable. Also, trade openness, with a negative and significant coefficient, emphasizes the importance of trade and global economic interaction in reducing income disparities, possibly due to increased access to economic opportunities for lower social categories.

5. Conclusions

Income redistribution and the reduction of social inequalities are important objectives of modern fiscal policies. The most effective policies are those that combine direct measures (such as progressive taxation and social transfers) with investments in social and economic infrastructure. Their implementation must be adapted to the specifics of each country, taking into account the socio-economic structure and level of development.

Regarding the relationship between labor taxation in Romania and the GINI coefficient, it is closely interconnected. By taxing labor, the state has the opportunity to redistribute income in society, reducing the discrepancies between different economic groups. However, the fiscal structure in Romania affects the efficiency of this process, by maintaining a flat-rate tax system on income since 2005, which led to a decrease in the tax burden for high incomes, but had a limited effect on low incomes. Social contributions remain among the highest in the EU, while European trends tend towards progressive taxation.

The impact of profit taxation in Romania on the GINI coefficient is limited by the low level of collection and the regressive structure of the tax system. Reforms that include progressivity, the elimination of inefficient exemptions and increased collection efficiency could contribute to reducing inequalities.

The relationship between VAT and the GINI coefficient can have a significant impact on income distribution. In Romania, the structure and level of VAT have a regressive effect on household income, which contributes to maintaining a high level of inequality. VAT contributes to financing the public budget, but has a regressive impact on household income, amplifying economic inequalities. Although the introduction of reduced rates and the use of collected revenues for social programs contribute to reducing this effect, a deeper reform of the VAT system, together with income redistribution measures, is necessary to reduce the negative impact on redistribution. In conclusion, the Romanian tax system favors

redistribution less compared to other states in the European Union, contributing to maintaining a relatively high level of inequality. A tax reform could reduce these discrepancies.

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HARMONIZATION OF THE ROMANIAN LEGISLATION WITH EUROPEAN POLICIES IN THE FIELD OF PREVENTION AND COMBATING MONEY LAUNDERING, IN THE FIELD OF CRYPTOASSETS

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Abstract: *Preventing and combating money laundering is a priority of the policies developed by the European Union in order to ensure a safe, transparent economic area and to prevent the use of certain financial instruments to disguise illicitly obtained proceeds or to finance organizations engaged in illegal activities. At the European and international level, one of the major money laundering risks identified is crypto-assets transactions, which were not covered by the legal regulations on the activities of issuing money or trading financial instruments. Activities in the crypto-assets market were not under the supervision of any national authority, and there was no registration or authorization of providers of exchange services between fiat currency and cryptoassets. In the framework of European policies, several regulations have been adopted to prevent and combat money laundering, but also to regulate the crypto-asset markets, regulations that need to be implemented in Romanian legislation.*

Keywords: *money laundering, market regulation, cryptoassets, cryptocurrency and cryptoassets exchange service providers.*
JEL Classification: *K20.*

1. General considerations

The development of regional policies to prevent and combat money laundering and terrorist financing has proven necessary as these phenomena are often transnational in nature and a national approach alone would not be effective in countering these criminal activities. In practice, international coordination and cooperation have proven to be necessary in order to achieve significant results.

A. At the international level, the Financial Action Task Force (FATF)[1] , which is the main international body in the fight against money laundering and terrorist financing. The Group was set up in 1989 by the G7[2] and issues recommendations to the states and regional bodies that are members of the organization.

Among the FATF's concerns is also to analyze the risks of the cryptoassets market to prevent and combat money laundering and terrorist financing, and the CryptoAssets Contact Group (VACG) has been set up for this purpose[3].

In 2019, the FATF developed the Guidance for a Risk-Based Approach to Virtual Assets (VA) and Virtual Asset Service Providers (VASp), which aims to explain how the FATF Recommendations on VA and VASp activities should be applied (FATF, 2019). The purpose of the guide is to help countries better understand how they should implement the FATF standards effectively and to consider the key principles underlying the FATF Recommendations that are relevant in the context of VA, such as: the objective-based

[1]The Financial Action Task Force
[2]The G7 is an international forum of the governments of economically, technologically and militarily developed countries: Canada, France, Germany, Italy, Japan, the United Kingdom of Great Britain and Northern Ireland and the United States of America,
[3]Virtual Assets Contact Group (VACG)

approach and functional equivalence, technological neutrality and future-proofing, and ensuring fair treatment of all VASp.

Both the public and private sectors should identify and assess the money laundering or terrorist financing risks that may arise in connection with:

- developing new products and new business practices, including new delivery mechanisms;
- use of new or emerging technologies for both new and existing products.

In the case of the private sector, such a risk assessment should be carried out prior to the launch of new products, business practices or the use of new or emerging technologies.

In 2020, the FATF produced the Virtual Assets Red Flag Indicators Report on money laundering and terrorist financing (FATF, 2020). These indicators have been grouped into five categories:

- Red flag indicators linked to transactions:
- Red flag indicators linked to trading patterns;
- Red flag indicators linked to anonymity;
- Red flag indicators about senders or recipients;
- Red flag indicators referring to the source of funds or wealth;
- Red flag indicators linked to geographical risks.

However, the FATF points out that these indicators are not exhaustive and are constantly evolving, so risk assessments also need to be dynamic.

In 2021, the FATF developed the Financial Proliferation Risk Assessment and Mitigation Guide. The document analyzes how virtual assets are being misused to potentially violate, fail to implement or avoid targeted financial sanctions (FATF, 2021).

The FATF notes that access to the formal financial system has become more difficult as a result of existing regulatory measures, so that various individuals and entities have used virtual assets as a means of evading internationally imposed financial sanctions. These individuals or entities, not having access to banking services, have found virtual assets attractive as they are not regulated. They used digital wallets from service providers in various countries to disguise the proceeds of various illicit activities, where transactions between cryptoassets and fiat currency could be traced and the amounts could not be recovered.

The guidance points out that identifying customer and transaction vulnerabilities is crucial to the risk assessments made by a financial or non-financial institution. At the same time, private firms should use the know-your-customer process, transaction monitoring and screening, as well as internal audit and regulatory findings. Additional sources of information may be used for risk assessment, such as: known domestic or international typologies, national risk assessments, supranational risk assessments, relevant sectoral reports published by competent authorities, relevant risk reports of other (especially neighboring) jurisdictions on their respective sectors, reports on violations of international sanctions, etc.

The paper recommends that cryptoasset service providers conduct risk assessments and prioritize among identified risks, with risk being considered as a function of threat, vulnerability and consequence. After conducting these assessments, they should track the evolution of risks, should consider adapting/calibrating/improving their policies, controls and procedures to effectively manage and mitigate the identified risks. At the same time, the guide recommends strengthening public-private cooperation.

All these documents are intended to provide practical tools for both the public and private sector in identifying, detecting and ultimately preventing criminal money laundering and terrorist financing activities involving VA.

B. At the European level, specific legislation has been adopted to prevent and combat money laundering, so that regulations are harmonized in all EU countries.

Thus they were adopted:

−Directive (EU) 2015/849 of the European Parliament and of the Council of May 20, 2015 on the prevention of the use of the financial system for the purpose of money laundering or terrorist financing, amending Regulation (EU) No 648/2012 of the European Parliament and of the Council and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC (OJ L 141, 5.6.2015)

−Directive (EU) 2024/1640 of the European Parliament and of the Council of May 31, 2024 on mechanisms to be put in place by Member States to prevent the use of the financial system for the purpose of money laundering or terrorist financing, amending Directive (EU) 2019/1937 and amending and repealing Directive (EU) 2015/849 (OJ L, 2024/1640, 19.6.2024). The repeal of Directive (EU) 2015/849 enters into force on July 10, 2027.

−Directive (EU) 2018/843 of the European Parliament and of the Council of May 30, 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purpose of money laundering or terrorist financing and amending Directives 2009/138/EC and 2013/36/EU (OJ L 156, 19.6.2018,).

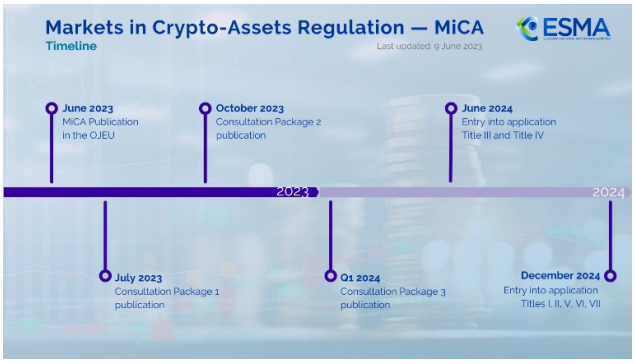
−Regulation (EU) 2023/1113[4] of the European Parliament and of the Council of May 31, 2023 on information accompanying transfers of funds and certain crypto-assets and amending Directive (EU) 2015/849 (OJ L 150, 9.6.2023).

−Regulation (EU) 2023/1114[5] of the European Parliament and of the Council of May 31, 2023 on crypto-asset markets and amending Regulations (EU) No 1093/2010 and (EU) No 1095/2010 and Directives 2013/36/EU and (EU) 2019/1937 (OJ L 150, 9.6.2023).

−Regulation (EU) 2024/1624 of the European Parliament and of the Council of 31 May 2024 on the prevention of the use of the financial system for the purpose of money laundering or terrorist financing (OJ L, 2024/1624, 19.6.2024). The Regulation shall apply from July 10, 2027, except in relation to the obliged entities referred to in Article 3(3)(n) and (o), to which it shall apply from July 10, 2029.

[4]Known under the acronym MiCAR
[5]Known by the acronym MiCA

Legislation adopted is mandatory on Member States, either by direct application or by transposition.



Source: https://www.esma.europa.eu/esmas-activities/digital-finance-and-innovation/markets-crypto-assets-regulation-mica

2. European policies to prevent and combat money laundering

At European level, common or specific policies have been adopted under adopted legislation, by the authorities responsible for preventing and combating money laundering, which have been given powers in relation to crypto-assets.

A. The role of the European Securities and Markets Authority (ESMA), is to oversee the functioning of financial markets to ensure investor protection, identify trends, issues and risks for these markets, help coordinate national market surveillance initiatives, facilitate the exchange of best practices, provide advice to national authorities[6] on how to address the specific issues facing these markets.

ESMA is also concerned about cryptoassets market developments and interference with traditional financial markets, as well as the protection of investors in these markets, which are known to be highly volatile. In this context, in November 2017 and February 2018, ESMA has issued joint warnings on cryptoassets to alert investors to the high risks of these instruments. The Authority is also cooperating with other international bodies with concerns in this area.

In September 2020, ESMA gave its opinion on regulating the cryptoassets market to set strict requirements for cryptoasset issuers and cryptoasset service providers.

With the adoption of MiCA, ESMA has been empowered to develop technical standards and guidelines containing specific provisions. On 17.12.2024, ESMA published the Final Report (JC, 2024) "Guidelines on conditions and criteria for the qualification of cryptoassets as financial instruments", guidelines which are addressed to competent authorities and cryptoasset service providers and have a 60-day implementation deadline.

The guidelines set out compliance and reporting obligations, as well as nine guidelines on the qualification of cryptoassets as financial instruments.

On December 10, 2024, ESMA together with the European Banking Authority (EBA) and the European Insurance and Occupational Pensions Authority (EIOPA) issued a Guideline on templates for explanations and opinions and the standardized test for cryptoassets, pursuant to Article 97(1) of Regulation (EU) 2023/1114 (MiCA Regulation) (JC, 2024). As stated in the text of the document - the Status of the Guideline - all "competent

[6]In Romania, this is the Financial Supervisory Authority

authorities, financial market participants and financial institutions should make every effort to comply with the Guideline".

The guidance aims for "a common approach for the regulatory classification of cryptoassets under the Regulation[7] respectively".

On 26.02.2025, ESMA published the Guidance[8] on procedures and policies, including customer rights, in the context of cryptoasset transfer services under the Markets in Crypto Assets Regulation (MiCA), relating to investor protection, which is addressed to competent authorities and cryptoasset service providers and has been developed in close cooperation with the EBA. The text of the document states that those to whom it is addressed should comply with this guidance.

The guidelines contain five guidelines for the actions of cryptoasset service providers, namely:

−sets out transparency obligations for cryptoassurance service providers, i.e. the information they must provide to customers before entering into a contractual relationship, in easy-to-understand language and a clear and simple form;

−establishes obligations to implement and maintain appropriate policies and procedures (including appropriate tools) on the conduct of the contractual relationship with customers (such as providing information on transaction amount, debit date, fees, charges, commissions, etc.). This information should be provided free of charge, if not provided more frequently than once a month;

−establishes obligations to implement and maintain appropriate policies and procedures regarding the cut-off times for instructions to transfer cryptoassets to be considered received on the same business day, maximum execution times depending on the cryptoasset transferred, reasonable estimates of the time interval or number of block confirmations required for the transfer of cryptoassets to be irreversible;

−establishes obligations to implement and maintain appropriate risk-based policies and procedures to determine whether and how to execute, reject, return or suspend a transfer of cryptoassets;

−establishes obligations to implement and maintain appropriate policies and procedures that set out the conditions of the cryptoasset service provider's liability to customers for unauthorized or improperly initiated or executed cryptoasset transfers.

B. The European Banking Authority (EBA, 2024), is an agency of the European Union whose role is to ensure the harmonization of the regulatory and supervisory framework for the banking sector throughout the Union in order to create an efficient and transparent single market for banking products. The EBA centrally manages information on banking supervision in the Member States in order to ensure a transparent framework of activity, financial stability and banking market discipline. The Agency promotes cooperation between national authorities and a transparent, simple and fair EU market that provides protection for consumers of financial products and services.

In the context of the regulation of the crypto-assets market, the EBA has been granted regulatory powers in relation to issuers of crypto-assets. Accordingly, on July 4, 2024, the Guidance on Information Requirements for Transfers of Funds and Certain Crypto-Assets pursuant to Regulation (EU) 2023/1113 ("Guidance on Travel Rules") was issued (EBA,

[7]MiCA Regulation
[8]ESMA 35-1872330276-2032

2024). This document contains guidance for VAsPs on how they establish procedures to detect and handle transfers of funds and cryptoassets that do not contain the required information on the payer/issuer and/or payee/beneficiary, and to ensure that these procedures are effective.

The guidance specifies what the VAsP must do to manage the risk of money laundering (ML) or terrorist financing (TF) when the necessary information on the payer, originator, payee or beneficiary is missing or incomplete.

The guidelines also issue guidance (EBA, 2024) specifying measures relating to the identification and assessment of money laundering and terrorist financing risks associated with the transfer of cryptoassets directed to or from an undisclosed address. The requirements set out in the Guideline relate to the reporting of transfers of funds and certain transfers of cryptoassets under MiCAR.

EBA has disseminated on 18.12.2024, the Guidance[9] on the templates to assist competent authorities in the performance of their duties in supervising compliance of issuers with their obligations under Titles III and IV of Regulation (EU) 2023/1114.

Competent authorities and financial institutions[10] must make every effort to comply with the guidelines, which set out compliance and reporting obligations.

3. Harmonization of the Romanian legislative framework with European policies in the field of preventing and combating money laundering

At national level, Law no. 129/2019 was adopted to prevent and combat money laundering and terrorist financing, as well as to amend and supplement some normative acts (Published in the Official Gazette of Romania, Part I, no 589 of July 18, 2019), which has undergone successive amendments in order to be brought in line with European legislation.

The most recent amendment was made by the adoption of Emergency Ordinance no. 10/2025 on amending and supplementing Law no. 129/2019 on preventing and combating money laundering and terrorist financing, as well as amending and supplementing certain normative acts (Published in the Official Gazette of Romania, Part I, no 589 of July 18, 2019).

According to the preamble of the legislative act, it transposes the amendments (Art. 38 of Regulation 2023/1113) made by Regulation (EU) 2023/1.113 of the European Parliament and of the Council of May 31, 2023 on information accompanying transfers of funds and certain crypto-assets and amending Directive (EU) 2015/849, which makes a number of amendments to Directive (EU) 2015/849 of the European Parliament and of the Council of May 20, 2015 on the prevention of the use of the financial system for the purpose of money laundering or terrorist financing, amending Regulation (EU) No. 648/2012 of the European Parliament and of the Council and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC.

The incorporation of these provisions into national law had to be completed by December 30, 2024. The transposition of EU directives is a fundamental obligation of EU Member States, and failure to comply by this date may lead to the European Commission

[9]EBA/GL/2024/16

[10]Unlike ESMA (which supervises VAsPs), the EBA supervises issuers of asset-backed tokens and e-money tokens in the crypto-assets area.

initiating infringement proceedings, followed by a referral to the Court of Justice of the European Union .[11]

The lack of this transposition led to contrary (incomplete) provisions in Law no. 129/2019 with those of the European legislation because Article 30[1] of the law referred only to the authorization of two categories of cryptoasset service providers, namely providers of exchange services between virtual currencies and fiat currencies and digital wallet providers, while MiCA establishes a broader regulatory framework for all categories of cryptoasset service providers (including issuers of cryptoassets).

With the adoption of GEO 10/2025, providers of cryptocurrency services are included in the category of financial institutions, and in the case of cross-border correspondent relationships involving the execution of cryptocurrency services, providers are obliged to adopt additional know-your-customer measures[12] , as follows:

a) determine whether the responding entity is authorized or registered;

b) collect sufficient information about the responding entity to fully understand the nature of its business and to determine, from publicly available information, the reputation of the entity and the quality of supervision;

c) to assess the controls in the area of prevention and combating money laundering and terrorist financing carried out by the respondent entity;

d) obtain senior management approval before establishing each new correspondent relationship;

e) document the responsibilities of each party to the correspondent relationship;

f) in the case of directly accessible crypto-asset accounts, ensure that the respondent entity has verified the identity of the customers who have direct access to the correspondent entity's accounts and has implemented KYC measures for these customers on an ongoing basis and is able to provide relevant KYC data to the correspondent entity upon request.

The legal requirements also stipulate that if crypto-asset service providers decide to terminate correspondent relationships, for reasons related to money laundering and terrorist financing risk management policy, they shall document and record their decision.

The regulatory act provides a reference rule to Article 3 of the MiCA on definitions:

−'*cryptoasset*' means a digital representation of a value or right that can be transferred and stored electronically using distributed ledger or similar technology

−"*cryptoasset service provider*" means a legal person or other enterprise whose occupation or business is the professional provision of one or more cryptoasset services to customers and which is authorized to provide cryptoasset services (excluding cryptoasset advisory services);

−"*cryptoasset service*" means any of the following services and activities relating to any cryptoasset:

(a) providing custody and management of cryptoassets on behalf of clients;

(b) operating a trading platform for crypto-assets;

(c) exchanging cryptoassets for funds;

(d) exchanging cryptoassets for other cryptoassets;

[11]According to the case law of the Court of Justice of the European Union, a Member State may not invoke any internal situation to justify failure to fulfill its obligations or to comply with the deadlines laid down by EU rules (preamble to the O.U.G. no. 10/2025)

[12]Art. I, point 8 of O.U.G. no. 10/2025

(e) execution of orders related to cryptoassets on behalf of clients;
(f) placement of crypto-assets;
(g) receiving and transmitting orders for cryptoassets on behalf of clients;
(h) providing advice on crypto-assets;
(i) providing cryptoasset portfolio management;
(j) providing cryptoasset transfer services on behalf of clients;

It also defines that an "*untrusted address*"[13] means distributed registry address that is not linked to either:

(a) a crypto-asset service provider;
(b) an entity which is not established in the Union and which provides services similar to those of a cryptoasset service provider.

Cryptoasset service providers are required to identify and assess the money laundering and terrorist financing risk associated with transfers of cryptoassets to or from an undisclosed address.

O.U.G. no. 10/2025, gives the Financial Supervisory Authority exclusive regulatory, supervisory and control powers[14] , regarding the application of Law no. 129/2019 on cryptoasset service providers: central securities depositories, investment firms, market operators, management companies of undertakings for collective investment in transferable securities or alternative investment fund managers applying for authorization to provide cryptoasset services, according to art. 60 of Regulation (EU) 2023/1.114.

At the same time, the competences of the National Bank of Romania regarding the exclusive powers of supervision and control, on a risk-based basis, of compliance with the provisions of Law no. 129/2019 are extended to cryptoasset service providers, which are also credit institutions or electronic money institutions and which apply for authorization to provide cryptoasset services, in accordance with the provisions of Article 60 of Regulation (EU) 2023/1.114.

Another element of legislative novelty is the repeal of Article 30^1 of Law 129/2019, which provided that authorization and/or registration of providers of exchange services between virtual currencies and fiat currencies and providers of digital wallets is required. Therefore, according to the new provisions, cryptoasset providers are only subject to regulation, supervision and control, but additional obligations are set for them and they are still required to submit suspicious transaction reports.

4. Conclusions

We can conclude that the field analyzed is a dynamic one, and legislative regulation must keep pace. Practice has shown that there is a need for continuous improvement of the legislation so that the prevention and combating of money laundering is effective and adapted to the evolution of the financial system.

The crypto-assets market is characterized by high volatility, which can affect customers, and this was the rationale behind the adoption of the new regulations.

It can be seen that the new legal act brings significant changes by broadening the notion of cryptoasset providers, defining cryptoassets and establishing national competences in the regulation, supervision and control of the cryptoasset market.

[13]By a rule of reference to Art. 3 of MiCAR - definitions
[14]Art. 1, point 12 of O.U.G. no. 10/2025

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15. Regulation (EU) 2023/1114[16] of the European Parliament and of the Council of May 31, 2023 on crypto-asset markets and amending Regulations (EU) No 1093/2010 and (EU) No 1095/2010 and Directives 2013/36/EU and (EU) 2019/1937 (OJ L 150, 9.6.2023).

[15]Known under the acronym MiCAR
[16]Known by the acronym MiCA

16. Regulation (EU) 2024/1624 of the European Parliament and of the Council of 31 May 2024 on the prevention of the use of the financial system for the purpose of money laundering or terrorist financing (OJ L, 2024/1624, 19.6.2024). The Regulation shall apply from July 10, 2027, except in relation to the obliged entities referred to in Article 3(3)(n) and (o), to which it shall apply from July 10, 2029.

INTERDISCIPLINARY PERSPECTIVES ON VULNERABILITY: A COMPARATIVE ANALYSIS OF DEFINITIONS AND CONCEPTUAL IMPLICATIONS

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Abstract: *This paper explores the concept of vulnerability from an interdisciplinary perspective, highlighting its complexity and evolving nature in academic and lexicographic contexts. Starting with the etymology of the term—literally meaning "the capacity to be wounded"—the study examines how its meaning has expanded beyond physical dimensions to encompass psychological, social, economic, legal, and ecological aspects. The comparison of definitions brings together a wide range of definitions from renowned dictionaries and academic literature, identifying the advantages and limitations of each approach. The findings show that general definitions offer clarity and versatility but often overlook contextual and causal factors. In contrast, academic definitions tend to be more comprehensive, integrating elements such as adaptive capacity, resilience, uncertainty, and affective dimensions, yet they can become overly abstract or difficult to apply in practice. A central challenge is balancing specificity with general applicability, and acknowledging both the universal nature of vulnerability and the need for targeted interventions for disadvantaged groups. The paper emphasizes the importance of an interdisciplinary approach to defining vulnerability, as well as the ongoing conceptual adaptation required in response to emerging global risks and social transformations. It also stresses the essential role of context in using the term, suggesting that no single, universally valid definition exists—only formulations tailored to specific analytical, policy, or practical objectives. This study thus contributes to a nuanced understanding of a key concept in public policy, social intervention, and academic research. The paper was elaborated within the framework of the "Young researchers 2024-2025" competition project 24.80012.0807.09TC "Strengthening scientific and methodological support for reducing social vulnerability by increasing the level of financial inclusion of low-income groups" (2024-2025).*

Keywords: *vulnerability, definitions, interdisciplinarity, resilience.*
JEL Classification: *B41, D63, Z13.*

1. Introduction

The concept of vulnerability has become a cornerstone in contemporary academic, policy, and humanitarian discourses. From climate change and social inequality to legal exclusion and digital risk, vulnerability shapes how we understand exposure to harm and the capacity to respond to it. The term itself, derived from the Latin vulnerabilis, meaning "capable of being wounded", has evolved significantly over time. Originally denoting physical injury, its scope has expanded to encompass psychological, economic, legal, and systemic susceptibility to adversity. Given its growing relevance across disciplines, vulnerability is far from a uniform or static concept. It is multifaceted, context-dependent, and shaped by the intersection of structural conditions and individual experiences. As such, defining vulnerability presents both conceptual and practical challenges. This section explores a range of definitions drawn from dictionaries and academic sources, highlighting the advantages and limitations of each. Through this comparative analysis, we aim to identify the key dimensions of vulnerability and propose a flexible yet operational framework suitable for interdisciplinary research and applied practice.

2. Methodology

This study employs a qualitative, exploratory research design, focused on the conceptual analysis and typological classification of vulnerability as presented in academic literature and authoritative reference sources. The objective is to synthesize and evaluate diverse definitions of vulnerability across disciplines, highlighting their applications, limitations, and conceptual evolution. The research methodology is rooted in documentary analysis, which includes: lexical and etymological sources, such as major dictionaries (DEX, Merriam-Webster, Oxford, Cambridge, Larousse), to trace the historical and linguistic origins of the term; academic literature, drawing from peer-reviewed journal articles; a comparative matrix was constructed to systematically evaluate definitions based on criteria such considered aspects, advantages, and disadvantages. This approach enables a multi-dimensional analysis, allowing the study to capture both the universality and specificity of vulnerability in different theoretical and applied contexts. Sources were selected based on relevance to key dimensions of vulnerability (ecological, social, economic, psychological, legal, and digital). As limitations, this study does not include primary data collection or empirical fieldwork. Instead, it relies entirely on secondary sources. While this approach enables a comprehensive conceptual review, it may not capture the full diversity of lived experiences of vulnerability in specific communities or cultural contexts. Future studies may benefit from integrating qualitative interviews, case studies, or participatory research to complement and ground the conceptual findings.

3. Results and discussions

The word *vulnerability* originates from the Latin *vulnerābilis*, having entered the Romanian language through French (vulnérabilité). Its root, *vulnus* (plural: vulnera), meant *wound* or *injury*[17], while the suffix *-abilis* indicated ability or capacity. Thus, vulnerabilis literally means *capable of being wounded* or *susceptible to injury*. Later, in both French and English, although the core meaning was preserved, the original sense was expanded, often being used metaphorically to describe emotional, physical, or systemic susceptibility to harm or damage[18].

Table 1 presents a wide range of perspectives on vulnerability, from environmental and social aspects to legal and psychological dimensions. This diversity reflects the multifaceted nature of vulnerability, which can be understood and approached from various angles, depending on the context and purpose.

[17] In Proto-Indo-European, *wel-* meant "to break, to hit, or to wound."
[18] *To harm* has a broader and more formal range, while *to hurt* is more specific to concrete traumas or injuries, whether physical or emotional.

Table 1. **Comparative analysis of vulnerability definitions and their advantages and disadvantages**

Authors/ source	Definition	Considered aspects	Advantages	Disadvantages
DEX '09 (2009)	The trait of being vulnerable	General, non-specific	Simple, easy to understand	Lacks specificity; does not provide context or details regarding vulnerability factors
Cambridge Dictionary	The quality of being vulnerable (= able to be easily hurt, influenced, or attacked) or something that is vulnerable	General, relation to external risks	Clarity and broad applicability	Lacks a detailed perspective on causal factors
Larousse Dictionary	The vulnerable nature of something or someone; the state of a vulnerable person	Individual, relation to personal condition	Highlights individual condition	Lacks details on circumstances or conditions of vulnerability
Merriam-Webster Dictionary	The quality or state of having reduced resistance to an external agent; the state of being left without shelter or protection from something harmful	Relation to protection and risks	Includes aspects related to protection and physical vulnerability	Focus on material conditions without integration of other factors
Oxford English Dictionary	The quality or state of being vulnerable, in various senses	General	Versatility, applicable in multiple fields	Lacks specificity to guide analysis
Adger (2006)	The state of susceptibility to harm due to exposure to environmental and social stresses and lack of adaptive capacity	Environmental change, social change, adaptive capacity	Comprehensive, considers both environmental and social factors; emphasizes adaptive capacity	Too broad, encompassing too many aspects
Wolf et al. (2013)	A possibility of harm in the future	Future risk	Simple and clear; easy to understand and apply in various contexts	Lacks details; does not specify types of harm or involved factors
Havrilla (2017)	The condition of being exposed or unprotected, with inherent components of risk and resilience	Exposure, protection, risk, resilience	Emphasizes risk and resilience; acknowledges the role of protection	Too focused on the dichotomy of protection versus exposure
Thekdi and Aven (2021)	The combination of consequences and uncertainties, considering the occurrence of a threat or set of threats	Consequences, uncertainties, threats	Highlights the role of uncertainty; considers multiple threats	Too focused on theoretical aspects rather than practical implications
Rozmarin	The affective pattern that	Power	Unique	Complex and

(2021)	derives from affective encounters with formations of power that limit and hinder life; an affective response marking the micro-vital connections of bodies, allowing transformation and creativity to transcend stable subject positions	formations, affective responses, transformation, creativity	perspective, considers affective and creative dimensions; emphasizes transformative potential	abstract; difficult to apply in practice
Fernandes, Ranchordas and Beck (2024)	The susceptibility to being placed in a position of economic, social, ecological, or legal disadvantage, with potential harm as a result; a state that any individual may experience rather than a label attributed to disadvantaged groups	Economic, social, ecological, legal aspects, universality	Inclusive; recognizes vulnerability as a potential state for all individuals; multifaceted	Dilutes focus on specific vulnerable groups; breadth hinders targeted interventions

Source: Elaborated by author

One of the key challenges is balancing the breadth and specificity of definitions of vulnerability. The definitions of vulnerability provided by the analyzed dictionaries reflect a wide range of perspectives, from simple general descriptions to attempts at capturing more applicable aspects of the concept. DEX '09 (2009) defines vulnerability as "the quality of being vulnerable," offering an extremely general formulation. This simplicity makes it accessible and easy to understand, but at the same time, it limits its usefulness in contexts that require a detailed understanding or concrete application. The lack of further description of causal factors or the impact of vulnerability makes this definition less suitable for complex studies or practical interventions. The Cambridge Dictionary expands on this approach by including the relationship with external risks, defining vulnerability as "the quality of being easily hurt, influenced, or attacked." This definition provides clarity and broader applicability, making it easy to integrate into various social or economic contexts. The Larousse Dictionary shifts the focus toward the individual condition, describing vulnerability as "the vulnerable nature of something or someone" and "the state of a vulnerable person." This approach highlights the personal aspects of vulnerability, which is useful in situations requiring understanding at the individual level. However, this definition does not provide details regarding the specific circumstances or external conditions that generate vulnerability. The Merriam-Webster Dictionary adds a material and protection-related dimension, defining vulnerability as "the state of having reduced resistance to an external agent" and "the state of being left without shelter or protection from something harmful." This makes the definition more specific and useful in contexts involving tangible risks, such as physical or material threats. Nevertheless, it overlooks other essential factors such as social, emotional, or environmental elements that are crucial for a more comprehensive understanding. The Oxford English Dictionary offers a versatile and inclusive definition, describing vulnerability as "the quality or state of being vulnerable, in various senses.". This approach is useful due to its applicability across multiple fields but suffers from a lack of specificity, making it difficult to apply in situations that require a more targeted approach. In the scientific literature, broader definitions such as those of Adger (2006) and Fernandes, Ranchordas and Beck (2024)

provide comprehensive views that include multiple factors, but they are often too general for targeted applications. On the other hand, simpler definitions like that of Wolf et al. (2013) offer clarity and ease of application but lack the depth necessary for nuanced analysis. Several definitions highlight the role of adaptive capacity and resilience (e.g., Adger (2006), Havrilla (2017)). These aspects are essential for understanding how individuals and communities can respond to and recover from vulnerabilities. Emphasizing adaptive capacity and resilience adds a dynamic component to the concept, focusing not only on the state of vulnerability but also on the potential to overcome it. Definitions such as that of Rozmarin (2021) introduce complex and abstract concepts, such as formations of power and affective responses. While these offer a deeper theoretical understanding, they present challenges for practical application, especially in policy formulation and intervention design. Practicality is crucial for definitions intended for use in real-world contexts, such as disaster management or social policies. The varied definitions underscore the importance of context in understanding and applying the concept of vulnerability. Different situations may require different definitions. For example, environmental policies may benefit from Adger's comprehensive approach, while social interventions might find the simplicity of Wolf et al. (2013) more effective. The definition by Fernandes, Ranchordas and Beck (2024) is noteworthy for its inclusive nature, recognizing vulnerability as a condition that anyone can experience. This universality can encourage a more empathetic and comprehensive approach to addressing vulnerabilities, but it may also dilute the focus on specific groups that require targeted support. The definitions demonstrate the interdisciplinary relevance of vulnerability. They incorporate elements from environmental science, social sciences, psychology, and other fields. This interdisciplinary approach is beneficial for developing holistic strategies to address vulnerability but also requires collaboration across disciplines. The inclusion of recent definitions (e.g., Thekdi and Aven (2021); Rozmarin (2021); Fernandes, Ranchordas and Beck (2024)) indicates that the concept of vulnerability is continuously evolving. As new challenges and understandings emerge, definitions are adapted to better capture the nuances of vulnerability in contemporary contexts.

From the analysis of vulnerability definitions, we can identify its key dimensions: ecological, social, economic, psychological, and legal. Thus, vulnerability is a complex and multifaceted concept that cannot be fully understood through the lens of a single discipline. Interdisciplinary approaches allow for a more holistic and nuanced understanding, integrating insights from various fields to address both the causes and consequences of vulnerability, as well as the potential pathways for resilience and empowerment. Ecological vulnerability can be referred to the susceptibility of natural systems and communities to environmental risks such as climate change, natural disasters, pollution, and resource depletion. This dimension highlights how ecosystems, and the people who depend on them, can be affected by environmental degradation or abrupt ecological shifts. A comprehensive review in Environmental Management proposes an interdisciplinary approach to assess ecosystem vulnerability, emphasizing the integration of ecological and socio-economic factors (Weißhuhn, Müller, Wiggering, 2018). The authors emphasized the importance of considering both biophysical and human dimensions to develop effective management strategies. Additionally, a bibliometric analysis provides an overview of research trends in ecological vulnerability, highlighting the increasing attention to this field (Chen et al., 2021). It highlighted an increasing focus on climate change impacts and the need for standardized assessment methods.

Social vulnerability encompasses the conditions and structural inequalities that make certain individuals or groups more susceptible to harm. Factors such as age, gender, disability, ethnicity, or social status can influence one's exposure to risks and access to resources and support. This dimension is especially relevant when considering marginalized or disadvantaged populations. A scoping review published in BMC Public Health characterizes various social vulnerability indices, discussing their composition and applications (Mah et al., 2023). This scoping review revealed a lack of consensus on the components included. The study called for standardized approaches to enhance comparability and applicability in policy-making. Another systematic review explores the relationship between an Social Vulnerability Index and health outcomes in the United States, underscoring the index's relevance in public health research (Higginbotham et al., 2025). It found that it was frequently used to predict health outcomes, with higher scores correlating with adverse health events. The study recommended integrating the index into public health planning to address disparities.

Economic vulnerability reflects the instability or precariousness of individuals, households, or communities in terms of income, employment, access to markets, or financial security. Economic shocks, unemployment, or poverty can significantly reduce an individual's ability to cope with external stressors and recover from adverse events. A survey in Sustainability reviews concepts and measurements related to economic vulnerability and resilience to natural hazards, offering insights into how economies can prepare for and respond to such events (Noy and Yonson, 2018). It emphasized the importance of adaptive capacity and proactive policy measures in mitigating economic impacts of disasters. Briguglio et al. (2008) developed an Economic Vulnerability Index (EVI) to quantify countries' susceptibility to external economic shocks, highlighting the significance of structural factors and advocating for policies enhancing economic resilience.

Psychological vulnerability refers to a person's emotional or mental susceptibility to harm, which can result from trauma, chronic stress, social isolation, or mental health conditions. This dimension is essential for understanding how vulnerability affects inner well-being, resilience, and the capacity to cope with adversity. Yamaguchi et al. (2023) examined the association between psychological vulnerability and stress coping strategies among Japanese university athletes, providing insights into how vulnerability influences coping mechanisms. It found that higher psychological vulnerability was associated with maladaptive stress coping strategies, suggesting the need for targeted interventions to enhance coping mechanisms. Harpviken (2020) discusses psychological vulnerabilities and extremism among Western youth, highlighting factors that contribute to radicalization. It identified as factors such as identity crises and perceived injustice, and recommended comprehensive approaches addressing these underlying issues.

Legal vulnerability involves the lack of legal protection or access to justice, as well as exposure to discriminatory laws, policies, or institutional practices. It can also arise from undocumented status, statelessness, or being part of a legally unrecognized group. This dimension emphasizes the role of legal frameworks in safeguarding or, conversely, endangering vulnerable populations. Moen, Hee Åker and Gulati (2024) explores police officers' experiences when interacting with individuals with intellectual disabilities, shedding light on legal vulnerabilities faced by this population. Through interviews with police officers, this study emphasized the need for improved training and legal safeguards to protect this vulnerable group. Additionally, Siegel et al. (2021) introduced the Legal Vulnerability Model

for same-sex parent families, linking legal recognition with negative family outcomes, advocating for legal reforms to support family well-being.

A relatively new form of vulnerability is the digital vulnerability, that refers to the susceptibility of individuals and groups to harm or exploitation within digital environments. This concept has gained prominence due to the pervasive integration of digital technologies into daily life, leading to new forms of exposure and risk. Unlike traditional vulnerabilities, which often stem from inherent personal characteristics or socio-economic factors, digital vulnerability is context-specific and arises from interactions within digital spaces. It encompasses various dimensions, including exposure to manipulative design, data surveillance and privacy risks, algorithmic bias and discrimination. Users may encounter interfaces designed to exploit cognitive biases, leading to unintended decisions or actions. These manipulative designs, often termed "dark patterns," can compromise user autonomy and privacy. The extensive collection and analysis of personal data through practices like dataveillance (”data+surveillance”, monitoring and collecting data) can result in privacy infringements and unauthorized use of information. This continuous monitoring can lead to a state where individuals feel perpetually observed, affecting their online behavior. Automated systems and algorithms may inadvertently perpetuate biases, leading to unfair treatment or discrimination in areas such as employment, lending, and law enforcement. DiPaola and Calo (2024) introduced the concept of socio-digital vulnerability, emphasizing how mediated environments can interfere with individuals' decision-making processes and social interactions. They argue that vulnerability is not solely an inherent trait but can be contextually induced by digital architectures. Grochowski (2024) examined how digital vulnerability manifests in consumer settings, particularly in a post-consumer society where traditional consumer protections may be inadequate. The study calls for a reevaluation of legal frameworks to address these emerging challenges. Mitigating digital vulnerability requires a multifaceted approach. Educating users about potential risks and manipulative tactics in digital spaces can empower them to make informed decisions and recognize exploitative designs. Developing and enforcing regulations that address data privacy, algorithmic transparency, and consumer protection can help safeguard individuals from digital exploitation. Encouraging designers and developers to adopt ethical principles in creating user interfaces and algorithms can reduce the prevalence of manipulative and harmful digital environments. Thus, digital vulnerability represents a critical area of concern in the modern digital landscape. Addressing it necessitates collaborative efforts from policymakers, technologists, and educators to create safer and more equitable digital experiences for all users.

We need to say that the concept of vulnerability plays a central role in disciplines ranging from environmental science to social policy and digital ethics. However, a tension exists between defining vulnerability in a general, abstract sense versus developing highly specific, contextualized definitions. A generalist definition of vulnerability refers to a broad, overarching understanding that can be applied across different fields and situations. It usually emphasizes susceptibility to harm; lack of capacity to anticipate, to cope with, or to recover from adverse events; exposure to risks or hazards. Such definitions are useful for creating universal frameworks or indices (e.g., UN disaster vulnerability metrics); making cross-disciplinary comparisons; supporting broad policy initiatives. At same time, these definitions can be too vague to capture the specific, lived realities of vulnerable groups in different settings.

A specific or contextualized definition focuses on how vulnerability manifests in specific environments, populations, or circumstances—for instance, psychological vulnerability in adolescents or legal vulnerability in refugee populations. Such definitions highlight power relations, historical context, and situational variables, are better suited to designing targeted interventions, reflect the fluid and dynamic nature of vulnerability (e.g., how digital platforms create new types of harm), but they may lack comparability across cases and risk being overly narrow or fragmented.

We should mention that both approaches have value. A hybrid model—using a general framework supplemented with contextualized analysis—may offer the most balanced way to define and respond to vulnerability in today's complex world.

In recent decades, wars, forced migration, and significant geopolitical transformations have increasingly challenged and reshaped the way we define and understand vulnerability. These global phenomena have exposed limitations in traditional frameworks and pushed scholars and policymakers to reconsider the dimensions, drivers, and consequences of vulnerability. Armed conflicts generate complex layers of vulnerability that go beyond physical harm. They affect entire populations through: displacement and destruction of livelihoods, breakdown of institutional and legal protections, increased exposure to gender-based violence and psychological trauma. These conditions require vulnerability to be understood not just in terms of individual frailty, but as a structural and political condition, deeply embedded in systems of violence and governance. Forced migration, whether due to war, persecution, or climate crises, has introduced new categories of vulnerable populations, such as: stateless individuals, asylum seekers and refugees, internally displaced persons. These groups often face multi-layered vulnerabilities: legal (lack of rights), social (discrimination), economic (poverty), and psychological (trauma). As such, the traditional definitions of vulnerability based on static characteristics are no longer adequate. The rise of nationalism, shifting alliances, and changing global power dynamics also reshape vulnerability. Vulnerability is increasingly politicized, with certain groups labeled as threats rather than protected populations. Digital and informational vulnerabilities emerge in contexts of hybrid warfare and disinformation campaigns. Access to humanitarian aid and international protection becomes contingent on shifting diplomatic relations. These evolving global realities demand a conceptual redefinition of vulnerability—from a passive, individual trait to a dynamic, context-dependent condition, shaped by intersecting forces of conflict, displacement, and power. The new paradigms of vulnerability must consider legal status, political agency, and transnational structures that either protect or marginalize affected populations.

Based on the synthesis of literature and evolving global dynamics, we propose the following operational definition of vulnerability - a dynamic condition arising from the interaction between individual or group characteristics and external stressors - structural, environmental, or situational, which reduces the capacity to anticipate, cope with, or recover from harm. To capture the complexity of this phenomenon, a typology can be helpful. The following categories are proposed:

- structural vulnerability, rooted in systemic inequalities and long-term conditions such as poverty, discrimination, legal exclusion, or lack of institutional support.
- transitory vulnerability, temporary or situational, arising from acute events such as natural disasters, job loss, illness, or displacement.

- self-perceived vulnerability, based on individuals' subjective sense of risk, fear, or insecurity, regardless of objective conditions; this is especially relevant in mental health, digital spaces, or identity-based contexts.

One of the central conclusions is that vulnerability cannot be fully understood without reference to context. Cultural, political, economic, social, legal, psychological and digital environments all shape how vulnerability is produced and experienced. Therefore, any operational use of the term, whether in research, policy, or practice, must be sensitive to the specific context in which it is applied. Conceptual flexibility is not a weakness but a strength. Rather than seeking a one-size-fits-all definition, future work should embrace pluralistic and intersectional models of vulnerability that can adapt to complex realities.

4. Conclusions

Vulnerability is a dynamic, multifaceted concept shaped by structural, contextual, and individual factors. No single definition can fully capture its complexity. An interdisciplinary and context-sensitive approach is essential for effective analysis, policy, and intervention. A hybrid model—combining general frameworks with specific applications—offers the most robust foundation for understanding and addressing vulnerability in a changing world. As recommendations for future research and practical applications of vulnerability concept we can mention as following: to develop interdisciplinary and context-sensitive models that integrate psychological, legal, economic, and technological dimensions of vulnerability; to focus on emerging forms of vulnerability, such as those related to digital environments, algorithmic governance, or climate-induced displacement; to prioritize participatory research that includes the voices of vulnerable communities in defining their own needs and risks; to design adaptive and inclusive welfare policies that recognize different types of vulnerability, especially structural and transitory; to integrate vulnerability assessments into public service planning, particularly in healthcare, housing, education, and digital access; to promote resilience-building strategies at the local level, including education, peer-support systems, and legal empowerment; to support community-led vulnerability mapping to identify and address context-specific risks; to use multidimensional vulnerability indices that go beyond demographic data to include social networks, legal status, and self-perceived insecurity; to apply these assessments in disaster preparedness, public health planning, and urban development.

Note: *The paper was elaborated within the framework of the "Young researchers 2024-2025" competition project 24.80012.0807.09TC "Strengthening scientific and methodological support for reducing social vulnerability by increasing the level of financial inclusion of low-income groups" (2024-2025).*

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ACCESS TO FINANCIAL SERVICES AMONG LOW-INCOME POPULATION GROUPS: AN APPLIED ANALYSIS OF FINANCIAL INCLUSION IN THE REPUBLIC OF MOLDOVA

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Abstract. *Financial inclusion is one of the key elements that can contribute to achieving the sustainable development goals, ensuring independence, protection, and the opportunity for well-being for all social groups. This study analyzes the access possibilities to financial products for low-income groups in the Republic of Moldova. The research objective is to determine the extent to which individuals with low incomes can access financial products. The study is based on bibliographic research, documentary analysis, and statistical data analysis covering the period 2020–2024. Indicators for measuring the level of financial service access were used, as well as comparative methods with other countries. The results show that the main barriers to financial inclusion stem from low income levels and a lack of financial education, especially in rural areas. The conclusions of this study will contribute to the development and implementation of effective tools and programs for financial inclusion, aimed at reducing the vulnerability of low-income groups and improving their financial capacity, which will result in increased autonomy and financial stability for these groups, as well as greater adaptability to economic changes and financial risks.*

Keywords: *financial inclusion, low income, vulnerability.*
JEL Classification*: G40, I2, I32.*

1. Introduction

Access to financial services is essential for full and active participation in economic and social life.

The lack of access or the inefficient use of such services affects not only individuals, but also entire communities, exacerbating social inequalities and limiting economic development potential. Financial inclusion - defined as access to and effective use of a wide range of quality financial services, at reasonable costs, for all population segments—is globally recognized as a crucial factor in reducing poverty, promoting economic prosperity, and ensuring financial stability. Therefore, financial inclusion is not only an important right of citizens, but also a necessity for building a fair and sustainable social and economic environment.

In this context, initiatives to promote access to and the efficient use of financial services must be tailored and accessible to the entire population, with a particular focus on vulnerable groups, in order to combat exclusion and support social cohesion. This research focuses on low-income groups in the Republic of Moldova - a category of people who often face significant barriers in accessing financial services, such as low levels of financial and digital literacy, rigid regulatory frameworks, underdeveloped infrastructure, high costs of financial services, and insufficient income. Consequently, there is an urgent need to develop customized financial education programs, to adapt financial products and services to the

specific needs of vulnerable populations, and to create a policy framework that supports financial inclusion.

The purpose of this research is to identify the extent to which low-income individuals in the Republic of Moldova access financial products and services, taking into account the country's specific economic and social conditions. In addition, the study aims to analyze the impact of financial inclusion on the economic well-being of vulnerable groups and to identify the policies and strategies that can enhance financial inclusion in the Republic of Moldova.

This paper is structured into five chapters, which include the introduction, literature review, description of the methodology and data used in the research, the results obtained, and final conclusions.

2. Literature review

Research on financial inclusion begins with the concept of financial literacy, which refers to the knowledge and understanding of financial concepts and risks, as well as the skills and attitudes needed to apply such knowledge and understanding in order to make effective decisions across a wide range of financial contexts. The ultimate goal is to improve the financial well-being of individuals and society and to facilitate active participation in economic life (OECD, 2021).

The scientific importance of financial inclusion is evidenced by the existence of specialized journals such as the Journal of Financial Literacy and Wellbeing, edited by Lusardi and Messy (Lusardi, 2023) and published by Cambridge University Press.

Identifying the factors that hinder financial inclusion is one of the key areas of study in this field.

Research on the interaction between financial inclusion and social inequalities can be found among scholars in Spain (Marta de la Cuesta-González, 2021). These researchers analyze the relationship between vulnerable financial consumers and banking institutions in Spain, highlighting the challenges related to access, usage, and perception caused by banking pressure, lack of financial education, and precarious personal situations.

Vulnerable individuals face unfair treatment, disadvantageous fees, and a lack of trust in institutions, which often leads to financial self-exclusion.

The authors propose institutional reforms, financial education programs, and tailored banking services, emphasizing that the issue is not the lack of access itself, but rather the unequal quality of services provided to these groups.

Another study highlighted that household income is a determining factor in the adoption and promotion of digital financial practices (Vik, et al., 2024). An important aspect highlighted by foreign researchers is the correlation between financial vulnerability, income, and other socio-demographic characteristics (WorldBank, 2024).

The importance of adapting financial services to the needs of vulnerable groups is emphasized by (Sebai & Talbi, 2023). The authors demonstrate that the inclusion of large populations in the financial system helps to diversify sources of financing for banks and reduce risks, but the positive effects are manifested only in the presence of a quality institutional framework.

As a result of the analysis of existing research, we find that access to financial services depends on the level of income more than on financial education. Thus, our research interest is related to the analysis of the degree of access to financial services by the population of the Republic of Moldova in conditions where the poverty level is very high (poverty rate 31%).

3. Data and methodology

The level of access to basic financial services - key elements of financial inclusion such as payment cards, insurance, savings/deposits, and credit - was analyzed.

For the dynamic analysis of financial product usage, primary data were used from financial supervisory institutions: the National Bank of Moldova, the National Commission for Financial Markets, and the statistical database of the National Bureau of Statistics (NBS).

To analyze the socio-economic context, we relied on data provided by the NBS. In particular, we focused on the 2024 study (NBS, 2024), which offers detailed information on household income and expenditures, consumption structure, poverty rate, and other relevant socio-economic indicators. It should be noted that this research is based on aggregated data available through open access on the official website of the (NBS, 2025).

The analysis period covered the past five years, from 2020 to 2024. This timeframe was selected to include the post-pandemic period and to evaluate the impact of the COVID-19 pandemic on financial inclusion.

The methodology combined both quantitative and qualitative approaches. Descriptive data analysis was conducted, including the calculation of indicators such as means, rates, and percentages to characterize the level of access to financial services and the structure of household income and expenditures. A comparative analysis was also carried out, assessing trends across time (2020–2024) and between different socio-economic groups (urban/rural environments, the socio-economic status of the household head, and income level), in order to identify disparities and emerging trends.

It is important to mention that this research has certain limitations. Data on household income and expenditures were collected through the Household Budget Survey (HBS), which may be subject to sampling errors. Moreover, the data on access to financial services do not provide detailed information on the quality and relevance of these services in relation to the specific needs of various socio-economic groups.

4. Results

According to World Bank data on financial inclusion (Demirgüç-Kunt, et al., 2022), 76% of the adult population globally holds at least one bank account.

This global statistic is significantly influenced by national legislative regulations that mandate the use of bank accounts for salary payments, government transfers, and both domestic and international remittances. The accelerated digitalization of financial products and services has had a positive impact on financial inclusion by facilitating the adoption and continued use of other financial services, such as depositing, saving, and accessing credit.

However, it is important to note that merely holding a bank account does not necessarily equate to full financial inclusion, as the effective use and real benefits derived from such services can vary substantially.

In the Republic of Moldova, between 2020 and 2024, an upward trend was observed in the number of payment cards in circulation, reaching approximately 3.75 million in 2024 (fig. 1). Relative to the total population, this indicator suggests that each citizen of the Republic of Moldova holds, on average, 1.5 bank cards - a level comparable to the European Union average of 1.6 cards per capita.

Nevertheless, it is crucial to point out that only 58.7% of all cards in circulation are active, which indicates a relatively low usage rate of this financial service in Moldova. This

discrepancy between the number of issued cards and their activation rate can be attributed to several factors, including low levels of financial and digital literacy among certain population segments, costs associated with card usage (such as bank fees), limited acceptance of card payments in some geographic areas, and a traditional preference for using cash in daily transactions.

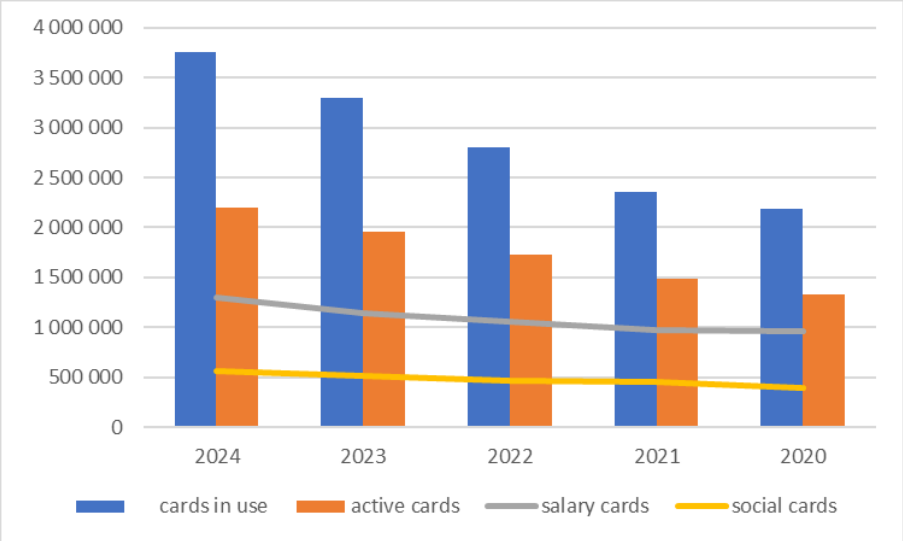

Figure no. 1. Number of payment cards in circulation, 2020-2024
Source: based on NBM data

Social cards, which are intended for beneficiaries of social assistance and government transfers, represent a relatively small share of the total number of payment cards in circulation, yet they stand out with a significantly higher activation rate (79.2% in 2023). In the past, these cards were mainly used for cash withdrawals from ATMs; however, their use for cashless payments has increased considerably in recent years, driven by social distancing restrictions and recommendations imposed during the COVID-19 pandemic. In just four years, the share of cashless payments made with social cards rose from 52% in 2019 to 76% in 2023, approaching the general average of 85.5% for cashless payments. This positive development suggests that, under the right conditions, even financially vulnerable groups can successfully adopt and use digital financial services.

Despite the positive trend observed in the use of payment cards, data related to other financial products and services remain significantly below the European average, indicating a low level of diversification in the financial instruments used by the population.

For example, when it comes to accessing private insurance services, the population of the Republic of Moldova shows reluctance. Insurance density (gross premiums written per capita) reached only USD 53.34 in 2023 (NBM, 2024). In contrast, the average insurance density in the European Union is around USD 2,200 (EIOPA, 2022), highlighting a considerable gap in the degree of financial protection provided by insurance products.

This reluctance toward insurance products can be attributed to several factors, including the low level of financial education among the population, a lack of trust in insurance companies, the perception that insurance is expensive and inaccessible, as well as competing priorities for households' limited financial resources.

Regarding access to credit services, low income levels represent a major barrier for many individuals, especially for low-income social groups that are often deemed ineligible for bank loans. This situation is caused by the strict eligibility criteria imposed by financial institutions, which are based on the assessment of applicants' repayment capacity, as well as the lack of collateral or assets that can be used as guarantees for obtaining credit.

A similar situation is found in the case of savings products offered by the banking and non-banking sectors in the Republic of Moldova. Although, according to data from the National Bank of Moldova (NBM), bank deposits remain the most commonly used savings instrument among the population, access to these financial products is limited for people with low incomes, who do not have sufficient financial surplus to save.

In this context, it is essential to note that 31.6% of the general population in the Republic of Moldova lives below the absolute poverty line, which highlights the economic vulnerability of a significant portion of the population.

Starting from the central research question - to what extent does the population of the Republic of Moldova access financial services under such a high level of poverty? - we conducted a detailed analysis of the income and expenditure patterns of different social groups to identify the factors that influence financial inclusion.

One of the critical aspects analyzed is the ratio between available household income and expenditures for various purposes (fig. 2). At the beginning of the analyzed period, the urban population reported relatively small differences between income and expenditures, which suggested a more precarious financial situation. However, by 2021, the situation changed, and by 2023, the urban population reported a higher positive gap between income and expenditures compared to that observed in rural areas. This evolution can be partly attributed to rising incomes in urban areas, due to economic development, the creation of new jobs, and easier access to services and economic opportunities.

It is important to note that the available data indicate that just over 40% of the population's total expenditures are allocated to the purchase of food and non-alcoholic beverages, and approximately 20% are allocated to covering utility costs (heating, water, electricity, etc.). This expenditure structure indicates a rather limited consumption model that largely ensures only the satisfaction of basic needs. Such budgetary constraints limit the population's ability to save, invest in education, or access other financial services that could contribute to improving quality of life and increasing financial resilience.

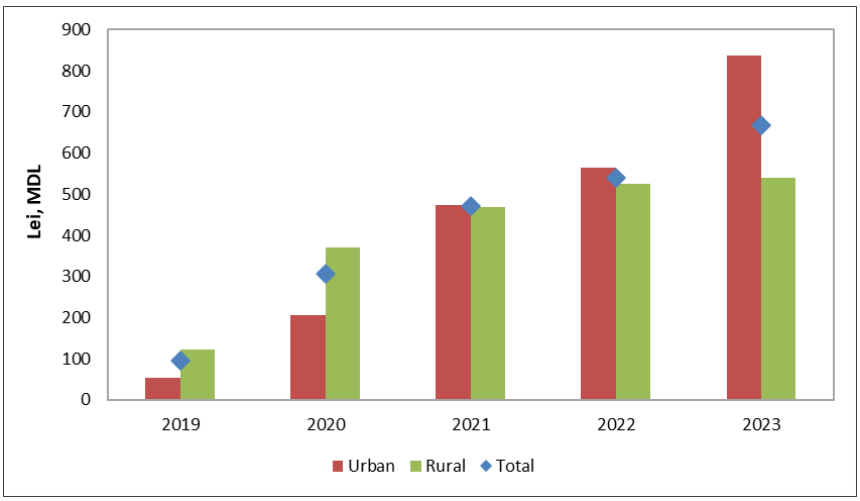

Figure no. 2. Dynamics of the difference between income and expenses by average and total.
Source: based on the NBS data

The analysis of population income data based on the socio-economic status of the household head indicates that self-employed agricultural workers represent one of the lowest-income groups (fig. 3).

It is important to note that the economic situation of this group has not significantly improved over time, which highlights the persistent vulnerability of individuals working in the agricultural sector.

Another vulnerable group is represented by pensioners, whose incomes are often limited to state pensions, which do not always keep pace with the rising cost of living.

The fact that these two population groups register the lowest incomes is largely linked to the income structure, where wages and self-employment (in the case of the self-employed) constitute the main sources of income.

Thus, both groups are largely deprived of the benefits associated with wage employment, with their primary income sources being social transfers (pensions, allowances, etc.).

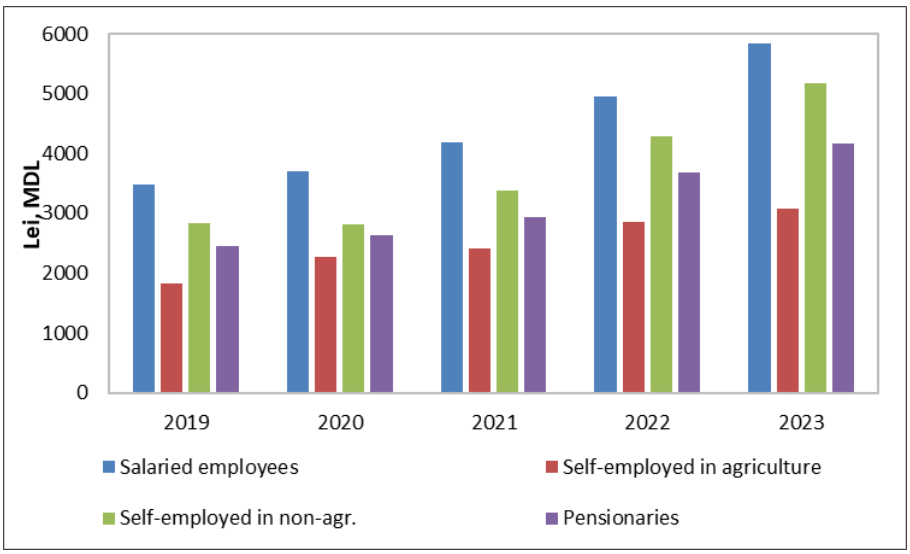

Figure no. 3. Income dynamics based on the socio-economic status of the household head
Source: based on the NBS data

In order to encourage financial inclusion and reduce the economic vulnerability of disadvantaged groups, it is necessary to promote financial education and ensure an adequate income level for all citizens. It is important to note that in the Republic of Moldova, as well as at the European level (OECD, 2023), efforts to promote financial education are primarily focused on young people, through the inclusion of financial education modules in school and university curricula. However, low-income adults have fewer opportunities for financial literacy, as they are no longer part of the formal education system.

Therefore, additional efforts are needed from public authorities and non-governmental organizations to provide specially designed educational courses and programs for adults, tailored to the needs and characteristics of this target group.

As for pensioners, data presented by the National Bureau of Statistics (NBS, 2025) show that they generally maintain modest but positive differences between income and expenditures, suggesting a small financial surplus over the past three years.

Nevertheless, it is important to note that this small gap reflects pensioners' strong dependence on fixed pensions, which limits their ability to adapt to rising living costs or to improve their financial situation by accessing financial services.

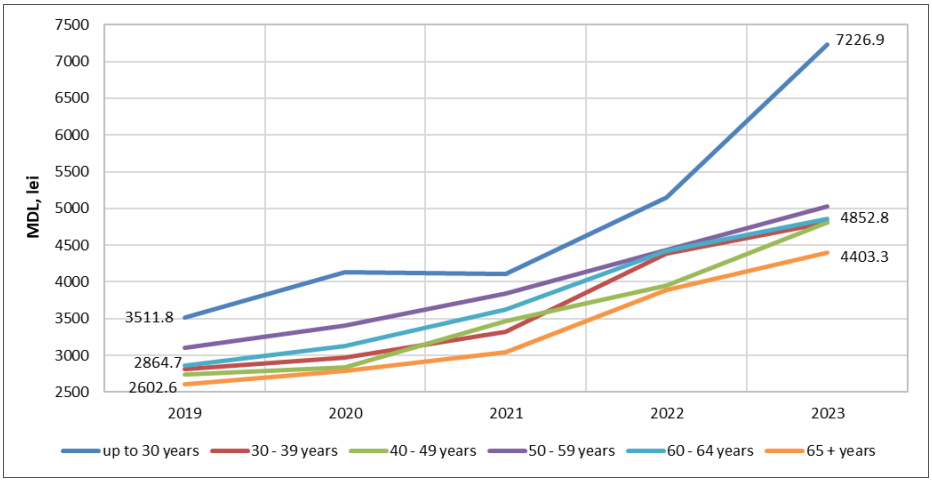

Figure no. 4. Income dynamics by age of household head
Source: Based on the NBS data

The fact that age is a critical factor in determining income levels and financial vulnerability is also evident from the distribution of income according to the age of the household head (fig. 4). As shown in the figure, households headed by individuals aged 65 and over consistently report the lowest incomes throughout the observation period (2019–2023).

Despite some modest increases over time, the incomes of this group remain significantly lower than those of younger groups, highlighting the persistent economic challenges faced by elderly households.

This situation underscores the need for public policies that provide financial and social support to older individuals, as well as for financial education programs tailored to their specific needs.

5. Conclusions

This research has shown that the overall level of financial inclusion in the Republic of Moldova remains modest, with significant disparities among different socio-economic groups. In particular, low-income groups face considerable barriers in accessing and effectively using financial products and services due to economic constraints, low levels of financial literacy, and the lack of financial products tailored to their specific needs.

Disposable income is confirmed as the main determining factor of access to financial services. Individuals living below the poverty line (over 31% of the population) lack the financial resources needed to efficiently use financial tools such as savings, insurance, or credit, thus perpetuating a cycle of financial exclusion.

Although bank account ownership is relatively widespread, the active use of payment cards - especially for cashless transactions—remains limited compared to the European average. This suggests a basic functional usage focused on cash withdrawals, rather than full financial integration, which would imply the use of a variety of financial services to manage resources efficiently and mitigate risks.

The analysis identified pensioners and self-employed agricultural workers as the most financially vulnerable groups. Their heavy reliance on social benefits - which are often insufficient to cover basic needs - significantly limits their access to more complex financial

products such as credit or insurance, and reduces their ability to save and build assets for the future.

Moreover, the low level of financial literacy among these groups makes them more susceptible to financial fraud and reduces their ability to make informed and responsible financial decisions.

To improve financial inclusion in the Republic of Moldova, it is essential to implement an integrated approach that combines efforts to promote financial education, develop accessible and relevant financial products for vulnerable groups, and create a policy environment that supports financial inclusion.

Financial education programs should be adapted to the specific realities and needs of different target groups, emphasizing the development of practical skills in budgeting, saving, and responsible credit use. Additionally, innovative financial products must be developed, taking into account the limited income and financial literacy of vulnerable groups—such as low-interest microloans, savings accounts with low minimum deposits, and affordable insurance products.

Furthermore, authorities should create a regulatory framework that fosters financial inclusion by encouraging competition and innovation in the financial sector, protecting consumers from abusive practices, and promoting transparency and accountability.

Acknowledgements

The paper was elaborated within the framework of the "Young Researchers 2024-2025" competition project 24.80012.0807.09TC "Strengthening scientific and methodological support for reducing social vulnerability by increasing the level of financial inclusion of low-income groups" (2024-2025).

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TRANSFORMING INTERNAL AUDIT AND MANAGERIAL CONTROL IN PUBLIC EDUCATION THROUGH GENERATIVE AI: CHALLENGES AND PERSPECTIVES

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Abstract: *The increasing complexity of financial operations and the demand for higher transparency and accountability in the public sector have emphasized the need for innovative tools in internal audit and managerial control systems. This paper explores the integration of Generative Artificial Intelligence (GAI) technologies in optimizing the internal control systems and internal audit processes within Romanian public educational institutions. The main objective of the research is to assess how GAI can enhance the efficiency, accuracy, and responsiveness of internal audit practices while supporting the modernization of the Internal Managerial Control System (IMCS). The study is based on an empirical approach, combining qualitative and quantitative methods, including structured questionnaires, semi-structured interviews with auditors and IT experts, and case studies conducted in both pre-university and higher education institutions. The results show that GAI can significantly improve the automation of risk assessments, real-time monitoring, data-driven decision-making, and predictive audit reporting. Moreover, it facilitates continuous auditing, enhances the reliability of financial records, and reduces human error, thus contributing to a more transparent and effective resource management system in education. Despite the benefits, the study also addresses key challenges such as data quality, integration costs, ethical concerns, and the need for tailored training for audit professionals. The research contributes to the literature by proposing actionable strategies for implementing GAI in the public education sector, highlighting both its transformative potential and the conditions necessary for successful adoption. This paper is relevant to scholars, policymakers, and practitioners interested in the intersection of accounting, internal control, audit innovation, and public sector digitalization. It calls for a paradigm shift in the way internal audit and control are approached in educational institutions, emphasizing the critical role of GAI in building resilient and future-ready audit systems.*

Keywords: *Generative Artificial Intelligence, Internal Audit, Managerial Control, Public Education, Digital Transformation, Risk Management, Continuous Auditing.*

JEL Classification: *M42, I22, H83, O33.*

1. Introduction

In recent years, public education institutions have been facing increasing pressure to ensure transparency, accountability, and performance in the use of public resources. Internal audit and managerial control systems play a critical role in achieving these objectives, particularly in a complex and highly regulated environment such as Romania's public education sector. However, traditional audit tools often struggle to keep up with the volume and complexity of operations, exposing institutions to delays, inconsistencies, and risk oversight.

In this context, Generative Artificial Intelligence (GAI) technologies are emerging as transformative tools with the potential to enhance both internal audit functions and the Internal Managerial Control System (IMCS). Their capacity to automate data analysis, generate predictive insights, and support continuous auditing opens new opportunities for improving decision-making processes and reducing human error.

This paper explores the potential of GAI to transform internal audit and managerial control within Romanian public education. Building on previous doctoral research, the study investigates both the benefits and challenges associated with GAI integration, using a mixed-method approach that includes case studies, interviews, and survey data. The objective is to

identify concrete ways in which these technologies can support audit modernization while ensuring compliance with national standards and ethical frameworks.

2. Theoretical Framework

2.1 Internal Audit and Managerial Control in Public Education

Internal audit and internal managerial control systems (IMCS) are essential mechanisms for ensuring compliance, risk management, and efficient resource allocation in public sector institutions. In Romania, the implementation of IMCS in educational institutions is regulated by national legislation, particularly the Order of the Ministry of Public Finance no. 600/2018, which defines the principles and standards of internal control within public entities.

In the education sector, internal audit serves not only as a verification tool but also as a mechanism for organizational learning and performance improvement. However, several studies, including the author's doctoral research, have revealed that the audit function in Romanian public education is often constrained by limited digital infrastructure, insufficient automation, and reliance on manual processes.

2.2 Digitalization and Innovation in Public Sector Auditing

The digital transformation of public sector auditing is an increasingly important topic in economic research and practice. Recent developments in data analytics, robotic process automation (RPA), and machine learning have begun to reshape audit procedures across sectors. These technologies allow for greater coverage, speed, and analytical depth, enabling auditors to detect anomalies and trends that would otherwise remain hidden.

Nevertheless, in the public education context, digital adoption remains uneven. While some institutions have initiated digital audit processes, the overall ecosystem lacks the necessary integration and skilled human capital to fully benefit from digital innovations.

2.3 Generative Artificial Intelligence in Audit and Control

Generative AI (GAI), a subset of artificial intelligence that creates new content and patterns from data, represents a paradigm shift in audit innovation. Unlike traditional automation tools, GAI systems can produce audit reports, simulate scenarios, and support strategic decisions based on large volumes of structured and unstructured data.

In internal audit, GAI can enhance risk assessment, automate routine tasks, and facilitate real-time monitoring. Moreover, in the context of managerial control, GAI tools can generate predictive insights and simulate control scenarios, helping managers better allocate resources and respond to potential failures.

Despite these promising developments, GAI integration in public education raises critical challenges related to data quality, ethical use, transparency, and the readiness of the institutional and legal framework. These aspects are further explored in the empirical section of this study.

3. Methodology

This research adopts a mixed-method approach to investigate the potential impact of Generative Artificial Intelligence (GAI) on internal audit and managerial control systems in Romanian public education. The choice of methodology is aligned with the need to capture both the quantitative extent of current practices and the qualitative insights of key stakeholders.

3.1 Research Design

The study is exploratory in nature, aiming to identify trends, opportunities, and challenges associated with GAI integration. The research framework is grounded in previous doctoral work conducted by the author, which examined the structure and efficiency of the Internal Managerial Control System (IMCS) across pre-university and higher education institutions.

3.2 Data Collection

Primary data were collected using three complementary tools:

- **Structured questionnaires** distributed to internal auditors, financial officers, and school managers in 42 public education institutions (27 pre-university and 15 higher education). The questionnaire focused on the current use of digital tools in auditing and perceptions of GAI.
- **Semi-structured interviews** conducted with 12 professionals, including internal auditors, IT specialists, and representatives from audit authorities, to explore deeper insights into feasibility, risks, and readiness for AI adoption.
- **Two case studies**, one in a university and one in a public high school, were developed to illustrate the practical context of internal audit operations and to simulate GAI use scenarios.

3.3 Data Analysis

Quantitative data were analyzed using descriptive statistics to identify patterns in technology usage, efficiency perceptions, and audit outcomes. Qualitative data from interviews were coded thematically, focusing on perceived barriers, institutional culture, and ethical concerns.

3.4 Research Limitations

The main limitations of this study include the relatively small sample size, which may limit generalizability, and the novelty of GAI, which means that most institutions have not yet implemented such technologies. However, the empirical findings offer valuable insights into the preparedness and expectations of stakeholders regarding future transformations in audit and control systems.

4. Findings and Discussion

4.1 Current Practices in Internal Audit in Public Education

The data collected from the 42 surveyed institutions reveal that internal audit processes are still largely manual. Over 85% of respondents indicated limited use of digital tools, with most relying on spreadsheets and document-based reporting. Although some higher education institutions have begun to adopt basic forms of automation, there is no evidence of advanced technologies—such as GAI—being used operationally.

Auditors reported challenges such as data fragmentation, lack of real-time access to financial information, and dependence on outdated legacy systems. These limitations reduce the effectiveness of risk-based audit planning and delay the detection of control breaches.

4.2 Potential Benefits of GAI Integration

Interview data and simulated case scenarios suggest that GAI can significantly improve audit efficiency and control reliability. Key perceived benefits include:

- **Automated risk identification** through real-time anomaly detection in transactional data.
- **Enhanced predictive analysis**, enabling auditors to simulate the outcomes of different control strategies.

- **Generative reporting capabilities**, which reduce time spent on routine documentation.
- **Increased transparency**, through continuous monitoring and audit trail generation.

Stakeholders emphasized the role of GAI in transforming internal audit from a reactive, compliance-driven function into a strategic, forward-looking tool.

4.3 Case Study Insights

The two case studies highlighted institutional differences in digital readiness. In the university setting, where partial ERP systems were already in use, the simulated integration of a GAI module demonstrated improvements in real-time audit reporting and reduced workload. Conversely, the pre-university institution faced structural barriers, including insufficient IT infrastructure and staff with limited digital skills.

These findings underscore the importance of context in the successful implementation of AI solutions. GAI cannot function effectively without clean, structured data, interoperable systems, and skilled personnel.

4.4 Challenges and Barriers to Adoption

Despite the benefits, several barriers to GAI adoption were consistently identified:

- **Data quality and integration**: Audit-relevant data is often incomplete, inconsistent, or scattered across systems.
- **Cost and institutional inertia**: Budget constraints and resistance to change pose significant obstacles, particularly in schools with limited administrative capacity.
- **Ethical and legal concerns**: Issues related to algorithmic transparency, audit independence, and data privacy emerged as critical points in interviews.

These concerns reflect a broader need for regulatory guidance and sector-specific digital strategies that ensure responsible AI adoption in public administration.

5. Strategic Recommendations

Based on the empirical findings and analysis, several strategic directions are proposed to support the effective integration of Generative Artificial Intelligence (GAI) into internal audit and managerial control systems within public education institutions.

5.1 Establishing a Digital Audit Readiness Framework

Institutions should begin by conducting a **digital maturity assessment** to identify gaps in infrastructure, data management, and staff competencies. This would enable tailored action plans aligned with both technological capabilities and institutional objectives. Key elements of such a framework include:

- Data standardization and consolidation across departments
- Integration of existing financial systems with audit platforms
- Clear protocols for data governance and access control

5.2 Investing in Training and Capacity Building

Effective use of GAI depends not only on the availability of technology but also on human expertise. Thus, targeted **training programs for internal auditors and financial controllers** are essential. These should focus on:

- Understanding AI-generated insights and limitations
- Interpreting predictive models responsibly
- Ethical and legal aspects of automated decision support

Collaborations with universities and professional bodies can support the design of continuous education modules specific to audit innovation in the public sector.

5.3 Developing Institutional AI Governance Policies

To ensure transparency, accountability, and ethical use of AI tools, institutions must adopt **internal policies on AI usage**. These policies should address:

- The scope and limits of GAI in auditing and decision-making
- Validation and supervision mechanisms for AI-generated outputs
- Compliance with national data protection and public finance regulations

This step is crucial to avoid over-reliance on algorithms and maintain the professional judgment of auditors.

5.4 Encouraging Pilot Projects and Cross-Institutional Collaboration

The implementation of GAI should begin with **pilot projects** in selected institutions, allowing for experimentation, adjustment, and knowledge sharing. Ministry-level support for cross-institutional collaboration and funding programs can foster scalable innovation across the education system.

6. Conclusions

This paper has examined the potential of Generative Artificial Intelligence (GAI) to enhance internal audit and managerial control systems within Romanian public education institutions. The findings highlight both the **transformative capacity** of GAI and the **institutional challenges** that must be addressed to achieve meaningful and sustainable implementation.

Through a mixed-method research design, the study demonstrated that GAI can significantly contribute to **audit automation**, **predictive analysis**, and **real-time monitoring**, thereby improving both the efficiency and transparency of internal processes. The case studies illustrated that the impact of GAI depends heavily on institutional readiness, particularly in terms of IT infrastructure, data quality, and staff expertise.

At the same time, several **critical barriers** were identified, including the fragmented nature of financial and audit data, resistance to change, and concerns about algorithmic transparency and ethical use. These findings point to the necessity of a **strategic, well-governed approach** that combines technological adoption with policy development and capacity building.

By building on the author's previous doctoral research, this paper contributes to the emerging literature at the intersection of **public sector audit innovation, education management, and artificial intelligence**. It calls for a shift in how audit and control are conceptualized in public education—moving from compliance-oriented models to **intelligent, adaptive systems** capable of supporting strategic governance.

Future research could expand on this study by evaluating pilot implementations of GAI in public sector institutions, developing audit-specific AI governance frameworks, and exploring the long-term impact of digital audit transformation on institutional performance.

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A SHORT ANALYSIS OF THE EDUCATIONAL TRANSFORMATIONS ACROSS EUROPEAN UNION MEMBER STATES

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Abstract. *Over the last two decades, the educational systems within the European Union (EU) have experienced important transformations, determined by a confluence of socio-economic, technological, and political drivers. This paper presents a brief analysis of the educational transformations occurring across European Union (EU) member states, with a focus on the post-pandemic context and the acceleration of digital innovation analyzing the recent literature and comparative data from the main statistical sources to present a framework of the evolving educational landscape. This research extends the ongoing discussion regarding educational transformation within EU member states taking into consideration aspects as digital transformation, and regional cooperation within European educational frameworks. The study highlights both shared trends and country-specific responses, offering a comparative perspective on the future of education in a rapidly changing European landscape.*

Keywords: *education, digitalization, transformation, policy framework, reform.*
JEL Classification*: I21, I28.*

1. Introduction

Over the past several decades, the education systems across European Union member states have undergone significant transformations. As Noelke& Mueller (2011) argues the aim of these transformations is to establish an education landscape that is not only inclusive and equitable but also adaptive to the rapidly evolving global context.

The historical context of education in European Union member states is marked by diverse and complex developments shaped by cultural, political, and socio-economic forces (Safonov et al., 2022). Understanding these transformative periods necessitates a look at the broad tapestry of educational evolution across centuries. In medieval Europe, education was primarily dominated by religious institutions, with monastic and cathedral schools laying the groundwork for higher education in universities. The Renaissance ushered in a newfound appreciation for classical knowledge, broadening curricular focuses beyond religious teachings to include the humanities.

The Protestant Reformation in the 16th century catalyzed significant educational reforms, emphasizing literacy and individual access to scripture, which contributed to the gradual secularization of education. The Enlightenment further propelled educational transformation, advocating for reason and scientific inquiry. This era underscored the need for universal education, laying seeds for the development of state-sponsored systems. The Industrial Revolution necessitated the emergence of schools that could equip populations with skills suited to industrial economies, prompting widespread educational reform across Europe.

The 20th century experienced profound transformations driven by two World Wars and significant socio-political shifts. Post-World War II reconstruction efforts emphasized education as a vehicle for economic recovery and political stabilization. The formation of the EU amplified collaborative educational policies, promoting exchange programs and fostering integration through knowledge-driven economies. The Maastricht Treaty further entrenched

the EU's role in supporting educational advancement, focusing on a cohesive framework for lifelong learning and fostering a knowledge-based society.

The historical context of educational transformations in EU member states reflects an ongoing journey marked by adaptation and reform, influenced by ideological shifts and pragmatic needs. This intricate progression underscores the enduring importance of education in shaping societal trajectories, remarkably overcoming obstacles and embracing opportunities for collaboration and innovation.

2. EU Education Policy Frameworks

The European Union has long recognized education as a cornerstone for fostering integration, economic growth, social cohesion, and the promotion of democratic values across its member states. Policy frameworks within the EU provide a dual-layered structure, integrating both supranational strategies and national policies to balance unity with diversity (Halász, 2015). At the EU level, a robust policy architecture seeks to coordinate efforts and establish shared objectives, while individual member states maintain agency over the design and implementation of their respective education systems. This interplay underscores the complexity of achieving convergence in educational priorities amid varying historical, cultural, and socio-economic contexts.

Centrally, the EU disseminates its aspirations for education policy through programs such as the framework, later succeeded by the initiative, which sets targets for mobility, inclusivity, and lifelong learning by 2025. These frameworks serve not as mandates, but as guiding instruments grounded in a voluntary but structured approach built upon best practices and peer review. Outputs include benchmarks, progress indicators, and collaborative platforms facilitating knowledge-sharing among member states. While policymaking authority remains decentralized, strategic funding mechanisms enable transnational cooperation, innovation, and reforms by bridging institutional and financial gaps that might impede educational development.

At the national level, member states negotiate the integration of EU benchmarks with localized needs, often using EU funding and guidelines to modernize curricula, enhance teacher training, or strengthen digital inclusion.

The European Union's education policies represent a sophisticated framework designed to harmonize and enhance educational systems across member states. Initially formalized through the Treaty of Maastricht in 1992, the EU's role in education policy is to support, coordinate, and supplement national actions, thereby respecting the autonomy of individual countries to define their educational content and organization as it is pressented by Cowen (2009). This cooperative approach enables the EU to facilitate the sharing of experiences and dissemination of best practices, fostering an environment conducive to cross-border academic exchange and innovation. Key initiatives such as the Erasmus+ program epitomize the EU's strategic objectives in education. Erasmus+ is not only about higher education student mobility but also covers vocational education, school education, adult learning, and youth activities. By providing financial support for millions of participants to study or train abroad, Erasmus+ seeks to improve skills, employability, and cultural awareness throughout Europe. Complementing these efforts is the European Education Area, envisaged to be fully realized by 2025, which aims to break down barriers to learning and improve educational standards through enhanced cooperation. This initiative underscores the EU's commitment to fostering inclusive and quality education for all citizens, a recurring

theme resonating through the broader discourse on educational transformations within the union (Constantinou, et al., 2025). Moreover, the EU education policies underscore the importance of digital readiness and inclusivity in education, especially in the wake of global challenges like the COVID-19 pandemic. Initiatives targeting digital education aim to address the digital divide and promote skills necessary for the digital age.

3. Case Studies of Successful Transformations

In examining successful educational transformations within the European Union, it is imperative to spotlight specific initiatives that have heralded remarkable improvements in educational outcomes. These case studies provide nuanced insights into how different educational systems can be restructured to address both prevailing and emerging challenges (Jessop, 2004). Each of these examples reflects a distinctive approach to reform, deeply influenced by cultural, economic, and social contexts, yet sharing overarching goals of enhancing educational equity, quality, and efficiency.

3.1. German and Finland Education Model

Finland stands as a paradigmatic case of educational excellence, often attributed to its holistic principles that prioritize educator autonomy, student well-being, and equitable access to resources. This model eschews traditional standardized testing in favor of fostering creativity and critical thinking, successfully balancing rigorous academic pursuits with personal development. Significantly, Finnish reforms emphasize teacher training and professional development, ensuring that educators are well-equipped to adapt curricula to individual learner needs, thus promoting a more personalized learning experience. This commitment to teacher empowerment and a student-centered approach has resulted in consistently high performance in international assessments, reflecting both depth of knowledge and breadth of skills.

Germany's dual vocational system demonstrates another successful transformation, providing a pragmatic illustration of the integration of academic education with vocational training. This system is deeply rooted in partnerships between educational institutions and industry stakeholders, affording students the opportunity to acquire both theoretical knowledge and practical skills in real-world settings as (Zutavern and Seifried, 2022). The dual model exemplifies adaptability, meeting labor market needs while reducing youth unemployment rates. German vocational training is not merely a parallel educational route but a fundamental component of lifelong learning, ensuring that learners can transition smoothly into various career paths, thereby aligning educational outcomes with economic demands (Turchyn et al., 2022).

Sweden, meanwhile, offers a compelling case of inclusive education policies that strive to dismantle barriers to learning for all students, particularly those from diverse backgrounds and varying abilities. The Swedish model is characterized by its legislative and institutional frameworks that promote equality and inclusion, ensuring that education is accessible to every child regardless of their socio-economic status or special needs. Through sustained governmental investment and commitment to diversity, Sweden has cultivated an educational environment where differences are celebrated and learning is tailored to accommodate individual needs, fostering an equitable and cohesive society.

Finland's education model stands as a paradigmatic example of transformative success within the European Union, characterized by its innovative approach to learning, equity, and development. Central to this model is its commitment to equal opportunity, ensuring every child receives high-quality education irrespective of socioeconomic background as it is described by Brewis, (2025. This egalitarian ethos is manifest in the lack of tuition fees across its education system, even in higher education, promoting accessibility and inclusivity. Further distinguishing Finnish education is its emphasis on teacher autonomy and respect, which fosters a culture where educators are entrusted with significant control over curriculum and pedagogical methods, allowing them to tailor learning experiences to better cater to individual student needs (Jahnukainen et al., 2025). Delving deeper, the model champions a holistic approach to education that balances academic and holistic personal development. Finnish schools prioritize a stress-free environment, eschewing the pressure of standardized testing that dominates other systems. This divergence from conventional minimalism focuses on enhancing students' creative and critical thinking capacities over the rote memorization of facts. Furthermore, the integration of vocational elements alongside academic curricula prepares students for real-world challenges by equipping them with practical skills. A distinctive feature remains the extensive teacher education required: Finnish teachers typically undergo rigorous training, supported by robust university programs, ensuring they are equipped with the knowledge and skills needed to foster student growth. The Finnish model's success is reflected in its consistently high rankings in international assessments, which evaluate educational attainment across various countries. Its approach, grounded in sustainability, equity, and adaptability, offers insightful lessons for EU member states seeking effective educational reform.

3.2. Sweden's Inclusive Education Policies

Sweden's approach to inclusive education has long been heralded as a paradigm of progressiveness and equality within European Union member states (Högberg and Lindgren, (2023). The foundation of this comprehensive system was laid in the late 20th century, aligning with Sweden's broader national policy of fostering social inclusivity and equality. Central to these policies is the principle that all students, regardless of their physical, intellectual, social, or linguistic backgrounds, are entitled to equitable educational opportunities within the mainstream education system. This reflects a significant commitment to the ideals of integration rather than segregation.

One of the core components of Sweden's inclusive education policy is its robust legislative framework, underscored by the Education Act. This legislation mandates that all schools must adapt their curricula and teaching methods to accommodate the diverse needs of students. A pivotal aspect of this approach is the individualized education plan, which is developed in collaboration with teachers, parents, and special educators. This plan ensures that the specific needs and potential of each student are recognized and met, emphasizing personalized learning strategies and support services. Furthermore, the widespread availability of special educational needs coordinators in schools aids in executing these plans effectively.

The Swedish model places a strong emphasis on teacher training, equipping educators with the necessary skills and understanding to support a diverse classroom environment. Continuous professional development programs are integral to ensuring that teachers remain adept at employing inclusive pedagogical strategies. Another noteworthy aspect is the role of

technology in Swedish classrooms, which enhances learning experiences for students with disabilities, offering tools that facilitate interaction and engagement in various subjects (Barow and Berhanu, 2021).

This comprehensive approach to inclusivity not only reduces educational disparities but also fosters a culture of acceptance and mutual respect. In comparison to other EU models, Sweden's policies exhibit a seamless integration of governmental, institutional, and community efforts in nurturing inclusive educational environments. This collective endeavor highlights the importance of collaboration and shared responsibility in achieving a system where every learner, regardless of their circumstances, can thrive. The Swedish experience thus serves as an exemplar within the EU, illustrating how inclusive policies can transform educational landscapes and contribute to broader societal goals of equity and solidarity.

4. Future Trends in European

Educational reforms across the European Union encounter a multitude of challenges, each complex in nature and significantly influencing the trajectory of transformation efforts. These difficulties often emerge from the intricate interplay of political, economic, and societal factors, each presenting distinctive hurdles that reformers must navigate to achieve meaningful progress. One primary challenge is the political resistance, which can stem from entrenched interests and ideological differences that oppose or slow down reform initiatives. Policymakers may face opposition from various stakeholders, including political parties, educators, and unions who may have vested interests in maintaining the status quo or who disagree with proposed changes. The process of consensus-building becomes essential yet arduous, requiring negotiation and diplomacy to reconcile differing viewpoints and garner the necessary support for implementation. Compounding these political intricacies are economic constraints that limit the feasibility and scope of educational reforms. The allocation of sufficient resources—both financial and human—is often a critical barrier, as budgetary restrictions can curtail the ambition and effectiveness of reform initiatives. During periods of economic austerity, educational sectors regularly experience cuts or stagnation in funding, which may hamper efforts to improve infrastructure, training, and curricula development. This financial strain is exacerbated by the need to balance investment in education with other pressing governmental expenditures, often leading to short-term priorities overshadowing long-term educational objectives. Consequently, reformers must strategically innovate within these limitations, seeking alternative funding models, utilizing technology efficiently, and in some cases, prioritizing specific areas of reform to maximize impact. In essence, the pursuit of educational reform in the EU must grapple with these multidimensional challenges, where political opposition and economic barriers are interwoven with broader societal objectives. The successful navigation of these challenges is pivotal, demanding a cohesive strategy that aligns diverse interests and leverages resources judiciously. Educators, policymakers, and civil society must engage collaboratively to drive reforms that are both resilient and adaptive, ensuring they can withstand the pressures from these entrenched challenges while advancing the overarching goal of educational betterment across Europe.

As European education systems move toward the future, they are poised at a crossroads characterized by significant and dynamic transformations. At the heart of these changes is an embrace of lifelong learning, which foregrounds the necessity for education systems to pivot from traditional methodologies confined to early life stages. The burgeoning concept of lifelong learning signifies an environment where individuals, irrespective of age or

previous educational attainment, have continuous access to learning opportunities. By promoting flexible learning pathways, Europe aims to address the rapid evolution of skill requirements driven by technological advancements and labor market shifts. As such, educational frameworks are increasingly incorporating digital platforms and alternative credentialing methods, which not only enhance accessibility but also cater to diverse learning styles and paces. These efforts align with broader objectives of fostering inclusivity, adaptability, and cross-continental educational mobility.

Parallelly, sustainability has emerged as a central theme, reflecting the growing awareness of environmental challenges and the intergenerational responsibility to address them. Educational institutions are progressively integrating sustainability into their curricula, thereby equipping students with the knowledge and skills necessary to navigate and mitigate ecological issues. This shift is not merely a curricular adjustment but a holistic transformation encompassing sustainable campus practices, research priorities, and community engagement. By doing so, education becomes a catalyst for a broader cultural shift towards environmental stewardship, ensuring that future generations are prepared to contribute positively to a sustainable future.

The increased focus on mental health represents a profound rethinking of educational priorities. Recognizing that mental well-being is fundamental to academic success and personal development, there is a concerted effort to de-stigmatize mental health issues while embedding supportive frameworks within educational settings. Initiatives range from integrating mental health education into curriculums to establishing robust support systems for students and educators alike, anchored in accessibility and sensitivity to diverse needs. These measures are critical in fostering environments that support resilience and emotional intelligence, key components of student success in an increasingly complex world. As European education evolves, the confluence of lifelong learning, sustainability, and mental health emphasis articulates a comprehensive strategy that seeks to nurture more holistic, adaptable, and empowered individuals poised to meet the challenges of tomorrow.

5. Conclusions

The examination of educational transformations in European Union member states reveals shared aspirations and diverse challenges as they navigate modern education. At the heart of these changes is a commitment to inclusive and equitable educational environments catering to diverse student populations. These transformations are driven by socio-political, economic, and technological factors influencing policies across the region. Strategic frameworks and initiatives guide member states toward a cohesive approach, but implementation reflects each nation's unique cultural and historical context.

The rise of digital technologies has transformed traditional educational methods, pushing institutions to include digital literacy and competencies in their programs. This change is vital for equipping students to succeed in a digital world and compete globally. While digital transformation offers innovation, it highlights the necessity to tackle inequalities in technology access and infrastructure. Closing the digital divide is crucial for ensuring that all European students benefit from advancements.

Collaboration among EU member states has profoundly impacted educational transformations through shared best practices and cross-border initiatives aimed at balanced education and lifelong learning. The success of these transformations hinges on policy adaptability to global challenges like climate change, migration, and economic shifts. Despite

uncertainties, there remains a strong commitment to a resilient education system ready to meet the demands of 21st-century learners.

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ALIGNING WORKFORCE SKILLS AND EDUCATIONAL OFFERINGS WITH THE CHANGING WORK MODEL TRENDS IN THE REPUBLIC OF MOLDOVA

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Abstract: *In the context of profound transformations in the labor market, driven by digitalization, the green transition, and demographic changes, the Republic of Moldova faces major challenges in aligning workforce skills with the emerging demands of the economy. This study investigates the structural gaps between the current educational offer and labor market needs, highlighting their impact on employability, social cohesion, and sustainable development. Through a critical analysis of educational policies and occupational dynamics, strategic directions for intervention are identified: curriculum modernization, expansion of dual education, promotion of lifelong learning, and strengthening of the education–business partnership. The paper argues for the necessity of an anticipatory and adaptable educational system as an essential element for enhancing national competitiveness and supporting Moldova's European integration.*

Keywords: *education, skills, digitalization, employability, adaptability.*
JEL Classification: *I28, J24, O15.*

1. Literature review

The dynamic nature of the modern workplace, influenced by technological advancements and evolving economic landscapes, necessitates a continuous alignment between workforce skills and educational offerings. Technological innovations, particularly the advent of Industry 4.0, have significantly altered job roles and skill requirements. The integration of artificial intelligence and automation has led to the emergence of new competencies while rendering certain skills obsolete. A study focusing on reskilling for Industry 4.0 emphasizes the necessity for workers to acquire advanced technological skills to remain relevant in the workforce (Li, 2024). The discrepancy between the skills possessed by the workforce and those demanded by employers, known as the skill gap, poses challenges to economic productivity. Research indicates that understanding these gaps is crucial for developing targeted educational programs. Strategies such as employer-led training initiatives and collaborations between educational institutions and industries are effective methods to bridge these gaps (Braun et al., 2024). Higher education institutions play a pivotal role in equipping students with both technical and soft skills (Javadian et al., 2024). The proliferation of AI technologies has transformed skill demands across various sectors. Research analyzing job vacancies from 2018 to 2023 demonstrates a significant increase in demand for AI-complementary skills, such as digital literacy and teamwork. Conversely, skills susceptible to automation have seen a decline in demand, highlighting the need for adaptive educational programs (Makela and Stephany, 2024). To effectively align educational offerings with workforce needs, several strategies have been proposed: integrating emerging technologies and practical experiences into curricula to reflect current industry practices; encouraging continuous professional development to help workers adapt to changing job requirements;

collaborations between governments, educational institutions, and industries to develop training programs that address specific skill shortages (Organisation for Economic Co-operation and Development, 2017). The alignment of workforce skills with educational offerings is imperative in responding to the rapid changes in work patterns driven by technological advancements. Continuous collaboration among educational institutions, industries, and policymakers is essential to develop responsive curricula and training programs that equip individuals with the necessary skills to thrive in the evolving labor market.

2. Introduction

Structural transformations of the global and regional economy – driven by the digital revolution, the green transition, and demographic changes – are generating new forms of work organization and profoundly altering the profile of skills demanded on the labor market. The Republic of Moldova, currently undergoing European integration and socioeconomic modernization, must respond to these challenges through coherent policies that align education with labor market requirements. The aim of this study is to analyze how the educational offer in the Republic of Moldova can be adjusted to better respond to emerging trends in the work model, thereby contributing to the reduction of unemployment, labor migration, and social exclusion.

In the Republic of Moldova, university and vocational education are continuously adapting to labor market demands. Each year, the national curriculum is revised, and educational plans are adjusted in accordance with economic and technological developments. Additionally, surveys with economic agents and interactions with graduates help ensure that students receive appropriate training. These measures reflect the ongoing efforts of universities and educational institutions to provide the necessary skills to meet labor market requirements.

With regard to work model trends, digitalization has profoundly transformed labor relations. An increasing number of activities are conducted online or in hybrid formats, raising the importance of digital skills as well as transversal competencies such as autonomy, critical thinking, and virtual collaboration.

In parallel, the green transition brings new occupational requirements in fields such as energy efficiency, green transport, and organic agriculture. Additionally, dual education has been successfully implemented in various educational institutions, with students benefiting from internships as early as their first, second, and third years of study. This practical approach allows students to gain direct experience in their field, while at the same time, companies benefit from subsidies for training costs, which encourages their involvement in practical education. European organizations estimate that by 2030, over 40% of jobs will require "green" skills. It is also estimated that failure to address climate change could jeopardize up to 40% of jobs, particularly in industries dependent on a healthy climate and ecosystem (Unicef, 2022).

3. Aligning Workforce Skills and Educational Offerings

The traditional work model – based on physical labor, in-person presence at the workplace, and long-term job stability – is undergoing a transition. Under the influence of digitalization, process automation, and changing social values, more and more economic activities are shifting toward flexible, hybrid, or remote forms.

In the Republic of Moldova, these transformations are being felt in several directions. Among them is *the accelerated digitalization of the economy*, which, during the COVID-19 pandemic, catalyzed the transition to digital solutions in administration, education, and the private sector. At the same time, automation is reducing the demand for repetitive manual labor while increasing the demand for digital and analytical skills.

Another trend is *the rise of self-employment and freelancing*. Digital platforms and the growth of the collaborative economy have expanded independent work, especially in fields such as IT, design, translation, or consulting. As a result, new forms of employment are emerging that require not only technical skills but also entrepreneurial abilities.

Migration and labor mobility represent one of the most pressing challenges for the labor market in the Republic of Moldova. In recent decades, the massive departure of workers – particularly young and skilled individuals – to European labor markets has caused significant imbalances in employment structures. This phenomenon is primarily driven by low wages, a lack of well-paid job opportunities, and the growing aspirations of young people for a more secure and predictable life. The construction, agriculture, healthcare, and education sectors are among the most affected, experiencing alarming staff shortages that limit both local economic development and the quality of public services. At the same time, the exodus of the workforce places increasing pressure on the educational system, which is called upon to prepare competitive specialists for a transforming national context and an expanding global market. The lack of an adapted educational offer and an efficient system of continuous training exacerbates this gap – especially in vocational and technical education, where there is a chronic shortage of qualified staff despite growing demand from employers. In this context, it is imperative to develop policies that combine labor retention measures, rapid professional retraining, and the creation of attractive conditions for the return of specialists from the diaspora – alongside a profound reform of the vocational training system to make it flexible, inclusive, and aligned with the real demands of the labor market (Nota Analitică privind diagnosticul în domeniul muncii și ocupării forței de muncă în Republica Moldova, 2021).

The green transition and sustainability also play a distinct role in the transformation of the work model in the Republic of Moldova. Climate change and the commitments undertaken as part of the European agenda require transformations in industries such as transport, energy, and agriculture. These transformations also involve the retraining of the existing workforce.

In this context, the Republic of Moldova's ability to anticipate trends and adapt educational and vocational training policies becomes essential for the country’s competitiveness and social cohesion.

One of the most pressing obstacles to the economic development of the Republic of Moldova is the lack of coherence between the skills provided by the educational system and those demanded by employers. This gap is evident at all levels of education – general, vocational-technical, and higher education.

In this regard, there is a *noticeable lack of digital skills*, even though basic digital competencies are becoming essential for most occupations. Data shows that a significant portion of the active population in the Republic of Moldova faces difficulties in using digital technologies – including young people from disadvantaged or rural backgrounds. Despite the fact that certain sectors (e.g., IT, construction, food industry) report a shortage of qualified specialists, many educational institutions continue to produce graduates in oversaturated

fields such as law or public administration. This results in training that is *poorly aligned with labor market demand*.

Deficiencies in the development of transversal skills are frequently highlighted by employers, who point to the lack of competencies such as critical thinking, teamwork, time management, effective communication, and adaptability. These skills are rarely explicitly included in school or university curricula.

The inflexibility of the vocational training system poses a major challenge for both employers and future employees. Initial and continuing training programs remain rigid, poorly connected to the economic environment, and insufficiently adapted to the dynamics of newly emerging occupations in the labor market. Partnerships between educational institutions and the business sector are often formal and lack functional mechanisms for feedback and co-creation of educational content.

The lack of a lifelong learning culture can have major long-term repercussions. Adult participation in continuing education programs is low, especially in rural areas and among workers with low levels of education. As a result, many employees are unable to keep up with evolving technological and organizational demands.

These discrepancies highlight the need for a sustained and coordinated effort among key stakeholders – government, educational institutions, employers, and civil society – to reconfigure the skills development system in a more flexible and future-oriented manner.

Faced with the pressures generated by labor market transformations, the educational system in the Republic of Moldova has begun a process of adaptation, although many of the reforms are still in early or fragmented stages. Efforts are focused on modernizing the curriculum, digitalizing the educational process, and strengthening ties with the economic environment.

In recent years, the national curriculum has been modernized to integrate key competencies such as autonomous learning, critical thinking, and digital and civic skills. However, the implementation of these components varies significantly, often depending on the individual initiative of teachers and the resources available at the local level. Another important initiative has been the expansion of dual education and the strengthening of partnerships between the educational system and the industrial sector. The dual model, which combines theoretical instruction with practical training in the workplace, has been implemented in certain colleges and centers of excellence, in collaboration with economic agents. Nevertheless, the initiative faces challenges such as a lack of well-trained staff, reluctance from some employers, and the absence of clear regulatory and evaluation mechanisms.

The digitalization of education received a significant boost during the global health crisis, which accelerated the use of information technologies in the teaching and learning process. Despite this progress, major inequalities persist in terms of access to equipment, internet connectivity, and the development of teachers' digital skills – especially in disadvantaged environments. In parallel, the Ministry of Education, together with other institutions, launched continuous training programs for teachers focused on developing digital abilities and modern pedagogical methods. However, participation is often limited due to lack of time, insufficient resources, or low motivation, and the actual impact of these trainings on the quality of the educational process remains difficult to assess.

Another area requiring increased attention is career guidance. Although some educational institutions have established career counseling centers, career orientation remains

a marginal component of the educational system. A major challenge in the current educational context is the disconnect between basic education (primary and secondary) and higher education. In schools and high schools in the Republic of Moldova, there should be a stronger focus on economic education, green economy, and digital literacy. These areas need to be integrated earlier into the educational curriculum to better prepare students for future economic and environmental changes. Furthermore, skills related to the proper use of digital technologies (such as computers and smartphones) should be taught from early education in order to ensure a smooth transition to higher education and vocational training. Students have limited access to up-to-date information on labor market trends and real career opportunities.

Although the steps taken are important, it is clear that the educational system needs a more coherent, intersectoral, and data-driven approach to effectively respond to labor market changes. A long-term strategic vision is needed – one that emphasizes flexibility, innovation, and lifelong learning.

Despite the reforms that have been initiated, vocational and higher education continue to produce a large number of specialists in fields with low demand, such as law, public administration, and general economics. At the same time, areas such as information technology, electrical engineering, food processing, and mechatronics struggle to attract enough pupils and students.

Educational policies and recent initiatives should first and foremost align with the labor market demands of the Republic of Moldova. The "Education 2030" development strategy envisions the modernization of training programs, the expansion of dual education, and the introduction of basic digital skills starting from primary school. Partnerships with the private sector are beginning to develop, particularly through chambers of commerce and sectoral councils. However, these partnerships remain sporadic and insufficiently systematized.

EU-supported projects (e.g., EU4Skills) provide assistance for the rehabilitation of VET (Vocational Education and Training) infrastructure and the training of teaching staff, but the results have not yet been scaled at the national level [2].

Centers of excellence have been launched in some regions; however, the lack of a system for monitoring professional integration limits the real impact of the reforms.

To ensure effective alignment between workforce skills and the demands of a dynamic and constantly evolving labor market, the Republic of Moldova needs systemic interventions firmly rooted in multisectoral cooperation. One of the priorities is the creation of a functional mechanism for anticipating labor market needs. This involves the development and regular updating of forecasts regarding skills demand, through a joint effort by public institutions, the private sector, and development partners. The information thus obtained should be integrated into the strategic planning of the educational offer, guiding both enrollment figures and the periodic revision of curricula.

At the same time, strengthening partnerships between education and the economy is essential to effectively bridge the gap between schools and labor market demands. The active involvement of employers in designing study programs, offering relevant internships, and participating in the evaluation of graduates' competencies could transform sectoral councils into effective platforms for dialogue and co-creation of occupational and educational standards. In this context, greater attention must be given to the reform of vocational and dual education, which should be made more flexible and continuously adapted to labor market

requirements. This involves attracting industry specialists as trainers, as well as providing clear incentives to companies that actively engage in vocational training.

Another essential pillar is the promotion of lifelong learning. The state should facilitate adult access to professional retraining and upskilling through concrete instruments such as training vouchers, the development of community learning centers, and information campaigns focused on the benefits of continuous education. In parallel, it is crucial to systematically integrate transversal and digital skills into all forms of education. Critical thinking, effective communication, problem-solving, digital literacy, and entrepreneurial spirit must be cultivated from primary school and continuously developed throughout vocational and higher education.

The modernization of career guidance and educational counseling services is also a key factor in supporting young people's professional pathways. These services must be professionalized, counselors should be properly trained, and guidance activities should be integrated into the educational trajectory, with an emphasis on early familiarization with real labor market opportunities. Finally, investments in educational infrastructure and modern resources remain fundamental. The digitalization of schools, equipping them with high-performance laboratories, interactive materials, and modern technologies are essential conditions for an educational process that is relevant, engaging, and aligned with the demands of the future.

By implementing these measures, the Republic of Moldova could build an educational system capable of responding to the economic and social challenges of the 21st century, reducing the risk of social exclusion and increasing the country's competitiveness at the regional and European levels.

A survey conducted among employees from various fields aimed to identify the competencies perceived as fundamental for the future of work, the degree to which the workforce is prepared to meet labor market demands, and the willingness of organizations to adopt alternative work models. The results indicate, first and foremost, a strong focus on digital skills, communication skills, critical thinking, problem-solving, and leadership abilities. Nearly three-quarters of respondents believe it is essential to develop skills related to the virtual environment and effective communication; more than half emphasize analytical thinking and leadership, while a very small percentage explicitly mentioned the importance of professionalism and credibility as distinct elements.

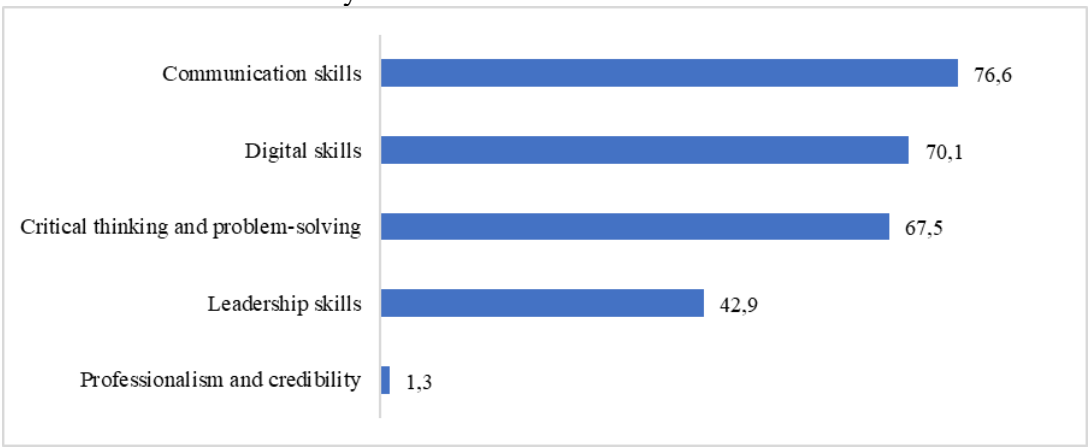

Figure 1. Key competencies considered essential for the future of work, %
Source: compiled based on survey responses

At the same time, in order to understand the extent to which these competencies are already acquired by the workforce, respondents were invited to assess their level of preparedness in relation to the current labor market demands, thus highlighting their awareness of personal competencies and the need for continuous improvement. The majority of participants rated their current skill level as "moderately prepared," while just over one-fifth considered themselves very well adapted to labor market requirements, and a significant segment acknowledged the need for additional training. This self-assessment reveals that, although there is a core group of employees who feel prepared, a considerable portion requires reinforcement or updating of their knowledge.

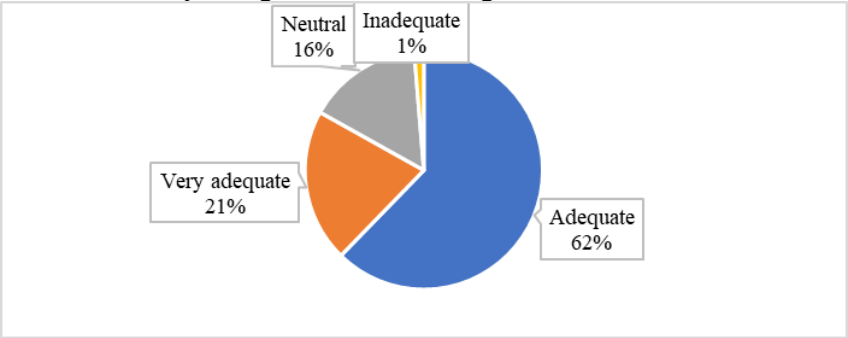

Figure 2. Self-assessment of skill levels in relation to labor market requirements
Source: compiled based on survey responses

Nearly 60% of respondents regularly benefit from continuing training programs offered at the organizational level, while a quarter have access to such initiatives only occasionally. A small portion stated that no such opportunities exist within their organization, highlighting differences in human resource strategies depending on the sector or internal organizational culture.

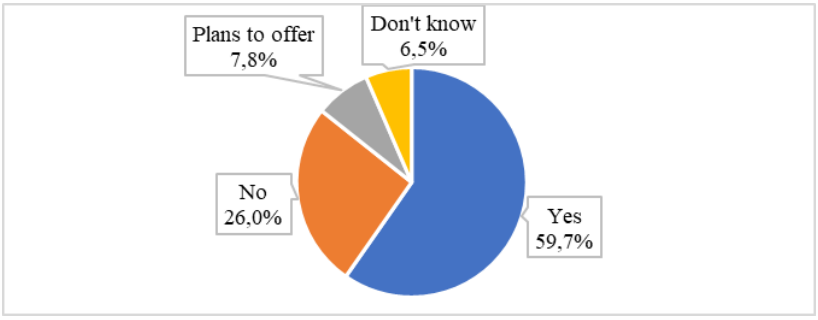

Figure 3. Planning and availability of continuing training and professional development programs at the organizational level
Source: compiled based on survey responses

The state of the educational system remains marked by pronounced skepticism: more than half of respondents believe that the training provided by educational institutions is not aligned with the needs of the modern economy and does not offer the essential skills required for the future of work.

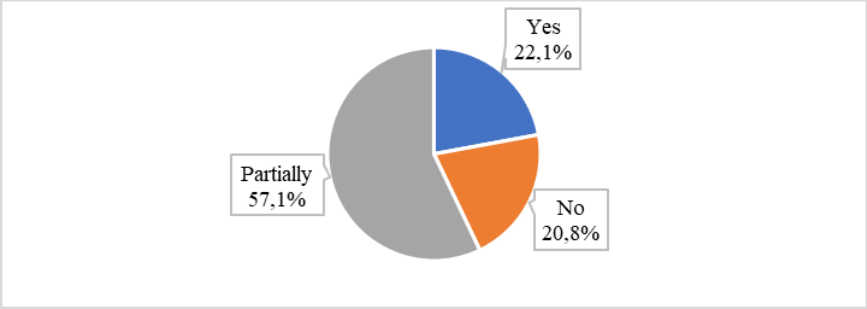

Figure 4. Relevance of the training provided by the educational system to current and future labor market demands

Source: compiled based based on survey responses

Regarding organizations' openness to new work models, the results indicate that only a small percentage are truly "very open" to change, with the largest share represented by organizations willing to experiment – but with a certain degree of caution.

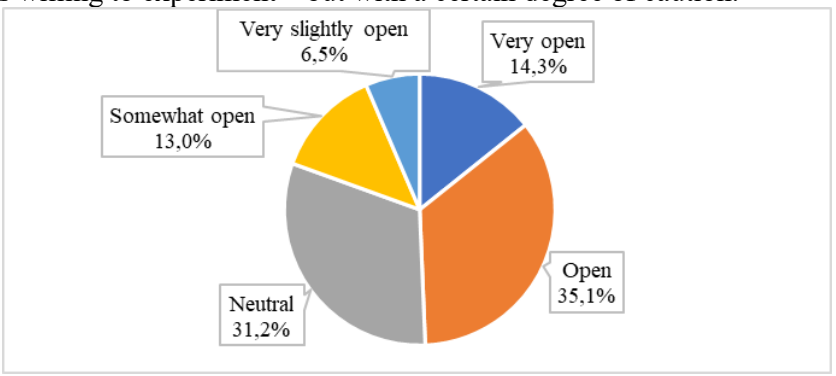

Figure 5. Degree of organizational openness to adopting new work models

Source: compiled based on survey responses

At the same time, there is also a significant proportion of respondents who describe their work environment as reserved or even resistant to innovations in work organization. This attitude – combined with issues such as insufficient digital infrastructure, managerial reluctance, or lack of trust in remote productivity – is seen as the main obstacle to implementing more flexible work arrangements such as teleworking, flexible schedules, freelancing, or job-sharing.

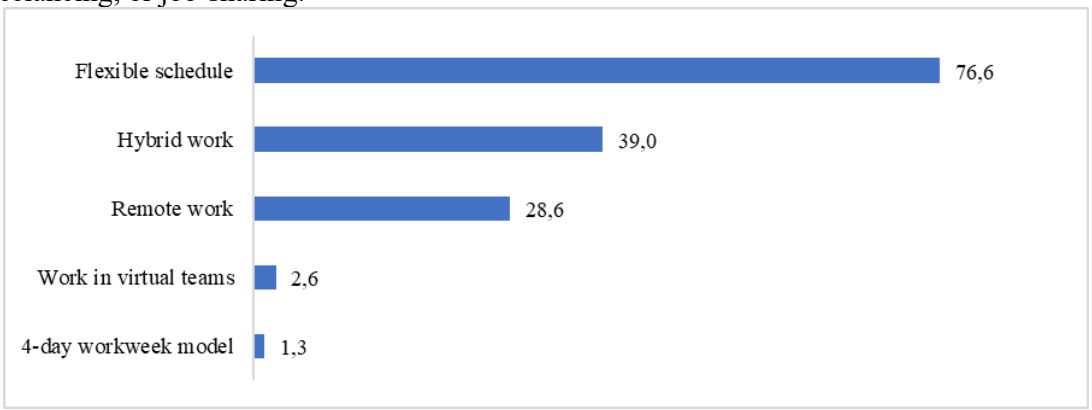

Figure 6. Alternative work models considered beneficial for the organization, %
Source: compiled based on questionnaires

This set of findings reveals, on the one hand, a growing need to develop digital and transversal skills, coupled with a strong focus on continuous learning and the adaptation of the educational offer. On the other hand, it highlights the necessity of an organizational environment that values these skills through policies centered on flexibility and openness to change. In the absence of such policies, even well-developed skills may remain underutilized, and the potential for innovation in the field of work risks being limited by cultural, technological, or managerial barriers.

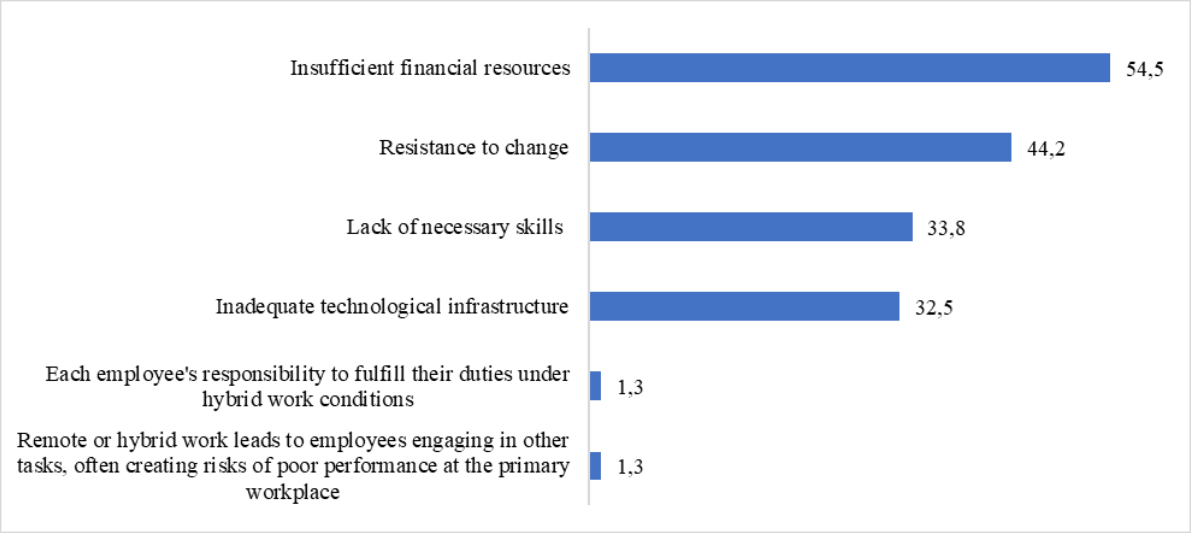

Figure 7. Main perceived obstacles to implementing alternative work models, %
Source: based on questionnaire data

The opinions and recommendations of the participants provided direct insight into the needs and expectations regarding the evolution of work models and skills development in the Republic of Moldova, while also being relevant for understanding priorities and possible intervention pathways. Among the frequent suggestions were the need to increase salaries and establish transparent mechanisms for rewards and bonuses – factors that highlight the importance of economic stability and the recognition of employees' efforts in boosting motivation and productivity. Additionally, many respondents supported the flexibilization of work schedules, whether through a reduction to a four-day workweek, the adoption of hybrid models, or fully remote arrangements. These options were seen as contributing to a better work-life balance and improved employee efficiency. However, some reservations were expressed regarding telework, particularly in contexts where physical presence and direct interaction are perceived as essential for the proper conduct of activities.

A significant number of responses emphasized the importance of continuous training and digital skills, with frequent references to collaboration between universities and the business sector in order to adapt curricula to the actual needs of the labor market. Suggestions also included mentorship programs and internships to support the transition of young people

from education to employment. On the other hand, several participants highlighted the need to update the Labor Code and fiscal policies to create favorable conditions for the implementation of modern work models and for ongoing investment in employees' skills. In the same vein, the necessity of reducing labor migration was noted, through measures aimed at ensuring competitive salaries and fair employment conditions.

Perspectives on improving the quality of education and infrastructure are also at the forefront, with calls for the introduction of digital education programs starting from school, along with increased access to the internet, modern technologies, and professional training adapted to the global context. The importance of emerging skills, such as those related to artificial intelligence, is also highlighted, as is the role of international partnerships in supporting innovation and research. Particular attention is given to inter-institutional cooperation, as respondents believe that a joint effort by trade unions, local authorities, and the private sector could generate sustainable solutions for fostering entrepreneurship, protecting workers' rights, and improving transport infrastructure. Thus, beyond the statistical findings, these comments and suggestions illustrate the depth and diversity of expectations regarding the transformation of work models and the development of skills in an economy undergoing adaptation to global market demands.

4. Conclusions

The profound transformations of the labor model in the Republic of Moldova – driven by digitalization, migration, the green transition, and new economic demands – necessitate a fundamental rethinking of how the workforce is prepared. The analysis presented in this article has highlighted both the structural challenges faced by the education system in adapting to new socio-economic realities and the opportunities that can be harnessed through coherent policies, multisectoral interventions, and active partnerships between the state, the private sector, and civil society.

The persistent gaps between the skills developed within the educational system and those demanded by the labor market directly impact youth employability, adult professional mobility, and the national economy's capacity for sustainable and competitive growth. In this context, aligning education with labor market dynamics can no longer be viewed as a mere policy option—it must be recognized as a strategic necessity for modernizing the country and strengthening social cohesion.

The results of the survey conducted among employees from various sectors support these conclusions, highlighting both the importance of digital and transversal skills and the relatively low level of preparedness perceived at the individual level. Equally, the limited awareness of new work models and skepticism toward the education system confirm the need for a strategic, integrated approach – one that shifts from isolated reforms to a robust framework for continuous learning and occupational innovation.

Moreover, more than half of the respondents believe that educational institutions are not adequately prepared to provide the skills required by the labor market, and approximately 60% rate themselves as "moderately prepared," thereby underscoring the pressing need for reforms and integrated strategies.

Based on the empirical data presented, it is clear that the need for digital and transversal skills, along with the importance of continuous training programs, are essential pillars in the modernization of the labor market. At the same time, the reluctance of some organizational environments toward telework and other flexible forms of employment

confirms the crucial role of public policies and education–economy partnerships in enabling a smooth transition to the work models of the future.

It is imperative for the Republic of Moldova to invest in the development of a flexible and forward-looking educational system, capable of responding swiftly to technological, climate, and demographic transformations. Curriculum reform, the digitalization of educational processes, early career guidance, the expansion of dual education, and the promotion of lifelong learning must become central elements of a sustainable national strategy for human capital development. At the same time, mechanisms for feedback and collaboration between schools and employers must be strengthened so that vocational training can reflect the labor market's requirements and trends in real time.

At the same time, a deliberate effort is needed to reduce inequalities in access to quality education, particularly in rural areas and among vulnerable groups, so that inclusion becomes not merely a declarative principle, but a functional reality. Without an equitable approach centered on the real needs of individuals and the economy, the risk of deepening social exclusion and continued emigration of skilled professionals will persist.

The coherent implementation of these policies and initiatives – grounded both in theoretical analysis and empirical evidence from the survey – will decisively shape the Republic of Moldova's ability to strengthen its economic competitiveness and ensure an adaptive, inclusive, and resilient workforce.

Only through an integrated vision – focused on continuous learning, inter-institutional collaboration, and future-oriented strategies – can the Republic of Moldova strengthen its resilience in the face of global transformations and build a society prepared for the challenges and opportunities of tomorrow's world of work.

Acknowledgments: *The article was developed within the framework of 23.70105.0807.10T Project for Young Researchers „Development of new working models in the context of post-pandemic consequences and strengthening of job-specific skills for occupations and areas of smart specialization in the Republic of Moldova".*

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MONETARY POLICY AND SUSTAINABLE FINANCE IN THE REPUBLIC OF MOLDOVA: CHALLENGES AND OPPORTUNITIES

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Abstract: *The urgent need to address climate change and environmental challenges has brought sustainable finance to the forefront of economic policy discussions. This study adopts a literature-based approach to investigate the role of the National Bank of Moldova in promoting sustainable finance and supporting the transition towards a green and resilient economy. The paper argues that integrating sustainability considerations into the monetary policy framework is crucial for aligning financial flows with climate goals and managing climate-related risks to financial stability. The findings suggest that the National Bank of Moldova can leverage various instruments, such as green lending facilities, ESG reporting requirements, and collaboration with fiscal authorities, to incentivize green investments and facilitate the allocation of capital towards sustainable projects. Furthermore, the study emphasizes the importance of adopting a holistic approach that harmonizes monetary, fiscal, and structural policies to create an enabling environment for sustainable finance. By fostering synergies between these policy domains, policymakers can catalyze sustainable investments, build an inclusive and resilient economy, and contribute to the achievement of national and international climate targets. The paper concludes by highlighting the need for further research to assess the effectiveness of specific sustainable finance interventions and to explore the potential trade-offs and unintended consequences of incorporating sustainability objectives into monetary policy.*

Keywords: *monetary policy, sustainable finance, green investments, financial stability, National Bank of Moldova*

JEL Classification: *E52, E58, Q54, Q56*

1. Introduction

The long-standing practice of separating environmental and social issues from economic decision-making has reached its limits, compelling central banks and financial authorities to finally integrate sustainability as an essential pillar of macroeconomic management, in response to growing pressure from academic research and public sentiment. Especially since entities in the financial sector, which interact directly with businesses and the population, are also becoming increasingly aware of their capacity to direct resources toward initiatives that advance sustainability goals. In line with global shifts, the integration of sustainability principles into financial flows represents a strategic imperative for the Republic of Moldova.

Recent scientific contributions highlight that monetary policy decisions represent essential levers for stimulating sustainable investments through the creation of a favorable financial framework. According to Bisultanova (2023), sustainable financial services serve as critical instruments for sustainable economic development, with governments playing a catalytic role in green financing initiatives. The author emphasizes that these services contribute to mobilizing the private capital necessary to bridge the gap between required investments and those actually implemented in sustainable projects, thus facilitating the transition toward greener and more resilient economies. Supporting these ideas, researchers Bongers and Díaz-Roldán (2019) suggest that reformulating traditional economic policies can

stimulate sustainable growth, underscoring that both economic and environmental dimensions must be taken into consideration to achieve comprehensive economic sustainability.

Therefore, we can firmly state that the combined approach to monetary policies and sustainable finance becomes not just an option, but an essential requirement for ensuring economic strength and lasting development, especially for economies facing specific challenges in transitioning and aligning with European sustainability standards, such as the Republic of Moldova. For this reason, the main purpose of this article is to examine the relationship between monetary policy and sustainable finance in the Republic of Moldova. This study aims to identify both the opportunities and challenges in promoting green investments and to assess how monetary policy tools can help support the shift toward a sustainable economy.

2. Literature review

The global shift towards a more sustainable economy has led to a fundamental transformation of economic and financial paradigms, recognizing the interaction between monetary policy and sustainable finance as an area of strategic importance. This connection is not coincidental, but rather a coordinated response to the challenges of climate change and the need to transition to resilient economic models. Researchers are increasingly exploring ways in which central banks can integrate sustainability considerations into their monetary policy instruments, thus expanding their traditional role centered on price stability and economic growth

Recent research suggests that monetary policy can play a decisive role in facilitating the transition to a low-carbon economy by creating a framework that favors green project financing and discourages investments in polluting sectors. Aligning central bank mandates with sustainability objectives is crucial for promoting green finance, as these institutions can catalyze climate-friendly investments without compromising financial stability (Dikau & Volz, 2021). In the literature, many authors characterize green monetary policy instruments as effective mechanisms for promoting sustainability. Vestergaard (2022) analyzes various tools that central banks can employ to support environmental goals, highlighting potential synergies between green monetary policy and existing fiscal measures. These tools include preferential terms for sustainable project loans, adjusted reserve requirements for banks financing green initiatives, and market operations favoring sustainable financial assets. Schoenmaker (2021) argues that incorporating green objectives into monetary policy sends a strong market signal about sustainability's importance, thereby mobilizing private capital toward environmentally positive projects.

To facilitate the coordinated implementation of these instruments, Dziwok and Jäger classified and systematized approaches to green finance and green monetary policy, developing a comprehensive framework that illustrates the complex interconnections between different strategies (Dziwok and Jäger, 2021). This taxonomy provides a valuable tool for policymakers, allowing them to assess the available options and select the most appropriate instruments for their specific context. The authors emphasize the need for a holistic approach that integrates green monetary policy into a broader framework of economic and environmental policies.

Among all financial instruments analyzed in this classification, central bank policies on collateral management show the strongest potential for growth and influence. McConnell and colleagues show that when central banks favor green assets in their collateral frameworks,

they can greatly help sustainable finance grow (McConnell et al., 2021). When central banks change their collateral rules to give priority to green assets, they can guide where money flows in the economy, sending it toward sectors needed for environmental change. This approach could greatly change financial markets, giving an advantage to projects and companies that support climate goals.

In parallel with the implementation of these instruments, the role of central banks in promoting transparency regarding climate risks is becoming increasingly important. Researchers highlight the contribution of central banks in communicating the relevance of climate risks for financial stability, arguing that effective communication can raise markets' awareness of the potential impact of these risks (Wołoszczenko-Hołda, 2022). Informing market actors is an essential first step in integrating climate risks into investment and lending decisions, thus facilitating the transition to a more sustainable economy.

This transparency supports the development of tailored macroprudential policies that should foster green lending while simultaneously contributing to mitigating financial risks associated with climate change (D'Orazio & Popoyan, 2019). Accordingly, financial stability and environmental sustainability are closely interlinked. Financial stability facilitates investments aimed at mitigating climate risks, creating a virtuous circle in which resilient financial systems support the green transition, which in turn reduces systemic risks in the long term (Sun et al., 2022). This integrated perspective highlights the complementarity between the traditional objectives of central banks and their new responsibilities in the field of sustainability.

To monitor and evaluate this virtuous circle's effectiveness, ESG (Environmental, Social, and Governance) reporting by financial institutions serves as a crucial tool for tracking progress toward a sustainable economy. Enhanced ESG transparency can improve banks' operational and market performance (Buallay et al., 2020).

Successful implementation requires effective coordination between policy instruments—essential for sustainable finance initiatives. Svartzman et al. (2020) propose a three-level framework for coordinating central bank policies amid climate uncertainty, emphasizing an integrated approach combining monetary, macroprudential, and financial stability policies. This holistic perspective acknowledges climate challenges' complexity and the need for coordinated responses from all stakeholders.

International experiences provide valuable lessons for developing green monetary policy frameworks. Petlenko (2024) examines green energy financing in Ukraine's energy security context, highlighting the critical relationship between governance frameworks and sustainable energy initiatives. Eastern Europe's specific challenges—post-Soviet transition and European integration aspirations—offer relevant insights for transitioning economies adapting green monetary policy instruments to local conditions.

3. Research methods

The study employs a mixed-methods approach integrating quantitative and qualitative research techniques. Our methodological framework rests on three foundations: a systemic approach examining monetary policy-sustainability interconnections, an evolutionary perspective tracking institutional transformations, and sustainable development principles guiding our evaluative criteria. Data sources include official National Bank of Moldova reports, National Bureau of Statistics data, policy documents, and relevant academic literature. Analysis combined synthesis techniques to identify monetary policy and

sustainable finance patterns, comparative methods to benchmark Moldova's indicators against European standards, and statistical clustering to extract correlations between banking sector evolution and macroeconomic indicators. Qualitative analysis of specialized reports provided crucial context for understanding NBM's strategic orientation toward sustainability objectives, strengthening the foundation for our conclusions and recommendations.

4. Results and discussion

The Republic of Moldova is at a crucial crossroads in its economic and financial development, simultaneously facing challenges related to the transition to a functioning market economy, aspirations for European integration, and the need to adopt sustainable practices. The National Bank of Moldova (NBM), as the central monetary authority, has a decisive role in facilitating this transition, by aligning its policy instruments with sustainability objectives.

The period 2019-2024 represented for our country an interval of extreme economic volatility, marked by multiple shocks that tested the institutional capacity to adapt. The evolution of the main macroeconomic indicators illustrates the amplitude of the challenges the economy faced during this period, from the severe contraction during the pandemic to the destabilizing effects of the conflict in Ukraine (fig.1):

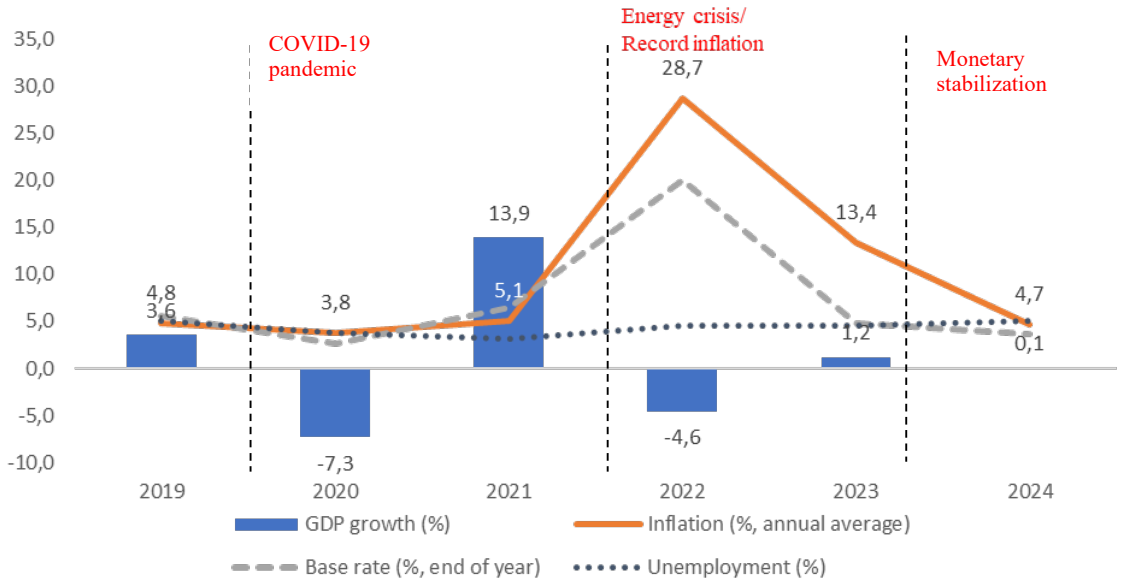

Figure 1: Evolution of key macroeconomic indicators, %

Source: NBM, NBS

In this difficult context, the NBM played a key role in ensuring stability by implementing adaptive and pragmatic monetary strategies. The fundamental challenge was the increase in inflation in 2022 (28.7%), driven by the convergence of the energy crisis, supply chain disruptions and the effects of the conflict in Ukraine. The NBM responded promptly and decisively, through an unprecedented increase in the base rate, demonstrating its determination to anchor inflationary expectations.

Faced with these challenges, the NBM actively used monetary policy instruments to stabilize the economy and counter inflationary pressures.

The NBM's monetary policy during the period under review was characterized by a rapid and flexible adaptation to the evolution of macroeconomic conditions. The main instruments used included the base rate, money market operations and the reserve requirement rate, each of which was strategically calibrated to effectively respond to the challenges specific to each stage.

Following the monetary easing during the pandemic, the central bank implemented the most aggressive monetary policy tightening in its recent history, raising the base rate from 2.65% at the end of 2020 to 21.5% at the end of 2022. At the same time, the reserve requirement ratio was adjusted from a low of 26% in 2021 to 37% in 2022, in order to restrict excessive liquidity in the system and strengthen the transmission effect of monetary policy. This coordinated approach of monetary policy instruments was essential in containing severe inflationary pressures and stabilizing financial markets, demonstrating the central bank's strong commitment to its primary mandate of ensuring price stability.

The monetary policy transmission mechanism was slow but effective, reflecting structural improvements in the financial system. The increase in the base rate was promptly transmitted to interest rates on the interbank market and, subsequently, to interest rates on bank loans and deposits. This transmission contributed to mitigating inflationary pressures and maintaining the exchange rate, in a particularly volatile external context.

Starting in 2023, as inflationary pressures subsided, the NBM initiated a gradual monetary easing cycle, reducing the base rate from the maximum level of 21.5% to 3.60% in 2024. This reduction was implemented in stages, in order to maintain the balance between the need to stimulate economic growth and the fundamental objective of price stability. Although monetary easing was substantial, the NBM maintained a prudent approach, highlighted by decisions to maintain the base rate at the same level during periods of heightened uncertainty regarding future inflation developments.

From an economic theory perspective, gradual reductions in the base rate may have implications beyond traditional monetary policy objectives. Coordination between traditional monetary policy instruments and sustainability objectives represents an important challenge, but also an opportunity for innovation in monetary policy, as Desalegn et al. (2022) point out. In theory, gradual reductions in the base rate can create favorable conditions for lending and investment, including for green projects, while maintaining price stability as the primary objective.

In parallel with promoting monetary policy, the NBM continued its efforts to strengthen the resilience of the banking sector, implementing Basel III standards and improving the regulatory and supervisory framework. The current structure of the banking sector in the Republic of Moldova reflects the results of these efforts (table 1):

Table 1: Key banking indicators for sustainable finance in RM

Indicator	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Assets (billion MDL)	90.68	103.77	118.50	131.37	153.85	170.32
Asset growth rate (%)	-	14.43	14.19	10.86	17.11	10.71
Loans (billion MDL)	40.97	44.90	54.63	58.71	62.48	80.82
Loan Growth Rate (%)	-	9.59	21.67	7.47	6.42	29.35
Loans (billion MDL)	40.97	44.90	54.63	58.71	62.48	80.82
Deposits (billion MDL)	68.45	79.70	90.15	95.14	113.98	129.34
Loan-to-Deposit Ratio (%)	59.85	56.34	60.6	61.7	54.8	62.5
Capital adequacy ratio (%)	25.25	27.25	25.89	29.25	29.91	26.32

Non-performing loans/Total loans (%)	8.49	7.38	6.14	6.44	5.55	4.15
ROA (%)	2.47	1.53	2.00	2.89	2.77	2.39
ROE (%)	14.63	8.89	12.26	17.04	16.15	14.79
Risk-Adjusted Return (ROA/NPL)	2.47	1.53	2.00	2.89	2.77	2.39

Sourse: NBM, own calculations

The implementation of Basel III standards has significantly contributed to improving the resilience of the banking sector, by strengthening capital and liquidity requirements. According to NBM data, the average capital adequacy ratio in the banking system of the Republic of Moldova remains significantly above the regulated minimum of 10%, indicating a good shock absorption capacity. Bank assets also registered a substantial increase, reaching 170.32 billion MDL, and the quality of the loan portfolio improved considerably, with the share of non-performing loans decreasing to 4.15%.

International experiences demonstrate that financial stability facilitates investments aimed at mitigating climate risks, creating positive synergies between the resilience of the financial system and the ecological transition (Sun et.al., 2022). These findings support the NBM's approach of first strengthening the stability of the banking sector as a prerequisite for the further development of green finance in the Republic of Moldova. The indicators analyzed show that the banking sector has reached the necessary level of stability and resilience to start a coordinated transition towards the integration of sustainability considerations, but this requires an appropriate regulatory framework and specific incentives from monetary and fiscal authorities.

The main barriers include the lack of a national taxonomy of sustainable activities, the absence of dedicated green lending facilities, the limited capacity to assess climate risks in financial institutions and the insufficient demand for green finance. Overcoming these obstacles requires coordinated interventions to capitalize on the potential created by positive financial stability indicators.

In addition to strengthening financial stability, another determining factor for the development of sustainable finance is the degree of innovation and accessibility of financial services. In this regard, the digital transformation of the banking sector is an essential catalyst for the implementation of green financing models, providing the technological infrastructure necessary for the efficient distribution of sustainable financial products and for monitoring their impact.

The evolution of financial inclusion and digitalization indicators of the payment system in the Republic of Moldova during 2019-2024 reflects a significant transformation of the financial sector and an acceleration of the process of modernization of the payment infrastructure (table 3).

Table 3: Financial inclusion and digitalization indicators of the payment system in RM

Indicator	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2024/ 2019 (%)**
Total number of ATMs	1137	1120	1152	1166	1243	1311	+15,3%
ATMs per 100,000 inhabitants	42,35	42,37	43,86	45,46	49,87	54,10	+27,7%
POS terminals	20517	23727	28463	32318	36709	44122	+115,1%
Contactless POS terminals	13815	18821	24154	28157	33372	42855	+210,2%

E-commerce platforms	406	533	584	764	1199	2202	+442,4%
Non-cash payments (million transactions)	50,92	70,26	101,6	135,9	183,0	246,0	+383,1%
Non-cash payments (billion MDL)	17,21	21,76	32,24	45,90	60,71	80,08	+365,3%
E-commerce payments (million transactions)	10,97	11,01	14,95	16,26	18,73	28,07	+156,0%
E-commerce payments (bn MDL)	4,63	4,77	6,57	8,12	9,52	13,46	+191,0%
EPI payments* (mln. operations)	7,52	11,40	16,17	20,55	23,30	26,40	+251,1%
Cash withdrawals (mln. operations)	28,25	25,77	27,99	29,46	30,97	30,31	+7,3%
% adults with bank account	N/A	N/A	64,25	N/A	N/A	N/A	N/A
% adults with debit card	N/A	N/A	46,09	N/A	N/A	N/A	N/A

EPI - Electronic payment instruments with remote access
Source: NBM, own calculations, Global Findex Database (2021)

Analysis of bank card transaction data reveals a profound transformation of payment behavior in the Republic of Moldova between 2019 and 2024. The number of non-cash payment transactions recorded an extraordinary increase of 383.1%, from 50.92 million in 2019 to 246.01 million in 2024, and their value increased by 365.3%, from 17.21 billion MDL to 80.08 billion MDL.

This impressive dynamic of electronic payments contrasts sharply with the moderate evolution of cash withdrawal transactions, which increased by only 7.3% in number over the same period. The ratio between the number of non-cash payment transactions and that of cash withdrawals changed significantly, from 1.8:1 in 2019 to 8.1:1 in 2024, indicating a fundamental transformation in the use of payment instruments.

E-commerce has become an important channel for cashless transactions, with the number of operations through e-commerce platforms increasing by 156% in the analyzed period, and their value by 191%. Even more dynamic was the evolution of payments through electronic instruments with remote access (mobile applications, internet banking), which recorded an increase of 251.1% in number and a tripling in value.

The traditional infrastructure for access to financial services, represented by the ATM network, recorded a moderate but constant growth, from 1,137 units in 2019 to 1,311 in 2024, representing an increase of 15.3%. This evolution, correlated with demographic trends (declining population), led to a more pronounced improvement in the density indicator, with the number of ATMs per 100,000 inhabitants increasing by 27.7%, from 42.35 in 2019 to 54.10 in 2024.

The most spectacular transformation is observed in the electronic payments infrastructure. The number of POS terminals increased by 115.1% during the analyzed period, from 20,517 in 2019 to 44,122 in 2024, and the number of POS terminals with contactless functionality recorded an even sharper increase of 210.2%, reflecting the rapid adaptation to modern payment technologies.

These developments in financial inclusion and the digitalization of the payment system are essential for the transition to a greener and more sustainable economy, as they

facilitate access to financial services for a wider range of economic actors and reduce barriers to financing innovative projects, including those in the field of sustainability, as suggested by the research of Mardari and colleagues (2022).

5. First steps towards sustainable financing

The integration of sustainability principles in the financial and banking sector of the Republic of Moldova is at an early stage, marked for now more by strategic approaches than by concrete achievements. So far, the effective contribution of the NBM in this area has been limited to the development of the conceptual framework and the establishment of institutional partnerships.

The main tangible achievement is the approval, by Decision of the Executive Committee of the NBM No. 145 of 28 May 2024, of the *Roadmap for Sustainable Finance* (NBM, 2024a). This strategic document was developed as a result of the commitment assumed through the Memorandum on Economic and Financial Policies concluded with the International Monetary Fund, within the framework of the program supported by the Resilience and Sustainability Financing Facility (RSF). The development of this document in collaboration with the International Finance Corporation (IFC) represents an important first step, but its effective implementation remains a desideratum for the future.

The second notable element is the establishment of inter-institutional collaboration. The NBM signed a Memorandum of Understanding with the Government of the Republic of Moldova and the National Commission for the Financial Market to develop a framework for sustainable and environmentally responsible financing. The stated goal is to facilitate the integration of sustainable financing principles into the national financial system. (NBM, 2024a). Although significant from the perspective of institutional cooperation, this memorandum remains at a declarative level for the time being, without yet generating concrete changes in the functioning of the financial system.

The NBM joined, starting with 8 November 2023, the international network for sustainable finance (SBFN), a voluntary community of financial sector regulators, central banks and other institutions committed to promoting sustainable finance (Ziarul Național, 2024). This accession could facilitate the alignment of the Moldovan financial system with international standards, but the concrete effects of this affiliation are to be manifested in the coming period.

Looking ahead, the *Roadmap for Sustainable Finance* outlines an ambitious five-year plan (2024-2028), structured around four main pillars:

- The first pillar aims ***to raise awareness and strengthen institutional capacities***, through activities such as organizing public events, conducting research, creating an advisory group, an information department and developing tools to measure progress. These initiatives are crucial for creating the necessary foundation for implementing sustainable finance concepts, but their success will depend on the allocation of adequate resources and the real commitment of the institutions involved.

- The second pillar focuses on ***channeling capital flows for sustainable finance***, by developing a taxonomy for sustainable finance, adopting guidelines for project selection and evaluation, developing guidelines on green bonds and credits, and exploring incentive options to encourage investment in sustainable projects. Although essential for the transformation of the financial market, these initiatives face the challenge of practical implementation in a

relatively small financial system with limited experience in the field of green financial instruments.

- The third pillar concerns the ***integration of ESG (environmental, social, governance) criteria and risk management,*** by including these criteria in corporate governance regulations, adopting environmental and social risk management requirements, and developing the capacities of financial sector entities. One of the major challenges in this area is the insufficient preparation of banks and other financial institutions to assess and manage climate and environmental risks, which require specialized expertise and appropriate analytical tools.

- The fourth pillar focuses on ***transparency and market discipline***, by adopting guidelines for reporting and publishing ESG information, monitoring such reporting, and creating a centralized publication mechanism. The implementation of this pillar faces the challenge of the lack of uniform reporting standards and the limited capacity of financial sector entities to collect and interpret relevant data.

Of course, this document is a rough one, there is a discrepancy between the scope of the proposed objectives and the resources available for their implementation. Most of the planned initiatives require specialized expertise, which is currently limited in the Republic of Moldova. At the same time, the document does not provide sufficient details on concrete ways to stimulate financial institutions to orient their lending towards sustainable projects, in an economic context in which short-term profitability considerations often prevail in business decisions. The NBM recognizes that "environmental risks and climate change will represent key sources of risk for the financial sector in the 21st century". However, financial entities in the Republic of Moldova do not yet have adequate tools for assessing and managing these risks. Their integration into corporate governance processes and lending decisions will require not only regulations, but also a profound change in mentality at the level of financial institutions' management.

The *Roadmap* mentions the intention to develop a national taxonomy for sustainable finance based on the EU taxonomy. This approach is logical in the context of the European aspirations of the Republic of Moldova, but needs to be adapted to local economic realities, characterized by the predominance of energy-intensive sectors and limited resources for investments in green technologies.

For the implementation of the *Roadmap* to be successful, coordination with other national policies and strategies is essential. The National Development Strategy "European Moldova 2030" includes among its priorities the alignment with the UN Sustainable Development Goals (UN Moldova, 2023). However, without a coherent and integrated approach, which actively involves line ministries, the business environment and civil society, there is a risk that the NBM initiatives will remain isolated and without a significant impact on the real economy.

Thus, we can see that although the NBM has taken the first important steps by developing the strategy and establishing the necessary partnerships, the effective implementation of sustainable finance principles in the Moldovan banking sector is only at the beginning. The challenges are considerable, from developing the necessary expertise to changing the organizational culture of financial institutions and aligning economic incentives with sustainability objectives. Success will depend on the NBM's ability to mobilize resources, build effective partnerships and adapt international standards to local specifics, while ensuring a gradual transition that does not affect the stability of the financial system.

6. Conclusions

Our study on the relationship between monetary policy and sustainable finance in the Republic of Moldova highlights the importance of integrating sustainability considerations into monetary policy to align financial flows with climate objectives. The financial stability ensured by the NBM in the period 2019-2024, despite a volatile context, creates the necessary premises for the development of sustainable finance, confirming that the stability of the financial system facilitates investments in climate risk mitigation projects.

The accelerated digitalization of the payment system and the improvement of financial inclusion are catalysts for the implementation of green financing models, providing the necessary technological infrastructure for the distribution of sustainable financial products. Recent initiatives by the NBM, such as the approval of the Roadmap for Sustainable Finance and the accession to the SBFN, are important steps that need to be complemented by concrete implementation measures.

Calibrating monetary policy instruments to encourage the financing of sustainable projects, without compromising price stability, is a key challenge. International experience suggests that green lending facilities and adjusted reserve requirements can create effective incentives, but their implementation requires a gradual approach. To maximize effectiveness, coordination between monetary, fiscal and structural policies is essential, thus creating synergies that catalyze sustainable investments and contribute to achieving climate targets.

Aknowledgement*: The article was developed within the framework of Subprogram 030101 „Strengthening the resilience, competitiveness, and sustainability of the economy of the Republic of Moldova in the context of the accession process to the European Union", institutional funding.*

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THE PROFESSIONAL ACCOUNTANT IN THE DIGITAL AGE: CHALLENGES, ADAPTATIONS AND OPPORTUNITIES

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Abstract: *The simple fact that artificial intelligence has the ability to perform work tasks specific to the professional accountant in a considerably shorter time does not mean that it will disappear, but, in most cases, it only implies that it is in a period of its transition, of reinvention. This stage can only be gratifying, as the permanent updating of the work skills will lead both to the increase of the entity's performance and to the appreciation and stimulation of the accountant. Today's professional accountant plays an even more important role within the employing entity, being considered an expert in financial advice, so important managerial decisions often depend on his opinion. Through a case study on the acquisition of new skills regarding professional accounting education, we analyzed some of the challenges and opportunities of the CODIX Project – Advanced Digital Skills for Industry 4.0, implemented by the Body of Expert and Licensed Accountants in Romania. An initiative like this, whose main purpose is to help professionals in order to keep them in the field of work and increase productivity, in an era of continuous transformations, denotes the country's sustained efforts to adapt to the new conditions in the labor market, CODIX representing a valuable support provided to accountants, a starting point. Thus, learning to collaborate harmoniously with digital tools is found to be strictly necessary, as the performance of the human workforce is directly influenced by the relationship of the professional accountant with artificial intelligence. With the help of training and professional development programs, human personnel can broaden their spectrum of knowledge and make their lives easier, while achieving better results with less consumption of resources.*

Keywords: *professional accounting education, challenges, opportunities.*
JEL Classification: *J24, M41, M53.*

1. Introduction

Digitalization is no longer just a trend, but a concrete reality that redefines the way economic professions work. Technologies such as artificial intelligence, robotic process automation (RPA) and real-time data analysis are profoundly transforming the role of the professional accountant. As Moll and Yigitbasioglu (2019) state, digitalization requires a transition from operational functions to strategic roles, in which the accountant becomes increasingly involved in managerial decisions, performance analysis and risk assessment.

At the same time, specialists point out that automation does not eliminate the need for professional accountants, but creates a new set of requirements related to digital skills, technological understanding and critical thinking (Baldvinsdottir et al., 2020). In this context, reskilling and upskilling become imperative for the survival and development of the accounting career. Continuing professional training programmes, such as those carried out by national professional bodies, play a crucial role in facilitating their adaptation to new realities (IFAC, 2022).

Also, another essential aspect is the human-technology relationship, which should not be seen as a competition, but as a synergistic collaboration. The modern accountant has the opportunity to reconfigure his professional identity in relation to these tools, becoming an orchestrator of technology and not a substitute for it (Richins et al., 2017). Thus, the digital transformation offers a framework for evolution rather than a risk of marginalization.

What the author wants to emphasize is the fact that in the era we live in today, traditional professions are undergoing profound transformations, and accounting is no exception, but, far from being replaced, the accounting profession is in an active process of

transition and reinvention, imposed by the new demands of the labor market and the integration of emerging technologies. Susskind and Susskind (2015) state that technological evolution, especially in the field of artificial intelligence (AI), has brought with it a redefinition of the role of the professional accountant, which is no longer limited to repetitive technical tasks, but is increasingly developing in a strategic, consultative and anticipatory direction.

This transition stage, if properly managed, offers numerous opportunities to increase the performance of economic entities, but also to recognize and value the expertise of the modern accountant (ACCA, 2020).

Deloitte (2019) argues that the contemporary accountant is no longer perceived exclusively as a financial records administrator, but as a strategic partner in decision-making, a trusted advisor to management and an analyst of risks and opportunities. In this context, advanced digital skills become an essential pillar in the continuous training of the professional accountant. The CODIX project – Advanced Digital Skills for Industry 4.0, carried out by the Body of Expert and Licensed Accountants of Romania (CECCAR), offers an eloquent example of the directions of adaptation of the accounting profession to the new requirements of the digital economy. More specifically, this training program aims to develop the digital skills of accounting professionals to enable them to remain competitive in the labor market, in parallel with the effective use of emerging technologies such as artificial intelligence, blockchain or RPA (CECCAR, 2022).

The purpose of this article is to analyze how accounting professionals in Romania respond to the challenges posed by digitalization, exploring the opportunities for adaptation and evolution through the prism of a case study dedicated to the CODIX Project. At the heart of the analysis is the research question: "How can the professional accountant adapt his skills in the digital age to remain relevant and valuable in the labor market?" The answer to this question will be based on the literature and supported by concrete examples from practice.

2. Literature review

Digital transformation has significantly influenced the accounting profession, and artificial intelligence, automatisms and digital tools play an increasingly important role in carrying out specific accounting tasks. However, this transition has not led to the disappearance of professional accountants, but has brought to the fore the need to acquire innovative skills to face the new challenges. In this regard, a study by AICPA (2020) highlights that the adoption of advanced technologies not only improves professional efficiency, but also transforms the way accountants fulfill their role within organizations. Thus, they are no longer just executors of financial procedures, but become strategic consultants, having a decisive role in managerial decision-making. In such a context, digital skills become essential to remain competitive in the labour market and to cope with the demands of the digital economy.

An important aspect of the transition of professional accountants is related to continuous training. Educational projects such as the CODIX Project in Romania emphasize the importance of a continuous learning framework that helps accountants acquire advanced digital skills, essential for their adaptation to the demands of the Industry 4.0 labor market (CECCAR, 2022). Thus, continuous training becomes a way for professionals to respond to the challenges imposed by new technologies, and digital education is considered a key factor in their professional development.

According to a report by the International Federation of Accountants (IFAC), accounting is in the midst of a significant transformation, fueled by new technologies that are altering both work processes and market expectations (IFAC, 2019). Among the main challenges identified by the literature are:

- Rapid change in technologies: Although modern technologies, such as automation, blockchain, and artificial intelligence, can significantly improve the efficiency of accounting processes, they can also generate fear of job replacement, especially among professionals who are not yet familiar with these technologies. A study by PwC (2020) suggests that professional accountants may be replaced to some extent by algorithms and robots in routine tasks, which raises concerns about the impact on jobs in this sector.

- The need for new skills: Digitalization has imposed the need to acquire advanced digital skills, such as the use of financial data analysis platforms and the management of integrated cloud-based accounting systems. Studies show that there is a significant gap between market requirements and the existing skills of accounting professionals (Schreyer, 2021). In this context, many organizations have failed to invest in the continuous training of their employees, which leads to an underutilization of the potential of digital technologies.

- Cybersecurity and data privacy: As financial data is stored and managed digitally, significant cybersecurity and data protection risks arise. According to a Europol report (2020), cyberattacks on accounting firms and financial institutions have increased significantly, putting data integrity and trust in financial services at risk.

Despite the challenges, digitalization also offers numerous opportunities for professional accountants. In the literature, these opportunities are related to increasing performance, developing the strategic role of accountants and improving the relationship with clients:

- Automation of routine processes: Digitization can eliminate repetitive and time-consuming tasks, allowing accountants to focus more on value-added activities such as financial data analysis and strategic advice. A report by Deloitte (2020) highlights that accounting professionals who embrace automation will be able to focus on increasing profitability and making more informed financial decisions that support organizations strategically.

- Starting the role of strategic advisor: In the past, professional accountants focused on reporting and recording financial transactions, but digitalization allows this role to be extended to a strategic partner, who provides data-driven insights to support business decisions. According to a study conducted by KPMG (2019), accounting professionals who develop advanced analytical skills will be able to provide valuable information for managerial decisions and for aligning financial strategies with organizations' business objectives.

- Increased productivity and efficiency: New digital tools enable accountants to improve productivity and efficiency by quickly accessing centralized financial information and integrating accounting systems with other organizational platforms. Studies in the field show that implementing advanced technologies such as predictive analytics and real-time reporting applications can lead to substantial time and resource savings while increasing the precision and accuracy of accounting processes (Schreyer, 2021).

- Educational and training projects: Educational projects, such as the CODIX Project, are essential for the training and continuous training of professional accountants. A report by the World Economic Forum (2021) highlights the importance of these initiatives, highlighting that digitalisation will become increasingly important in vocational education, given market

demands and rapid technological developments. Continuing education projects, which include professional education courses and certifications in areas such as data analytics, artificial intelligence, and blockchain, are crucial for maintaining the competitiveness and relevance of professional accountants.

In addition to the general aspects related to digitalization, there are also specific educational initiatives in the literature that support professional accountants in acquiring the necessary skills. In this sense, the CODIX Project aligns with the current market and vocational education trends. The CODIX project offers accountants the opportunity to acquire advanced digital skills, essential in the context of transformations in the accounting industry and the new digital economy.

International reports and case studies show that such projects have a significant impact on the adaptation of accounting professionals to digitalization. According to a report by the European Commission (2020), continuing education and training are fundamental pillars in the development of the digital skills of the workforce, and projects such as CODIX are a good example of initiatives that support professional adaptability and improved organizational performance.

Studies conducted by Fayol & Long (2021) highlight that the transition to the use of advanced technologies in accounting has led to significant changes in the nature of accounting activities, generating extensive automation of repetitive processes. The authors also suggest that although many of the traditional tasks of the accountant have been automated, strategic analysis and financial advice remain fundamental aspects of professional activity. These changes cause a constant need to update skills, accountants having to adapt quickly and redefine their approaches to clients and employers.

Another relevant study, conducted by Liu et al. (2020), explores the effects of digitalization on accounting processes within large organizations. They point out that the analysis of big financial data and the use of advanced software allow accountants to perform more complex functions, such as predictive analysis and the development of long-term financial strategies. So, as mentioned before, it is concluded that accountants are required to become more than just "executors", being actively involved in the strategic decisions and financial forecasting of organizations.

Ionescu and Muntean (2021) agree, stressing the importance of educational and continuing education projects, considered essential to ensure a rapid and efficient adaptation of professional accountants. They claim that the CODIX project allows the acquisition of essential skills for operating in the digital age and encourages interdisciplinary collaboration between accountants and IT experts, which significantly increases organizational performance. Continuous professional training thus becomes a necessity not only to meet market demands, but also to contribute to the development of an effective legislative and regulatory framework in the field of digital accounting.

Also, a study by Brown & Green (2019) analyzes the impact of automation on the efficiency of the accounting profession, showing how traditional accounting processes are increasingly supported by automation software, which reduces the time required for routine tasks. In this sense, the authors suggest that, although some tasks are automated, the role of the accountant does not disappear, but changes, and the new responsibilities involve analytical and consulting skills.

Rapid transformations in the digital field have a profound impact on the role of the professional accountant. Although repetitive tasks are automated, accountants are increasingly

involved in strategic decision-making and economic risk assessment. In this context, continuous training and the acquisition of new digital skills become essential for their adaptation to economic and technological changes. CODIX is a key component in this process, providing accounting professionals with the tools they need to successfully navigate the digital age.

3. Methodology and data related to the case study

The case study is based on a qualitative design and uses a mixed research method, combining literature review and analysis of secondary case studies, given the limitations of direct access to interviews with professional accountants. The author has chosen this approach to provide a detailed and in-depth understanding of the challenges and opportunities faced by professional accountants in the face of digitalization.

The methodology adopted includes the following steps:

- Review of the literature (see chapter 2): In this first stage, I carried out a thorough analysis of the academic literature and reports relevant to the topic addressed, focusing on the challenges and opportunities created by digitalization for professional accountants. Bibliographic sources include research articles, reports from international agencies and case studies related to educational initiatives in the field of accounting and new digital skills.

- CODIX project analysis: In the second phase, we examined the implementation and impact of the CODIX Project – Advanced Digital Skills for Industry 4.0, a program supported by the Body of Expert and Licensed Accountants of Romania. The analysis was carried out on the basis of published materials, official reports and other publicly accessible documents, which provide a clear picture of the purpose and objectives of the project, as well as the benefits obtained for professional accountants. At this stage, we explored how the project contributes to adapting accountants to new digital technologies and improving their skills in areas such as data analysis, the use of accounting software and financial information management.

- Analysis of secondary sources and official documents: As direct access to professional accountants for interviews was not possible, we resorted to the analysis of secondary sources, including official reports and case studies published on the official platforms of the relevant organizations (e.g. the official website of the CODIX project, reports published by the Body of Expert and Licensed Accountants of Romania and academic studies in the field). These sources provide valuable information on how the CODIX project has been implemented and its impact on the education and training of accountants in Romania.

Starting from the following research question: "How can the professional accountant adapt their skills in the digital age to remain relevant and valuable in the labour market?", an in-depth understanding of how professional accountants can respond to the challenges and opportunities brought by digitalisation is pursued. This involves an assessment of the various ways in which they can develop or improve their skills and knowledge in order to remain competitive in the labour market. Finally, the research question will allow the identification of solutions and best practices for accounting professionals who want to maintain their relevance and competitiveness on the labor market in a period of rapid transformation of the financial industry. This research will provide recommendations for the implementation of educational programs adapted to the new technological realities and will contribute to the development of viable strategies for training and adaptation of professional accountants.

The CODIX (Advanced Digital Skills for Industry 4.0) project, implemented by the Body of Expert and Licensed Accountants in Romania, aims to improve the digital skills of professional accountants, by offering courses and continuous training sessions in essential areas such as financial data analysis, the use of advanced accounting applications and risk management in the digital environment.

This project responds to an urgent need in the context of continuous transformations in the financial-accounting field, with the main purpose of preparing professional accountants to face the challenges of today's professional day. The implementation of the CODIX project is aligned with Romania's strategic objectives regarding increasing the competitiveness and productivity of the national economy, in an increasingly dynamic and challenging digital landscape.

The project was designed to help accountants update their skills and integrate into the digital age, providing both continuous training opportunities and access to educational resources to improve professional performance. Within it, accountants benefited from training in the use of advanced digital tools and were exposed to new working methodologies, which include process automation and the use of artificial intelligence in financial analysis.

The analyzed project supports a smoother transition to a future in which technology and digitalization will play a key role in shaping professional practice in the field of accounting.

Operational objectives include:

- Analysis of the digital skills needed for professional accountants: Identifying and assessing essential digital skills and knowledge for professional accountants, in the context of emerging technologies (e.g. artificial intelligence, automation, data analytics, blockchain), to understand what skills they need to develop in order to remain relevant in the labour market.

- Evaluation of educational and training initiatives: Investigating educational programs and training projects, such as the CODIX Project, to understand how these initiatives support professional accountants in acquiring and updating digital skills, thus contributing to increased performance and productivity in the field of accounting.

- Examining the impact of digitalisation on the role of the accountant in organisations: Analysing how digitalisation is changing the role of the accountant, including the impact of automation and digital tools on their tasks and responsibilities, as well as how the accountant can adopt a role of strategic advisor to add organisational value through the use of these technologies.

By providing a structured framework for continuous training and up-to-date educational resources, the CODIX project supports accountants in integrating digital technologies into their activities, thus contributing to the development of a more adaptable and competent workforce in the face of the challenges of economy 4.0.

4. Results and discussions

First of all, we will present the results of the analysis of the CODIX project, a project initiated to support professional accountants to improve their digital skills and respond to the challenges generated by the digitization of economic activities, starting from its objectives, going through the strategic stages, identifying the benefits provided and so on.

Among the key objectives of the project are: acquiring advanced digital skills, promoting adaptability to new technologies, increasing efficiency and productivity. When we talk about acquiringadvanced digital skills, we are referring to the continuous training of professional accountants, ensuring their ability to effectively use essential digital technologies

to perform their professional tasks (data analysis, financial information management, etc.). Adaptability consists of CODIX's proposal to contribute to the integration of new technologies into the daily work of accountants, providing them with tools and resources to adopt innovative digital solutions and to collaborate effectively with advanced accounting and data management software, while the objective of increasing efficiency and productivity requires professional accountants to adopt solutions that improve the efficiency of accounting processes, reducing the time required to complete repetitive tasks and providing more time for strategic analysis of financial data.

The CODIX project has gone through a number of strategic milestones, which include both training activities and assessments of the competences of professional accountants. The implementation of this project was achieved by:

- Organization of professional training courses and sessions: CODIX has offered a set of courses and continuous training sessions in the field of digital technologies applied to accounting. These courses covered topics such as the use of advanced accounting software, financial data analysis, and financial information management. Modules on emerging technologies, such as the automation of accounting processes and the integration of digital platforms into the daily work of accountants, were also included.

- Development of interactive educational resources: The project contributed to the creation of digital platforms and interactive educational resources for accountants. They were designed to help participants learn at their own pace, with access to video tutorials, case studies and simulations of accounting processes in digital environments.

- Skills assessment and certification of professionals: Another important aspect of the implementation of the CODIX project was the evaluation of the progress of the participants and their certification. After completing the training program, the participants were evaluated based on the knowledge acquired and obtained certificates attesting to their advanced digital skills.

The CODIX project is a relevant example of how educational initiatives can contribute to the adaptation of professional accountants to the transformations brought about by digitalization, this being an important contribution in the life of today's accountant, due to its multiple benefits, the gratifying results (see Table no. 1).

Table no. 1. Results and benefits of the implementation of the CODIX project

Main Benefit	Detailed Description	Hypothetical example from practice
Improving digital skills	Development of essential skills, such as, for example, data analysis, use of accounting software, financial information management, use of emerging technologies (automation, cloud computing).	At company X, the implementation of advanced accounting software (e.g. SAP) allows accountants to improve the process of analyzing financial data, reducing errors and speeding up financial reporting by 30%.
Increasing adaptability and competitiveness in the labour market	Participants gained flexibility in relation to new technologies, strengthening	In company Y, after the employees learned to use new financial management

	their role in organizations. According to CECCAR (2021), digital skills increase performance and maintain the relevance of the accountant.	technologies (e.g. cloud software), they were able to quickly adopt innovative financial solutions, helping the organization to increase its competitiveness in the market.
Streamlining professional activities	Automating repetitive tasks, increasing accuracy in financial processes, and optimizing resources have led to improved organizational performance.	Firm Z implemented RPA (Robotic Process Automation) to automate the account reconciliation process. This saved 50% of the time it took to complete the aforementioned process and reduced financial errors.
Increasing trust in digital technologies	Exposure and training in the use of modern technologies have led to a greater openness of accountants to digitalization, facilitating the transition to an agile and efficient accounting model.	At W, after participating in training on digital financial solutions, accountants began to adopt cloud computing solutions, which led to a reduction in financial data processing times.

Source: author's own creation

Secondly, we will present to the results of the analysis the secondary sources and official documents, more specifically the sources available on platforms such as the CODIX project website, the reports published by the Body of Expert and Licensed Accountants of Romania (CECCAR), but also case studies.

The official website of the CODIX project provides detailed information about its aims and objectives, about its implementation in Romania, it also contains progress reports, case studies and educational resources describing its impact on professional accountants. These documents are valuable because they provide a clear picture of the activities carried out within the project and the benefits obtained by the participants. An eloquent example, which the author extracted from the documents available on the official website of the CODIX project is the report entitled "Digitization of the accounting profession: skills and good practices in the era of digital transformation", published in 2022. This report provides a detailed analysis of the activities carried out within the project and their impact on professional accountants and, summarizing its content, I recall the following:

- The document includes statistical data on the number of participants in the training sessions, their level of satisfaction and the assessments of the skills acquired. For example, it is mentioned that more than 500 accountants have participated in digital training courses, and 85% of them have reported a significant improvement in their digital skills.

- The report presents concrete examples of how professional accountants have applied the skills acquired in practice. A case study highlights the implementation of accounting process automation software in a medium-sized firm, which resulted in a 30% reduction in the time required to close accounts monthly.

- It includes training materials, practical guides and interactive tools that have been used in the training sessions. These resources have been developed to support lifelong learning and the practical application of new skills.

The Body of Expert and Licensed Accountants of Romania (CECCAR) plays an essential role in the implementation and monitoring of the CODIX project. CECCAR publishes reports and guides describing the educational activities and continuous training of accountants, including details on how new digital skills are integrated into the professional training curriculum. CECCAR's official reports include statistics on the number of participants in the CODIX project, their progress, as well as the impact achieved on their professional activity. An example of a report that is relevant to this study is the report published by CECCAR in 2022, entitled "Study on the digital skills of the professional accountant in the context of the digitalization of the economy". I mention a few aspects that caught my attention after analyzing it, namely:

- The CECCAR report states that, by the end of 2022, more than 500 CECCAR members participated in the training sessions within the CODIX project. It is also mentioned that over 70% of the participants managed to apply at least one of the digital skills acquired in practice.

- According to the report, the training led to increased efficiency in financial reporting, and the accountants involved in the project said that the new skills helped them manage the large volume of information more easily, while also increasing the accuracy of financial analyses.

- The CECCAR report includes a comparative section between various training programs (traditional vs. digital), highlighting that the programs integrated in CODIX had the greatest impact in the development of digital skills relevant to Industry 4.0.

Case studies are another important type of secondary source that can be used to analyze the impact of the CODIX project. These studies are based on the experiences of the participants and provide concrete examples of how digital skills have been acquired and applied in various professional situations. The case studies help to understand how the project participants managed to implement the new technologies and processes in their daily work and to assess the effects of these changes on their efficiency and professional performance. An example of a case study, which the author considers worth remembering, is the case study presented at the CECCAR National Conference in 2022, also published in the bulletin "Accounting expertise in the digital age", regarding the implementation of digital skills within an accounting firm in Cluj-Napoca. In fact, a small accounting firm from Cluj, *ContabDigital SRL,* with a diversified portfolio of clients (SMEs and liberal professions), participated in the courses offered through the CODIX project. Three of the company's accountants enrolled in training modules on automating accounting processes, using cloud applications for archiving and transmitting tax documents, and analyzing financial data with Power BI. After completing the courses, the company implemented a cloud-integrated invoicing and accounting solution, which resulted in a 40% reduction in the time needed to process monthly accounting documents; one of the accountants started using Power BI to generate interactive reports for its clients, increasing customer satisfaction and strengthening the relationship with them, and

the firm was able to automate the sending of tax notifications and deadlines to clients, significantly reducing administrative errors. At the beginning, as was natural, accountants encountered difficulties in adapting to the interfaces of some applications and the lack of technical support, but for this identified problem, the solution was proposed by participating in post-training mentoring sessions, organized by CECCAR in partnership with software providers. As an overall impact, the company reported a 30% increase in efficiency in daily work and a reduction in the time allocated to repetitive tasks, while participants became internal promoters of digitalization, contributing to the training of colleagues from other partner companies.

This case study, published by CECCAR and presented at the conference, clearly illustrates how the participants in the CODIX project applied the digital skills acquired and how they had a real impact on professional performance and operational efficiency.

In the author's opinion, secondary sources and official documents are essential to understand the implementation and impact of the CODIX project on the education and professional training of accountants in Romania. These sources provide a detailed picture of the purpose and objectives of the project, as well as how it contributes to the development of essential digital skills for professional accountants. Official reports and case studies published by CECCAR and other organizations provide relevant data on the progress of the project and its impact on the professional performance of accountants. Overall, these sources help to assess the success of the CODIX project and to understand how it contributes to the adaptation of accountants to the new demands of the labour market in the digital age.

Although to many of us, especially those who did not grow up in the digital age, it may seem that technology could totally replace human labor, the truth is that it only changes the nature of this work. Codix, by developing skills in accounting and financial management software, not only helps professionals adapt to new technologies, but also shows them how to use these tools to add real value to their professional activity.

In the analysis of secondary sources, we noticed that the implementation of the CODIX project is not without challenges. Although the objectives of the project are clearly defined, the adaptability of accountants to new technologies can vary significantly, depending on previous experience and the level of openness to change. Clearly, not all participants will learn at the same pace or benefit to the same extent from the project. Some may face greater difficulties in replacing their old accounting practices with digital tools, and this aspect has also been mentioned in CECCAR reports. This is a real challenge, because the success of the project depends a lot on the ability of professionals to adapt to new technologies.

There is also a challenge related to the financial resources and time that organizations allocate to the continuous training of employees. Not all companies or institutions have the necessary resources to invest in the continuous development of their staff. This can be an obstacle, especially for SMEs or organizations that do not yet fully understand the long-term benefits of digitizing accounting processes.

5. Conclusions and recommendations

The results of the research confirm that digitalization is an essential transformative factor for the accounting profession, requiring a redefinition of the role of the professional accountant. The answer to the research question I posed at the beginning of this study, namely: "How can the professional accountant adapt his skills in the digital age to remain relevant and valuable in the labor market?" highlights that the continuous development of

advanced digital skills is an indispensable condition for maintaining professional competitiveness. Maintaining relevance in the labour market for professional accountants requires continuous investment in education and training, the integration of emerging technologies into current work and active participation in retraining initiatives, such as the CODIX project. These steps ensure not only the survival of the profession in the digital age, but also its evolution towards a higher level of added value.

The CODIX project – Advanced Digital Skills for Industry 4.0 provided a concrete framework for training and adaptation, through which participants acquired relevant skills in data analysis, use of modern software solutions and financial information management in a digital environment. According to CECCAR reports (2021), the impact of the project was reflected in streamlining professional activities, increasing trust in technologies and strengthening the role of the accountant as a strategic partner in decision-making.

From my perspective, the CODIX project represents only the beginning of a new era in continuing professional training for professional accountants. As the available sources show, the future of vocational training will increasingly depend on the deployment of digital technologies, and projects such as CODIX are essential to meet this requirement. In the future, I see the possibility that this project will be expanded and include more technological areas, for example, the use of artificial intelligence in accounting or blockchain to ensure financial transparency.

In conclusion, the analysis of the CODIX project, In my opinion, this transition to digitalization is not just a simple technological adaptation, but a revolution in the way accounting is a daily practice. Previously, most accounting tasks were done manually, which required a lot of time and resources. By integrating emerging technologies such as automation and advanced data analytics, CODIX not only improves efficiency, but also changes perspectives on the role of accountants. They are no longer seen only as "executors" of financial tasks, but as true strategic advisors within organizations.

Ideally, the professional training of accountants should not only be limited to academic courses and certifications, but should also include continuous development programs that address emerging technologies and rapid changes in the labor market. What I find really valuable in the CODIX project is the fact that it is not limited only to theoretical training, but directly addresses the applicability of skills in the daily work of accountants. This type of approach allows professionals to immediately see how the knowledge acquired can be applied in practice.

Together with relevant secondary sources, it shows us how continuing education can help professional accountants remain competitive and relevant in the job market. At the same time, it emphasizes the importance of innovative approaches in vocational education, which not only align with market requirements, but also contribute to the development of a more efficient and agile work environment.

The author recommends, among others:

- Integration of digital skills in the initial and continuous training of accountants. CECCAR's university curricula and programs should include mandatory modules on accounting technologies, cybersecurity, data analysis, and modern software tools.

- Creating partnerships between training institutions and the private sector. Working with digital solution providers and accounting firms would allow access to practical learning scenarios and technologies applicable in real life.

- Promoting a culture of continuous learning and openness to innovation among professionals. It is essential to change the mentality regarding vocational training: not as an obligation, but as an opportunity for development. Initiatives such as CODIX should be replicated at national level and institutionally supported.

- Monitoring the impact of digitalization on the accounting profession. Organisations such as CECCAR should regularly produce impact reports highlighting trends, challenges and best practices identified among digitalised accounting professionals.

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STRATEGIC DIRECTIONS IN THE DEVELOPMENT OF TOURISM ON THE ROMANIAN COASTLINE

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Abstract: *The strategy of developing the coastal tourism product is a way forward for companies in this area, especially in view of the significant increase in tourist traffic in the region. In recent years, the travel motivations of tourists visiting the Romanian coast have diversified and their demands regarding the quality and composition of tourist packages have increased. As a result, the offer of tourism operators must be as attractive as possible by exploiting resources that have not been exploited so far. Thus, the historical vestiges of Dobrogea could be exploited by including themed excursions in tourist packages. As night-time leisure, which is accessed by young people, represents an important source of tourism revenue for the area, daytime leisure services should also be diversified so that water sports can also be a motivation for tourists aged between 18 and 35. In terms of summer recreation, the area lacks or has insufficient sports grounds and playgrounds for children. This area is also accessed by families with children and unfortunately, apart from the heliomarine, children have no other leisure time solutions. By diversifying tourist products, the Romanian coast can become an attractive destination on both the national and international tourist market.*

Keywords: *strategies, tourism products, coast, development.*
JEL classification: *L83, M31.*

1. Introduction

The Romanian coast attracts a significant number of tourists every year. The main reasons for traveling are heliomarine cure, leisure, water sports, rest and relaxation. As a result, the tourist products marketed in this area should fully satisfy the requirements of the tourist segments.

In 2020, the Covid19 pandemic hit the tourism industry hard, and when travel resumed, many entrepreneurs charged high prices for tourism products and services.

In 2021, some restrictions on travel to foreign destinations led to an increase in domestic tourist traffic on the Romanian coast. The situation changed starting with the 2022 summer season when many domestic tourists preferred foreign destinations and on the Romanian coast the demand was differentiated in the resorts of this area. For example, in Sulina the tourist traffic decreased significantly in the 2024 summer season. The main reasons for this situation were the high rates charged for tourist services and transportation services.

In the northern part of Constanța County, the resort that attracted the most tourists in the 2024 summer season was Mamaia Nord - Năvodari. The upward trend in tourist traffic in the Năvodari area was higher than that recorded at the county level due to the fact that in the 2021 - 2024 period many of the tourists accessing the resort of Mamaia chose to stay in the Năvodari area because the beach benefits from the fine sand enjoyed by those who come for the heliomarine cure. In Mamaia resort, the beach has been widened and the sun loungers are covered with a thick layer of shells. This has been a source of dissatisfaction for tourists in recent years.

Tourism entrepreneurs from the south coast have launched attractive tourist packages for families with children as well as for middle-income tourists. Many hoteliers have thus ensured a high occupancy rate of their tourist accommodation facilities.

In order to increase tourist traffic in the future, tourism entrepreneurs on the Romanian coast should adopt strategies to develop the tourism products and services they market. The Romanian coast has valuable tourism potential which is not being fully exploited. Historical relics can be valorized by designing and promoting cultural-historical tourist circuits for both domestic and foreign tourists. The culinary traditions of the minorities living in Dobrogea can be valorized by launching on the market tourist products that valorize gastronomic tourism. Innovative marketing strategies are the ones that can relaunch tourism on the Romanian coast.

2. Tourist traffic in the coastal area from 2015 to 2023

The tourist traffic manifested on the Romanian seaside registered an increase between 2015 and 2019, followed by a significant decrease of 21.53% in 2020. The decrease was generated by the global Covid19 pandemic that affected the hospitality industry.

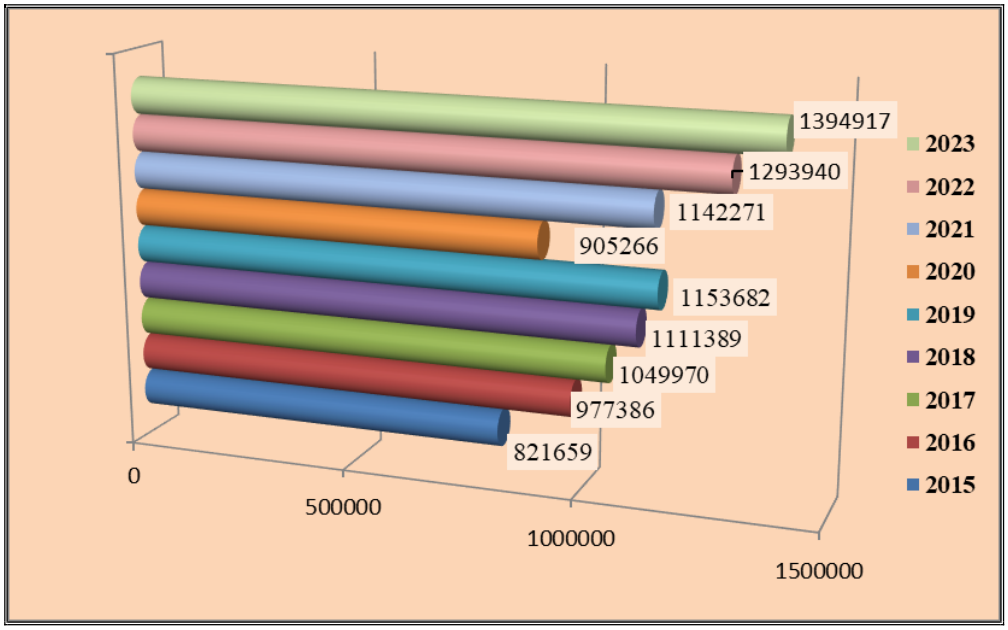

Chart 1 Number of tourist arrivals in the Romanian coastal area (excluding Constanța), between 2015 and 2023

Source: Personal processing based on data retrieved from the website http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table, accessed on 24.03.2025.

In the period 2021 - 2023, the tourist demand on the Romanian coastline has increased year on year. In 2023 the demand increased by 7.8% compared to the previous year The evolution of the tourist demand is justified by the fact that since the summer season of 2021 tourist trips have been allowed. Very many of the resident tourists who were usually oriented to foreign destinations have chosen to spend their vacation in the 2021 summer season in seaside resorts due to uncertainty about travel conditions abroad. The upward trend in tourist demand has continued in the following years.

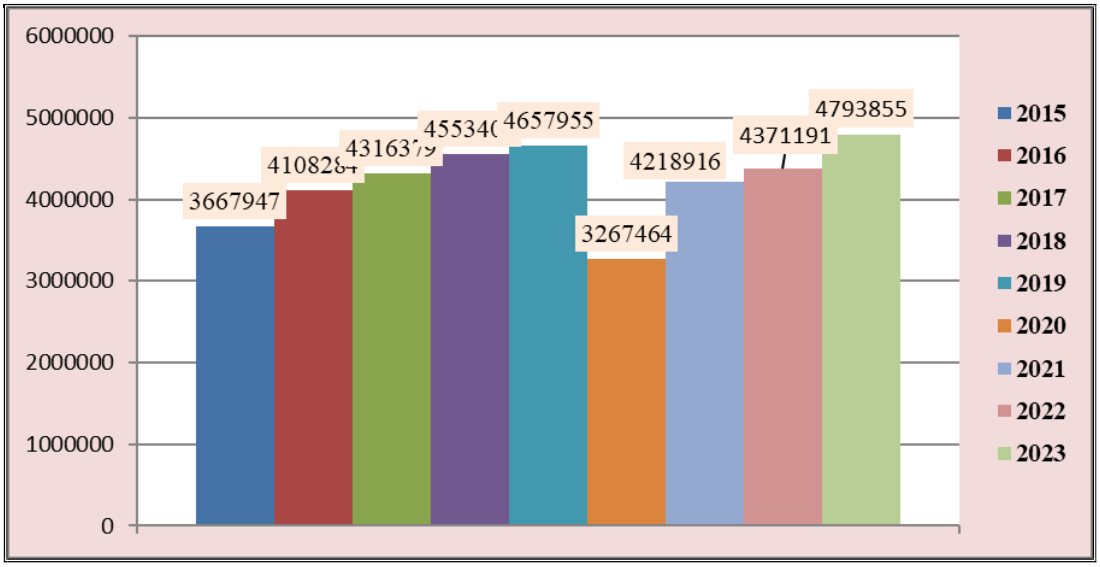

Chart 2. The number of overnight stays made by tourists arriving on the Romanian coast, between 2015 and 2023

Source: Personal processing based on data retrieved from the website http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table, accessed on 24.03.2025.

During the period analyzed, the highest level of the number of overnight stays made by tourists arriving on the Romanian coast was recorded in 2023, when this indicator had a value of 4.793.855. This year, the increase was 9.66% compared to the previous year.

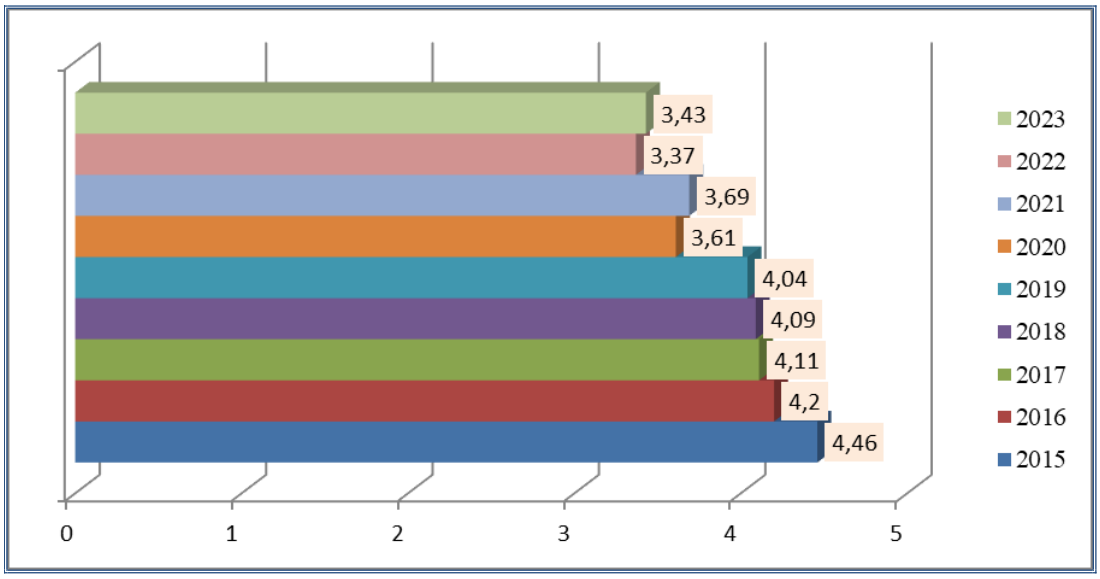

Chart 3. Average length of stay of tourists arriving on the Romanian coast, between 2015 and 2023

Sursa: Personal processing based on data retrieved from the website http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table, accessed on 24.03.2025.

During the analyzed period, the highest level of the average stay realized by tourists arriving on the Romanian coast was recorded in 2015, when this indicator had a value of 4.46 days/tourist. The decrease in the average length of stay is due to the shift in recent years from medium and short-stay tourism to weekend tourism.

3 Strategic directions in the marketing policies adopted by tourism companies on the Romanian coast

The strategy for developing the seaside tourism product is a way forward for companies in this area, bearing in mind that the primary objective is to increase tourist traffic. The historical vestiges of Dobrogea could thus be exploited by including themed excursions in tourist packages. As night-time recreation, accessed by young people, is an important source of tourism revenue in the area, day-time recreational services should also be diversified so that water sports can also be a motivation for the 18-35 age group.

As far as summer recreation is concerned, there are no or insufficient sports fields and playgrounds for children in this area. This area is also accessed by families with children and unfortunately, apart from the heliomarine cure, children have no other leisure options.

The differentiation strategy is another alternative to increase tourist traffic. Differentiation is associated primarily with the rates charged by tourism firms but also with the content of the tourist packages marketed.

Operating on fairly segmented markets (Nenciu, 2009), tourism firms on the Romanian coastline opt mainly for a strategy of adapting the quality of tourism products specific to the coastline in relation to the demands of the various segments of tourists or for a strategy of qualitative differentiation from the offer of competitors in countries offering similar products (Nenciu, 2014). In recent years, some of the four-star hotels in the area are successfully applying these strategies. The tourist services provided in many of the villas and guest houses in Năvodari have improved in terms of quality, but this has led to the use of high price strategies. However, occupancy is high during the summer season. Resorts have also sprung up along the lines of the large resorts in Antalya. The tourist packages marketed by these resorts are complex and all inclusive.

Any tourist trip to a seaside destination induces the tourist's desire to eat different culinary delicacies from those consumed in everyday life. As a result, tourism businesses in the area have diversified their culinary offer to include fish products. The fact that a large number of restaurants specialize in coastal dishes is one of the area's strengths. In recent years, cherhana restaurants and numerous restaurants specializing in fish and seafood have opened in the area.

The strategy of renewal and innovation of the tourist offer is also a solution for the development of tourism on the Romanian coast and for increasing its competitiveness and attractiveness. In this area, innovation is aimed at initiating gastronomic tourism programs related to culinary fish products, real and creative valorization of local cultural potential, traditions of the area, introduction of one-day trips to the Danube Delta in tourist packages.

The role of innovation strategy in tourism has been analyzed in recent years through various studies. Since the mid-twentieth century, several coastal areas in southern Europe started to develop in terms of tourism, attracting significant numbers of tourists and culminating in the emergence of mass tourism. Subsequently, a number of negative effects occurred, leading to a loss of attractiveness and competitiveness vis-à-vis other tourist destinations. Therefore, it is necessary to implement strategies of diversification and

innovation of tourism products in order to economically develop the coastal areas and increase their competitiveness. Recent models of territorial innovation are based on networks, considering that the relationships established between organizations play an important role in the development of new tourism products and services (Brandão et al, 2019).

Tourism on the Romanian coast is currently experiencing a major shortage of qualified staff. Most companies, due to seasonal activity, do not employ qualified staff and do not invest in training. This fact is reflected in the quality of services provided by insufficiently trained staff and very poorly motivated by low salaries (Nenciu, 2014).

It is true that in tourism, the employee's performance is defining because the tourist makes contact with the receptionist as soon as he or she enters the hostel or hotel. If the receptionist is not able to respond to all requests and resolve them then the whole vacation will be affected by this first contact. Ideally, companies should ensure that they have a qualified, responsible workforce that is willing to make a decisive commitment to ensuring the satisfaction of their guests. Unfortunately, there are still managers in the area who do not attach great importance to ensuring a climate of partnership with their employees, and this is reflected in their performance and ultimately in the level of tourist satisfaction.

The selection of staff should be treated seriously, because the fluctuation of workers has negative effects on the overall activity of the tourism company. Ongoing staff training and development should be a priority for Romanian coastal tourism firms. The organization of simple but concrete internal programmes, to be carried out with a well-established periodicity and to include all categories of staff, is a solution in this direction. There are numerous researches (Ubeda-Garcia, 2013; Ul Afaq, 2011) showing the link between employee training and organizational performance. The results obtained from these studies have shown that the participation of employees in tourism establishments in training and refresher courses positively influence organizational performance.

The organization of team-building programs, inside or outside the tourist structure, the attribution of remuneration for the employee's superior performance motivates the employee and motivates him/her to perform in the activity he/she carries out at the level of the tourist structure.

When tourism companies on the Romanian coast will understand that there is a close relationship between the quality of employee performance, the existing facilities and the company's financial results, it will be possible to talk about competitiveness. Evaluating and rewarding performance should be mandatory strategic guidelines for human resources activity in tourism establishments.

At present, coastal tourism employees are paid low wages, have mediocre training, some of them do not know foreign languages and are unable to provide quality services. This is reflected in their attitude towards tourists and their demands.

In conclusion, in the framework of personnel policy it is necessary to adopt strategies to motivate employees and to retain high performers.

Romanian seaside tourism in our country has a significant potential that unfortunately is not being capitalized in a superior way. A good understanding of the real values that characterize the Romanian tourism sector, a correct analysis of travel motivations and the demands of the main segments of tourists, the study of international tourism trends, accompanied by the outlining of marketing strategies tailored to the realities of the area are some of the ways forward for the relaunch of Romanian coastal tourism.

As far as pricing policy is concerned, companies on the seaside should apply fair rates that reflect the true quality of the services provided. Some entrepreneurs in the area apply the all-inclusive system. In the summer season, coastal companies apply high price strategies. This strategy is not reflected in the quality of the services provided, which leads to some dissatisfaction among tourists.

The strategic variants most often used by coastal tourism firms in their distribution activities are represented by the selective distribution adopted by entrepreneurs using a limited number of intermediaries and the intensive strategy used by tourism businesses selling their products and services through a significant number of intermediaries (Nenciu, 2014).

Depending on how the activities are carried out over time (Balaure, Cătoiu, Vegheș, 2005), tourism operators in the coastal area adopt the strategy of permanent marketing communication or the strategy of intermittent communication.

At the present time it would be advisable to create a brand of the area to be supported by numerous promotional techniques. It is very true that in recent years, thanks to the events and concerts organized on the area's beaches, the notoriety of the Romanian coast has increased.

4. Conclusions

In order to increase tourist traffic and make the area more attractive to tourists, companies need to adopt marketing strategies aimed at improving the quality of services provided by tourism workers, marketing complex and innovative tourist packages and developing daytime leisure activities. There is also a need for aggressive promotion of this destination on both the internal and external markets through specific promotional techniques and the creation of a representative brand for the area.

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SUSTAINABILITY IN TOURISM: CHALLENGES AND PERSPECTIVES

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Abstract: *This paper addresses the issues of aligning tourism with the approach to achieving sustainability, as sustainability became a necessity and even a condition for the viability of organizations. In this context, the aim of the research is to highlight the problems and challenges of tourism establishments by aligning them to the achievement of sustainability. In order to achieve the general objective of the research we set the following additional research objectives: researching the theoretical-methodological approach of sustainability in tourism; identifying the premises and factors of achieving sustainability in tourism; identifying the problems and challenges faced by tourism companies in achieving sustainability; outlining the strategic directions of achieving sustainability by tourism companies. The research methodology used in the paper is quite comprehensive, and includes multiple research methods, such as: analysis, synthesis, induction, deduction, abduction, documentation, qualitative research. As a result of the research conducted, we underline the fact that in the 21st century, sustainability has become a condition for the viability of companies. Thus, each company is obliged to redesign its managerial system, its principles of activity, in order to align its strategic objectives with the approach of achieving sustainability. Therefore, setting strategic objectives to achieve sustainability and incorporating them into the daily activities of tourism establishments is becoming a vital necessity for tourism organizations, a condition for their viability.*

Keywords: *sustainability, sustainability in tourism, sustainable companies, goals of sustainability in tourism, sustainable destinations, sustainable practices.*
JEL Classification: *Q01, Q56, Z32.*

1. Introduction

As society has evolved, the tourism phenomenon has undergone major changes. From mass tourism to luxury tourism, from traditional tourist attractions to exotic tourist attractions, all of these have challenged economic operators on the tourist market to resize their offer in order to satisfy tourists. On the other hand, as tourism in this sector has intensified, significant changes have taken place, from the emergence of new destinations to changes in tourists' consumption behaviour.

As the tourism phenomenon has developed, tourists' behaviour had a negative impact on the ecosystem, contributing to its degradation through the inappropriate use of tourist attractions. In this context, there is a need for tourism companies to reconsider their policies and strategies in order to achieve balance from a triple perspective: economic, social and environmental. *The overall objective of the research* is the theoretical-practical investigation of ways to achieve sustainability in organizations operating in the tourism sector.

The *adjacent objectives of the research* are:

O1: investigating the theoretical-methodological aspects of sustainability;

O2: identifying factors, principles, objectives, successful examples of achieving sustainability in tourism;

O3: identifying problems and challenges of tourism organizations in achieving sustainability.

The research hypotheses include:

I1: sustainability is an approach to achieving balance from three perspectives: economic, social, environmental;

I2: the main factor influencing the achievement of sustainability in tourism is the responsible use of the potential of tourism destinations;

I3: the main problem in achieving sustainability in tourism organizations is the lack of interest of tourism organizations in achieving sustainability.

Research methodology. In order to achieve the research objectives, we applied a broad research methodology, which includes methods such as: analysis, synthesis, induction, deduction, abduction, scientific abstraction, documentation, content analysis and qualitative research. Each of these methods allowed us to advance the research approach and to achieve the overall objective and the adjacent research objectives.

2. Content

The rapid development of the global economy in the 21st century has generated significant imbalances in society as a result of the development of entrepreneurship, the intensification of the utilization of natural resources, creating significant disturbances in the functionality of the global ecosystem. As natural resources are depletable and all factors of production are utilized to their maximum capacity, there is a need to reduce the negative impact of people's activities on the environment. Addressing the imbalance facing society has been one of the most important priorities of the world's countries over the last 20 years.

In this respect, researchers have recently been increasingly pointing out the need for economic agents, educational institutions and market players to focus on the need to achieve balance from a triple perspective: economic, social and environmental.

Thus, along with the concerns of making profit and increasing turnover, economic agents must be concerned with integrating social practices into the work they carry out, with eliminating the negative human footprint on the environment.

Subsequently, we can highlight the fact that since 1987, countries have become aware of the need to concern themselves with achieving economic-social-environmental balance, i.e., to reorganize their classical business models into innovative models that would put a special emphasis on sustainability.

2.1. Theoretical approaches on sustainability

Thus, the concept of *sustainability* originated with the publication in 1987 of the report "Our Common Future" by the World Commission on Environment and Development (WCED), which was also called the Brundtland Commission. Analysing the content of the report "Our Common Future", we can mention that sustainability is *"meeting the needs of the present generation without compromising the ability of future generations to meet their own needs"* (Brundtland Report, 1987). Based on the Brundtland Commission's definition, we can conclude that sustainability is a deep, broad and highly complex concept that focuses on eliminating or reducing the negative impacts of present generations on the development opportunities of future generations.

On the other hand, analysing the definition of sustainability according to the researcher Simonis, 2008, we can note that sustainability is "the concept that boils down to carrying capacity and has long been used by biologists, but until now has rarely been considered by economists" (Simonis, 2008).

In the same context, according to the United Nations (UN), sustainability "encompasses the totality of socio-economic development methods that focus on ensuring a balance between economic, social and environmental aspects" (UN, 2023). According to the UN definition, sustainability is an extremely complex concept, which focuses on ensuring balance from three perspectives: economic, social and environmental.

In the same context, UNESCO defines sustainability as a "development model that includes three components: environment, society and economy" (UNESCO, 2022).

The Cambridge Dictionary defines sustainability as "the ability to continue at a particular level for a period of time: the quality of causing little or no damage to the environment and therefore able to continue for a long time" (Cambridge Dictionary, 2024). According to this definition, we note that sustainability focuses on producing long-term effects, thus the concern to achieve sustainability is a long-term approach, it is a dynamic process involving multiple actors and influencing factors.

Schematically the essence of the sustainability concept can be represented in Figure

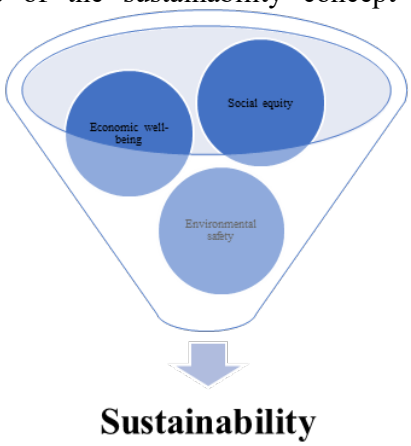

Figure 1. Essence of the sustainability concept

Reference: developed according to https://www.dadot.com/environmental-education-center

The role of sustainability was noted as early as the 1992 Earth Summit in Rio de Janeiro and reiterated at the World Summit on Sustainable Development in Johannesburg in 2002 (Baron, 2001). Sustainability includes the most important component, environmental protection, while the environment conditions the achievement of sustainability. The European Union requires a new approach to global environmental problems related to environmental impacts and the pressure of all socio-economic consequences. Being aware of the need for continued economic and social development, it is absolutely imperative to protect and improve the environment, which is the only possibility to create and maintain the well-being of both the current and future generations; this balance has been the factor that can and must ensure the development of society as a whole (Glasbergen, 2018).

Finally, we can point out that sustainability is a complex approach, focused on achieving economic well-being, social equity and ecological security, which focuses on reducing the negative human footprint on the development of society in order to provide development opportunities for future generations. As a result, sustainability aims to sensitize citizens to the need to reduce negative impacts on society, the environment, and to focus on reuse, recycling, regeneration.

2.2. Factors and principles in achieving sustainability in tourism

Achieving sustainability in tourism is an important commitment of countries in the contemporary global context. Studies carried out by researchers in the field argue that achieving sustainability in the tourism industry is recognized as being of particular importance. The Travel and Tourism Development Index (TTDI) is a notable benchmark that highlights the role of sustainability and resilience in the growth of the travel and tourism sector, thereby contributing to the overall development of a country (World Economic Forum, 2023).

Due to their ability to deal with environmental, socio-cultural and economic concerns, sustainable tourism practices have gained popularity. Sustainability in tourism incorporates the conservation of natural resources, the protection of ecosystems and the mitigation of the effects of climate change. Moreover, it emphasizes the preservation of local cultures, heritage sites and local community well-being (Font et.al., 2019).

The economic aspect of tourism sustainability is also crucial. In both developed and developing regions, sustainable tourism practices can stimulate economic development, create employment opportunities and alleviate poverty. However, it is essential to ensure that economic benefits are equitably distributed among local communities, minimizing economic leakage and encouraging local entrepreneurship (World Economic Forum, 2023).

In terms of a destination's competitiveness, sustainability plays a significant influence. Today's tourists are more aware of their impact on the environment and social equity and are looking for destinations that demonstrate a commitment to sustainability. By implementing sustainable practices, destinations can enhance their image, attract conscientious travellers and gain a competitive advantage in the tourism market (World Economic Forum, 2023).

The resilience of destinations is an additional factor demonstrating the importance of sustainability in tourism. Destinations can better withstand risks and challenges such as climate change, natural disasters and crises if they adopt sustainable practices. Sustainability measures, such as climate adaptation and community engagement, contribute to a destination's resilience, enabling a quick recovery and reducing its vulnerabilities (Font, 2019).

Studying the specialized literature, we can note that *sustainable tourism* is a form of tourism that takes into account its economic, social and environmental impacts, meeting the requirements of visitors, industry, the environment and host communities (Font, 2019). On a long-term perspective, sustainable tourism emphasizes a balance between environmental, economic and socio-cultural factors.

According to the World Tourism Organization, 2023, the key principles of sustainable tourism are (Figure 2.).

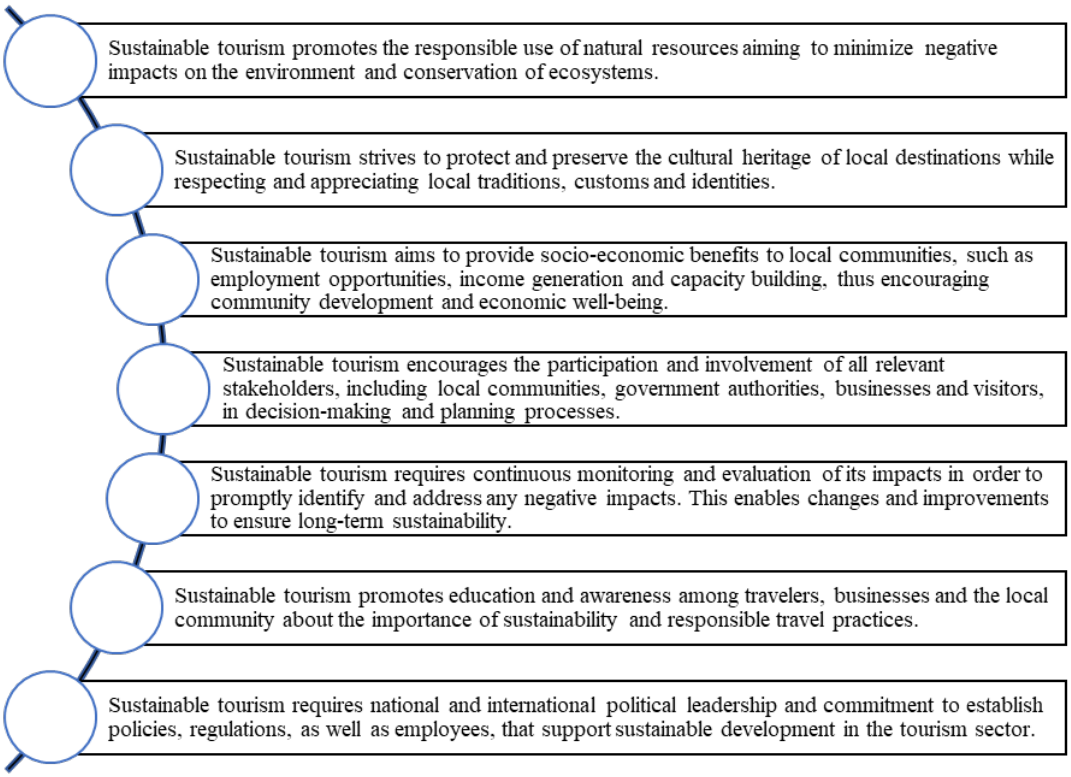

Figure 2. Principles of sustainable tourism
Reference: https://www.unwto.org/sustainable-development

The World Tourism Organization, on the other hand, outlined 12 objectives for achieving sustainability in tourism (Table 1.).

Table 1. Pillars and goals for achieving sustainability in tourism, according to UNWTO

Pillars and sub-pillars of sustainable tourism	**Goals of sustainable tourism**
1. Tourism policy and governance 1.1 Position of tourism in development policies and programs; 1.2 Tourism policy and regulatory framework; 1.3 Tourism governance and institutional set-up.	All 12 goals.
2. Economic performance, investment and competitiveness 2.1 Measuring the development of tourism and its contribution to the economy; 2.2 Trade, investment and the business environment;	1. ECONOMIC VIABILITY; 2. LOCAL PROSPERITY; 5. VISITORS' SATISFACTION.

2.3 Brand, marketing and product positioning; 2.4 Resilience, security and risk management.	
3. Employment, decent work and human capital 3.1 Human resources planning and working conditions; 3.2 Skills assessment and providing training.	3. THE QUALITY OF HUMAN RESOURCES AND JOBS.
4. Poverty reduction and social inclusion 4.1 Integrated approach to poverty reduction through tourism; 4.2 Strengthening pro-poor tourism initiatives; 4.3 Including disadvantaged groups in the tourism sector; 4.4 Preventing negative social impacts.	2. LOCAL PROSPERITY; 4. SOCIAL EQUITY; 6. LOCAL CONTROL; 7. COMMUNITY WELL-BEING.
5. Sustainability of the natural and cultural environment 5.1 Linking tourism with natural and cultural heritage; 5.2 Focusing on climate change; 5.3 Enhancing the sustainability of tourism development and operations; 5.4 Measuring and monitoring tourism impacts.	8. CULTURAL RICHNESS; 9. PHYSICAL INTEGRITY; 10. BIOLOGICAL DIVERSITY; 11. RESOURCE EFFICIENCY; 12. ENVIRONMENTAL PURITY.

Reference: UNWTO, 2023.
Available at: https://www.e-unwto.org/doi/epdf/10.18111/9789284415496

The essence of the 12 goals for achieving sustainability in tourism is:

1. ECONOMIC VIABILITY: To ensure the viability and competitiveness of tourist destinations and enterprises so that they can continue to prosper and provide long-term benefits.

2. LOCAL PROSPERITY: To maximize the contribution of tourism to the prosperity of the host destination, including the proportion of visitor spending that is retained locally.

3. QUALITY OF HUMAN RESOURCES AND JOBS: To strengthen the number and quality of local jobs created and supported by tourism, including the level of pay, conditions of service and availability to all without discrimination by gender, race, disability or otherwise.

4. SOCIAL EQUITY: To seek a widespread distribution of the economic and social benefits of tourism throughout the beneficiary community, including improving the opportunities, incomes and services available to the poor.

5. VISITOR FULFILLMENT: To provide visitors with a safe, satisfying and fulfilling experience available to all visitors without discrimination based on gender, race, disability or in other ways.

6. LOCAL CONTROL: To engage and empower local communities in planning and decision making about the future management and development of tourism in their area, in consultation with other stakeholders.

7. COMMUNITY WELFARE: To maintain and strengthen the quality of life in local communities, including social structures and access to resources, facilities and life-support systems, avoiding any form of social degradation or exploitation.

8. CULTURAL WEALTH: to respect and enhance the historical heritage, authentic culture, traditions and distinctiveness of the host communities.

9. PHYSICAL INTEGRITY: To maintain and enhance the quality of landscapes, both urban and rural, and avoid physical and visual degradation of the environment.

10. BIOLOGICAL DIVERSITY: To support the conservation of natural areas, habitats and wildlife and minimize damage to them.

11. RESOURCE EFFICIENCY: To minimize the use of scarce and non-renewable resources in the development and operation of tourism facilities and services.

12. ENVIRONMENTAL PURITY: To minimize air, water and land pollution and waste generation by tourism businesses and visitors (Sustainable Tourism for Development, 2023).

In conclusion, the importance of sustainability in tourism is argued by its ability to protect the environment, ensure the preservation of socio-cultural heritage, promote economic development, enhance destination competitiveness and cultivate resilience. Many reports and research studies emphasize the need for sustainable practices to ensure a sustainable and responsible future for the tourism industry, reflecting the importance of sustainability in tourism.

2.3. Sustainability in tourism: successful stories

Sustainability in tourism became a committed priority, which practically all countries in the world have defined and are currently trying to achieve through concrete, safe, complex and effective measures. Although achieving sustainability in tourism is a complex, dynamic, ongoing and far-reaching process, in the last 10 years various countries have made far-reaching changes to the tourism supply and the regulatory framework for tourism, thus intervening in tourism consumption, breaking down stereotypes of irrational consumption and bringing national policies of the nation states into line with the process of achieving sustainability in tourism.

Thus, we present below some successful stories where countries have implemented measures to achieve sustainability in tourism.

Case study 1: Andaman Discoveries Company from Thailand. An example of achieving sustainability in the tourism sector is given by Andaman Discoveries, a Thai company serving local communities. After the devastating tsunami in 2004, Andaman Discoveries, together with a network of supporters, helped villages in southern Thailand to implement more than 120 projects in over 20 villages. All projects have focused on creating realistic economic opportunities for local communities. Andaman Discoveries placed long-term social, economic and environmental sustainability as a top priority in all its projects.

Case study 2: NGO Feynan Ecolodge. Another example of sustainable tourism development is provided by Feynan Ecolodge which is a Jordanian Non-Governmental Organization that has contributed to the development of sustainable tourism in the area.

Feynan Ecolodge is located in the "Dana" Biosphere Reserve and is designed to contribute to local socio-economic development in total harmony with its environment.

In Table 2. we presented examples of successful measures to achieve sustainability in rural localities.

Table 2. Examples of successful measures to achieve sustainability in rural localities

Dimensions	**Activities performed**	
	Andaman Discoveries Company from Thailand	**NGO Feynan Ecolodge**
Preservation	- Restoring local orchids due to the project „The Orchid Conservation reestablished water lily into original habitat". - Collaborating with the Mangrove Action project and the International Union for Natural Conservation to create groups to participate in Youth in Action for next generation. - Implementing Youth education project funded to focus on „Local Action, Global Change" to educate young people about the environment, human interaction with the environment and local conservation efforts.	a. Generating electricity exclusively using photovoltaic (PV) panels with the capacity to store up to three days of electricity to account for cloudy days. b. For lighting, 8W CFL bulbs or 1-3W LEDs are used in only three areas: kitchen, toilets and offices. At night the cabins are lighted using candles made on site. c. Purchasing only essential appliances and only those rated Energy Star or A/A+ in the US and EU respectively.
Community	- Providing lessons in English. - Providing restaurant and catering courses, planning trips to local communities. - Initiating tour guide and first aid training for local communities. - Donating books to libraries in nearby villages, gym equipment and traditional Thai tools. - Recruiting volunteers to provide training and education sessions in first aid, dental care, hygiene.	a. Employing only staff from local communities and sourcing up to 80% of food and supplies from nearby villages. This provides jobs, supports the local economy and creates an authentic local experience for guests. b. Providing opportunities for local women in candle making and on-site workshops at the lodge; c. Transportation to and from the reception centre is provided by 45 local Bedouin drivers in their spare time, which provides their families with additional sources of income.
Culture	1. It helped the Moken community to develop snorkelling trips and Koh Surin. 2. It developed in-depth tours of island communities and	- Promoting the region's rich Bedouin culture; - Bread, candle, leather goods and cultural exchange projects to create a rare income-generating opportunity for

	villages. 3. It developed customized tours focused on benefiting local communities in the areas of social welfare, community development and conservation.	women. - Activities such as local intercultural cultural exchange, where guests can spend a day with a local shepherd and learn Bedouin traditions including coffee brewing, goat hair tent making, bread baking from locals providing an authentic insight into local life. - Local guides share their culture, history and environment with guests.

Reference: own analysis based on *Compendium of best practices in sustainable tourism*. Available at: https://sustainabledevelopment.un.org/content/documents/3322Compendium%20of%20Best%20Practices%20in%20Sustainable%20Tourism%20-%20Fen%20Wei%2001032014.pdf

If we were to analyse the initiatives to achieve sustainability in tourism by tourist accommodation establishments, then we have to note that the initiatives of a tourist accommodation establishment claiming to contribute to achieving sustainability should focus on the following initiatives:

1. *Energy saving in hotels:* heating through air conditioners, kitchen hardware, all-inclusive hotels reduce energy use and switch to renewable energy sources;
2. *Hotel water conservation:* hotels continue to implement water-saving features. Such initiatives include the reuse of sponges and towels, which are now the norm in the hospitality industry, as well as the installation of low-flow faucets and other installations.
3. *Paper recycling and waste reduction:* Along with reuse efforts, hotels are trying to decrease the amounts of paper used, as well as separately collecting paper for recycling. Reducing waste and recycling waste is one of the initiatives that hotels in Europe are promoting.
4. *Providing hotel bathroom facilities:* Many hotels create a great impression by offering visitors unique bathroom features that create the impression of an ECO hotel. For example: Rock Resorts encourages the use of different natural, additive-free creams and oils and offers them to their guests in the bathrooms etc.
5. *Using environmentally friendly hotel room keys:* Current hotel room keys are made of plastic (polyvinyl chloride) which is a by-product of a dangerous manufacturing process. Many hotels are switching to card alternatives made from paper, wood and bio-plastic that are better for the earth but just as strong.
6. *Bio cleaning products:* Many hotels have reoriented their purchases towards organic products for tourists, including cleaning products with bio-based oils and other unique cleaning products. On the other hand, reducing the use of goods containing chlorine dyes and petrochemical chemicals is another initiative of sustainable hotels.
7. *Cooking:* a focus on more feasible and beneficial food offerings, cooperation with locals, purchasing local products are some of the initiatives that sustainable hoteliers are practicing.
8. *Alternatives to bottled water in hotels:* in order to reduce waste and provide a higher quality of experience, more hotels are rejecting plastic bottles as the norm and instead

offering innovative refreshment options for meeting attendees and independent travellers, look for filtered water stations that are easily accessible, free refillable bottles, and other options that are designed to offer visitors simple and appealing alternatives to water in plastic bottles.

9. *Selecting the hotel menu:* Hotels and resorts are adding a growing number of choices in a variety of menus from organic products that coordinate natural delivery, hormone-free meats and dairy, and other common products that offer visitors more favourable maintenance options.

Finally, it can be noted that different companies in the tourism sector, both hospitality establishments and all other categories of economic agents, in the last 10 years, have implemented various initiatives to achieve sustainability in the tourism sector through the reduction of water and energy consumption, reuse of resources, recycling and re-circulation of resources.

According to the UNWTO, 2024, in order to assess the top most sustainable rural areas (villages) offering tourism services, 9 principles (Figure 2.) have been identified for assessing sustainability initiatives in rural areas:

1. Cultural and natural resources: the village has natural and cultural resources (tangible and intangible) recognized at national, regional or international level.

2. Promotion and preservation of cultural resources: the village engages in the promotion and preservation of cultural resources that make the destination unique and authentic.

3. Economic sustainability: the village is committed to promoting economic sustainability by supporting business development, entrepreneurship and investment.

4. Social sustainability: the village is committed to promoting social inclusion and equality.

5. Environmental sustainability: the village is committed to achieving environmental sustainability by promoting and/or disseminating policies, measures and initiatives that advance the conservation of its natural tourism resources and minimize the environmental impacts of tourism development.

6. *Tourism development and value chain integration:* the village tourism is significantly commercialized and developing. The village further promotes the strengthening of the tourism value chain and the competitiveness of the destination in areas related to market access, marketing and promotion, innovation, product development and quality.

7. *Governance and prioritization of tourism:* The village is committed to making tourism a strategic strategy, a pillar of rural development. It further promotes a governance model based on the development of public-private partnership, cooperation with other governments.

8. Infrastructure and connectivity: The village has infrastructure to facilitate access and communications that improve the well-being of rural communities, promote business development, and enhance the visitor experience.

9. *Health, safety and security:* The village has health, safety and security systems in order to protect residents and tourists.

Figure 2. Principles in assessing sustainability initiatives in rural areas in the EU, according to the UNWTO, 2024

Reference: https://www.e-unwto.org/doi/epdf/10.18111/9789284424368

At the level of 2023, the top 3 sustainable villages in the EU are shown in Table 2.2.

Table 3. Top 3 sustainable villages in the EU

Village	Image
Damanhur, Italy Damanhur has its own constitution, culture, art, music, currency and schools. It invites visitors to come and visit through its website and is a fascinating example of a long-standing, well-organized, lively, open-minded, visionary community, successful in doing things its own way.	
Findhorn, Scotland The Findhorn Eco-Community was founded in 1962 by a family who had started growing vegetables, finding that over the years more people joined them, bringing their vision and ideas. Findhorn has become known as one of the most established and well-organized organic villages in the world. They welcome visitors to participate in their "experience week", to attend their vegetable growing classes.	

Tamera, Portugal Tamera is another open educational community offering online and on-site courses. Love, spirituality, ecology and renewable energy are key themes in the courses they offer, along with the intention to work for stewardship of the earth in a post-capitalist world, a political expression that will no doubt attract some visitors and put off others.	

Reference: adapted according to [1] https://lumohouses.com/learn/eco-villages-communities-europe/

Analysing the table, we observe that each rural community is focused on promoting the conservation of tourism resources, educating youth and tourists, community development through achieving ecological, economic and social sustainability.

3. Conclusions

Based on the research carried out, there is a strong need for tourism businesses to focus their activities on aligning their activities towards sustainability. As a result, by assuming their responsibilities, tourism establishments will help communities on the one hand and society as a whole to achieve sustainability. Through activities such as: saving resources (energy, water, etc.), responsible use of tourism resources, use of organic products and equipment, awareness raising activities on the need to achieve sustainability in tourism, tourism establishments can help communities and society to anchor themselves in the approach to achieving sustainability.

In addition, the 12 sustainable tourism goals, approved by the UNWTO in 2023, need to be implemented by tourism organizations in order to identify the most relevant measures that would support them in aligning their strategic objectives with sustainability principles.

Moreover, another measure that would help to establish a culture of sustainability in tourism is the education of tourists, which is becoming a major challenge for tourism establishments, as it is very difficult to uproot certain toxic habits of tourism that contribute to the pollution and destruction of tourist attractions and to cultivate new values of responsible tourism. As a result, joint efforts are required from the authorities on the one hand, but also from economic entities and tourists on the other hand, in order to align the achievement of sustainability in tourism.

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THE INFLUENCE OF THE CAPITAL MARKET ON ROMANIA'S ECONOMIC GROWTH

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Abstract. *The capital market plays an important role in economic development by providing certain ways of direct financing of public or private companies and by attracting financial resources from the economy and placing them so as to increase the return on equity. For this reason, the article aims to evaluate the influence of the capital market on Romania's economic growth through a multiple linear regression. The chain index for gross domestic product was used to quantify the economic growth. Among the indicators typical of the capital market, we have chosen for the econometric model: the number of transactions, the volume of transactions, capitalization and the number of issuing companies. The model shows that economic growth is positively influenced by the factors that characterize the capital market which we have chosen. More precisely, according to the econometric model, 39% of the variation of the GDP chain index is due to the four variables specific to the capital market: the number of transactions, the volume of transactions, capitalization and the number of issuing companies.*

Keywords*: capital market, economic growth, GDP chain index, time series.*
JEL Classification: *C22, G29, G19.*

1. Introduction

Obviously, all aspects of human endeavor involve the use of money which is generated by itself or borrowed, and which increases capital accumulation, which results in economic growth (Ewah et al., 2009). The financial market plays a significant role in an economy which consists of financing various deficit units.

A well-developed financial market is an important influencing factor not only on economic growth, but also on preventing an economy from entering a crisis (Nordin and Nordin, 2016). The capital market is a component of the financial market through which financial instruments such as stocks and bonds are traded on medium and long term.

The capital market comprises the primary market and the secondary market. The primary market represents the segment of the capital market in which new issues (which are issued for the first time) of securities (financial instruments, equity securities) are traded. Specifically, if a company needs capital, it can obtain it from investors by issuing new equity securities (e.g., shares) which are sold on this primary market, thus achieving the initial transfer of money from investors to firms.

The secondary market represents the other segment of the capital market in which already issued financial instruments are traded. The general public also has access to these capital markets, being able to buy or sell equity securities. In the secondary capital market, investors sell or buy these securities from one another, not from the issuing entity.

In modern economy, the capital market is of particular importance. The capital market has the role of efficiently transferring monetary resources from those who save money to those who need capital and want to use it in a better way (Stoica, 2002). Thus, it can be said that the capital market has a significant influence on the quality of investment decisions.

To issuers, the money they need to carry out or develop their activities can be obtained through the capital market at good costs, normally lower than those obtained through the banking market or other financial institutions. To an investor, organizing the company as a joint-stock company allows for the transfer of ownership, which can be done simply, quickly and safely through the stock exchange, due to the negotiability of securities. In this context, the stock market favors investments in financial assets as well as their circulation and mobility, contributing to the financing of the economy through the primary market (Stoica, 2002).

The main functions of the capital market are: attraction of financial resources, mobilization of savings, creation of liquidity, efficient allocation of capital, and risk diversification (Yadirichukwu and Chigbu, 2014). High efficiency and effectiveness of those functions through prompt delivery of their services have a positive impact on economic growth. The capital market has the role of providing long-term, non-debt financial capital which allows companies to avoid excessive dependence on debt financing. Therefore, through the capital market, long-term funds of sectors of the economy (households, firms, government, etc.) are mobilized, capitalized and made available to different sectors of the economy (Ndako, 2010). Efficient mobilization and allocation of funds enables businesses and economies to leverage their human, material and management resources for optimal production, which results in sustainable economic growth (Yadirichukwu and Chigbu, 2014).

2. Literature Review

In the specialized literature, there are numerous studies that investigate the link between the development of capital markets and economic growth. However, there are very few works that address this aspect regarding our country.

Brasoveanu et al. (2008) analyze the correlation between capital market development and economic growth in Romania based on a regression function and VAR models. Thus, it is found that there is a positive bidirectional causal link between capital market development and economic growth, with stronger effects from economic growth towards capital market development, which suggests that economic growth determines the development of financial institutions.

Stoica (2002) states that in Romania, as in other former socialist countries, the components of the capital market appeared in an unnatural order, the secondary market being the first. He mentions that a small number of companies have procured the resources necessary to develop their activities on the capital market, with bank financing remaining the main source of financing for companies.

Barna and Mura (2010) study the relationship between capital market development and economic growth in Romania based on quarterly data from 2000-2009, using a regression function. They find that capital market development is positively correlated with economic growth, with a feedback effect, whereas a stronger link is from economic growth to capital market development, which shows that economic growth leads to the development of financial institutions.

Kolapo and Adaramola (2012) study the impact of the Nigerian capital market (using the variables market capitalization, total new issues, value of transaction and total listed equities and government stocks) on economic growth (using the GDP variable) from 1990-2010, applying Johansen co-integration and Granger causality tests, and show that there is a positive influence of the capital market on the country's economic growth.

Yadirichukwu and Chigbu (2014) investigate the impact of the capital market on economic growth in Nigeria according to data from 1985-2012, using regression analysis and multivariate co-integration, and show that market capitalization and the total number of listed securities have a significant negative influence on economic growth, while the value of shares traded and new issues have a significant positive influence on economic growth.

Nwamuo (2018) explores the impact of the capital market on economic growth in Nigeria based on data from 1981-2016, using regression functions and the Johansen co-integration test. The results revealed that the total listed equity has a positive and significant impact on economic growth, and the number of deals has a negative and non-significant impact on economic growth.

A large number of studies investigate the influence of the capital market on economic growth in Nigeria. Most of these show that the capital market has a positive and significant impact on economic growth (Edame and Okoro, 2013; Briggs, 2015; Taiwo et al., 2016). However, Ewah et al. (2009) find that the capital market does not contribute to economic growth significantly and Agu Bertram (2018) notes the existence of a negative relationship between market capitalization and Gross Domestic Product.

Francis et al. (2015) study the influence of capital market development on economic growth in Africa and state that there is a significant increase in real GDP per capita after the establishment of stock exchanges. The results also show that in the period after the launch of the stock market, there were significant improvements in the level of private investment and indicate that stock markets play a complementary role to the banking sector, contributing to the availability of private credit.

Nordin and Nordin (2016) examine the impact of the stock market and the debt market on the Malaysian economy applying the Johansen-Juselius co-integration test and show that both markets have a significant and positive influence on the annual growth rate of real gross domestic product per capita.

Tan and Mohamad Shafi (2021) analyze the influence of the capital market on economic growth in Malaysia during the period 1998 – 2018 using the autoregressive distributed lag (ARDL) co-integration bounds test and find that the stock market has a significant and positive effect on economic growth.

Sari and Widiyanti (2018) analyze the short and long-term effects of three capital market instruments on economic growth in Indonesia, based on data from January 2011 to December 2017, using the Johansen co-integration test and the error correction model. The results demonstrate that on both short and long term, the capital market has a significant positive influence on economic growth.

Coşkun et al. (2017) investigate the relationships between the development level of capital market subcomponents and economic growth between January 2006 and June 2016 in Turkey, based on ARDL models, Markov Switching regression and Kalman filter. They find that there is a long-run co-integration relationship between capital market development and economic growth, as well as a unidirectional causality from capital market development to economic growth.

Algaeed (2021) investigates the effects of capital market development on GDP per capita growth in Saudi Arabia during the period 1985-2018, applying ARDL, FMOLS models and the Johansen test. Regarding stock market indicators, he obtained the following results: capitalization and liquidity have a negative impact on economic growth and the share price index and the number of shares traded have a positive influence on economic growth.

Choong et al. (2010) study the role of stock markets as a channel through which foreign capital flows can promote economic growth in developed and developing countries.The results obtained indicate that stock markets, if they reach a certain threshold level of development, become a significant channel through which capital flows positively impact economic growth.

Durnev et al. (2004) analyze the influence of the capital market on economic growth in transition economies. The results analyzed in the paper suggest that the mere existence of a stock market itself is unlikely to support economic growth. They find that sound property rights, solid shareholder rights, stock market transparency and capital account openness contribute to efficient capital allocation and economic growth.

Oprea and Stoica (2018) investigate the impact of capital markets integration on economic growth in EU countries and identify the main factors through which capital markets' development influences economic growth based on data from the period 2004-2016 for EU countries, using the Autoregressive Distributed Lag model. The results obtained show that capital market integration has a positive influence on economic growth and the main factors through which the capital market exerts this influence are stock market capitalization, value traded, capital mobility and stock market indices.

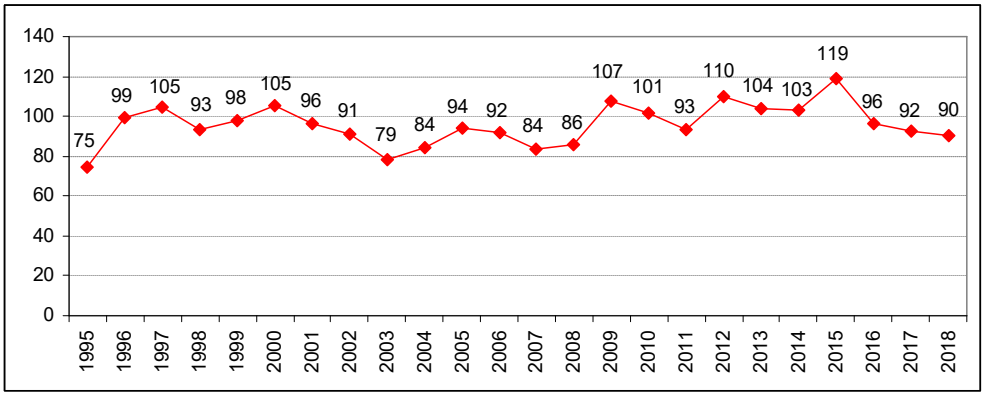
3. The Variables Used in the Analysis

The study of the influence of the capital market on Romania's economic growth was carried out via a linear regression. The economic growth is quantified by means of GDP chain index. The influence of the capital market on the economic growth is achieved through the number of transactions, the volume of transactions, capitalization and the number of issuing companies. In calculating the GDP chain indexes, the gross domestic product was used, expressed in current US dollars, by conversion from the national currency using one single year official exchange rate.

Regarding the GDP, the data source was the World Bank World Development Indicators Database and the data for the number of transactions, the volume of transactions, capitalization and the number of issuing companies were obtained from the Bucharest Stock Exchange (http://www.bvb.ro/TradingAndStatistics/Stats/GeneralStatistics).

Figure no. 1. shows the evolution of the GDP chain index in Romania in the period 1995–2018, the values being expressed as a percentage.

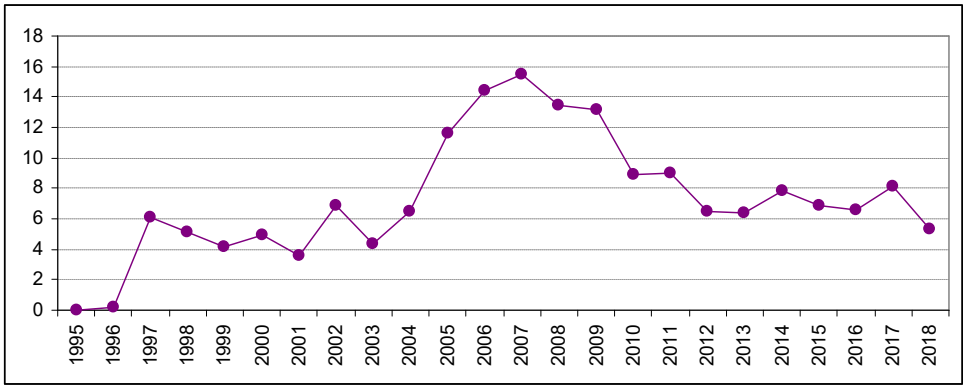
Figure no. 1. GDP Chain Index in Romania between 1995–2018



Source: Personal processing in Excel based on the data in the Annex.

In Figure no. 2. the dynamics of the number of transactions carried out in Romania between 1995 and 2018 is presented, the unit for the ordinate axis being 100,000.

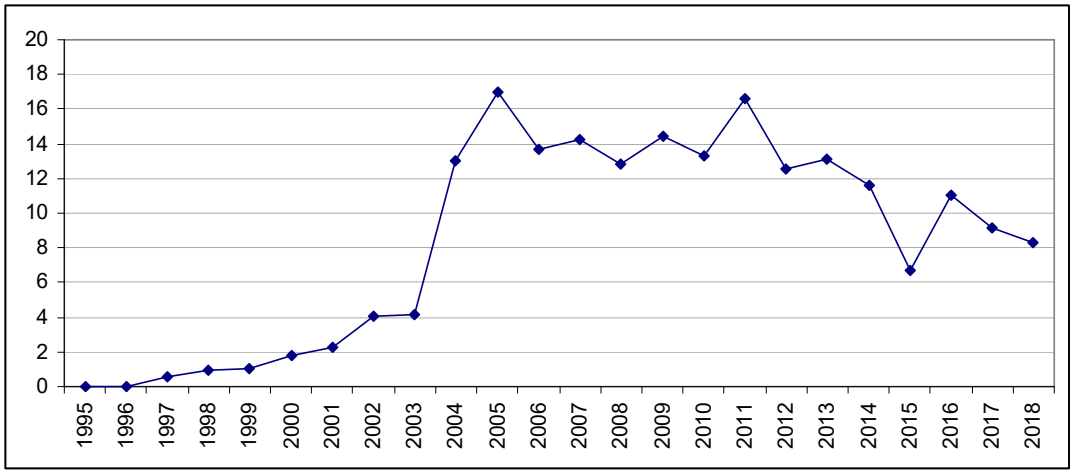
Figure no. 2. Number of Transactions Performed in Romania between 1995–2018



Source: Personal processing in Excel based on the data in the Annex.

In Figure no. 3. the dynamics of the volume of shares traded in Romania between 1995 and 2018 is presented, the unit for the ordinate axis being 1,000,000,000.

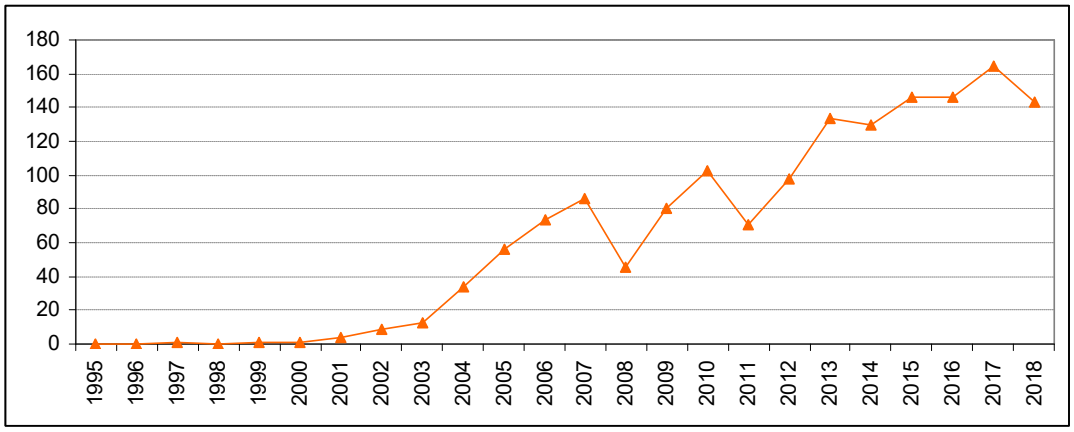
Figure no. 3. Volume of Shares Traded in Romania between 1995–2018



Source: Personal processing in Excel based on the data in the Annex.

Figure no. 4. shows the evolution of the capitalization of shares traded in Romania during the period 1995–2018, the unit for the ordinate axis being 1,000,000,000.

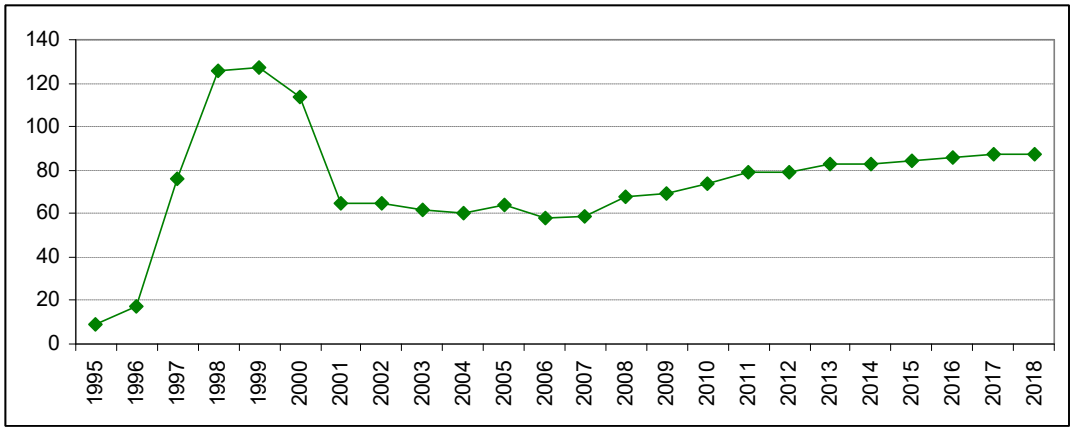
Figure no. 4. Capitalization of Shares Traded in Romania between 1995–2018



Source: Personal processing in Excel based on the data in the Annex.

Figure no. 5. provides the evolution of the number of issuing companies in Romania between 1995 and 2018.

Figure no. 5. Number of Issuing Companies in Romania between 1995–2018



Source: Personal processing in Excel based on the data in the Annex.

The variables in the model are represented using the following notation:
ci_gdp = GDP chain index
no_trans = number of transactions
vol_trans = volume of transactions
cap = capitalization
is_com = issuing companies
In the following table we present information regarding the distribution of the five time series in the model.

Table no. 1. Variable Descriptions

Variable	Observations	Maximum	Minimum	Mean	Median	Std. Dev.
ci_gdp	24	118.7193	74.75684	95.68103	94.99997	10.21235
no_trans	24	1544891	379.0000	730549.7	650622.0	400280.9
vol_trans	24	1.69E+10	42761.00	8.43E+09	1.01E+10	5.87E+09
cap	24	1.64E+11	23100000	6.41E+10	6.34E+10	5.80E+10
is_com	24	127.0000	9.000000	74.20833	75.00000	2.383792

Source: Personal processing in EViews based on the data in the Annex.

Since the time series used in the study have all positive terms and their orders of magnitude differ greatly from one series to another, their terms are expressed in logarithmic form.

4. Study of Stationarity in Time Series

Before specifying the econometric model, the stationarity in these time series must be studied and for this purpose, the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test were used.

Using the Augmented Dickey-Fuller (ADF) test, the stationarity in time series for GDP log chain index (l_ci_gdp) is tested and it is found that the series is stationary, since the probability associated with the t-statistic is lower than the significance threshold of 0.05 (Table no. 2.).

Table no. 2. Results of ADF Unit Root Test for the Logarithm of GDP Chain Index Variable

Null Hypothesis: l_ci_gdp has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.881096	0.0075
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Source: Personal processing in EViews based on the data in the Annex.

According to the results in Tables no. 3. and 4., the logarithm of the number of transactions and the logarithm of the volume of transactions (l_no_trans, respectively, l_vol_trans) are also stationary.

Table no. 3. Results of ADF Unit Root Test for the Logarithm of Number of Transactions Variable

Null Hypothesis: l_no_trans has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.67800	0.0000
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Source: Personal processing in EViews based on the data in the Annex.

Table no. 4. Results of ADF Unit Root Test for the Logarithm of Volume of Transactions Variable

Null Hypothesis: l_vol_trans has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.533192	0.0000
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Source: Personal processing in EViews based on the data in the Annex.

Using the Phillips-Perron (PP) test, we show that the series of natural logarithms of capitalization and number of issuing companies (l_cap, respectively, l_is_com) are still stationary. Indeed, the probabilities associated with the adjusted t-statistics are lower than the significance level of 0.05 (Tables 3 and 4).

Table no. 5. Results of PP Unit Root Test for the Logarithm of Capitalization Variable

Null Hypothesis: l_cap has a unit root
Exogenous: Constant
Bandwidth: 13 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.635167	0.0000
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Source: Personal processing in EViews based on the data in the Annex.

Table no. 6. Results of PP Unit Root Test for the Logarithm of Number of Issuing Companies Variable

Null Hypothesis: l_is_com has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.966183	0.0006
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Source: Personal processing in EViews based on the data in the Annex.

Therefore, all logged series of the variables considered are stationary, so that the model will be built according to them.

5. Model for Assessing the Influence of the Capital Market on the Economic Growth

Based on the model, we will study the dependence of the economic growth (quantified by the logarithm of the GDP chain index– l_ci_gdp) on the indicators characteristic of the capital market: the logarithm of the number of transactions (l_no_trans), the logarithm of the volume of transactions (l_vol_trans), the logarithm of capitalization (l_cap) and the logarithm of the number of issuing companies (l_is_com). Thus, we used a multifactorial linear regression as seen below:

$$l\_ci\_gdp_t = a_0 + a_1 l\_no\_trans_t + a_2 l\_vol\_trans_t + a_3 l\_cap_t + a_4 l\_is\_com_t + \varepsilon_t, \quad t = 1995,\ldots,2018$$

where

a_k – coefficients of the independent variables that must be determined, $k = 1,2,3,4$;

a_0 – intercept that must be determined;

ε_t – error terms, a variable that is normally distributed with mean 0 and variance σ^2.

6. Research Results and Analyses

For estimating the parameters of the econometric model, the least squares method was used and the following results were obtained:

Table no. 7. Regression Results

Dependent Variable: l_ci_gdp
Method: Least Squares
Sample: 1995 2018
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
c	-3.689559	0.281204	-13.12057	0.0000
l_no_trans	0.106807	0.050907	2.098090	0.0495
l_ vol_trans	0.112805	0.047255	2.387165	0.0275
l_ cap	0.048896	0.023266	2.101638	0.0492
l_ is_com	0.186179	0.076301	2.440060	0.0247

R-squared	0.390015	Mean dependent var	4.555483
Adjusted R-squared	0.261598	S.D. dependent var	0.108016
S.E. of regression	0.092819	Akaike info criterion	-1.733285
Sum squared resid	0.163691	Schwarz criterion	-1.487857
Log likelihood	25.79942	Hannan-Quinn criter.	-1.668173
F-statistic	3.037081	Durbin-Watson stat	2.018526
Prob(F-statistic)	0.042964		

S**ource:** Personal processing in EViews based on the data in the Annex.

Therefore, the model for evaluating the influence of the factors characteristic of the capital market on the economic growth is the following:

$$l\_ci\_gdp_t = -3.689559 + 0.106807 l\_no\_trans_t + 0.112805 l\_ vol\_trans_t + 0.048896 l\_ cap_t + 0.186179 l\_ is\_com_t + \varepsilon_t,\ t = 1995,\ldots,2018$$

Since the probabilities associated with t - statistic are lower than the 0.05 significance level for all coefficients, we can accept the hypothesis that the model parameters are significantly different from zero.

P-value of F-statistic (0.042964) is less than 0.05, which means that we can reject the null hypothesis that all coefficients in the model are zero. Therefore, the model is significant (at least one coefficient in the regression, except for the intercept, is significantly different from 0).

The coefficient of determination (R-squared) has the value 0.390015 which shows that 39% of the variation of the logarithm of GDP chain index is due to some variables that characterize the capital market.

Another prerequisite for the acceptance of the model is the absence of autocorrelation in the residuals (prediction errors). In order to verify the absence of autocorrelation in residuals, we benefit from the Durbin-Watson test. Because the value of the Durbin-Watson statistic is close to 2, the errors are not autocorrelated.

It is also necessary to verify that different samples of the residual variable have the same variance (homoscedasticity). The essential part of the Breusch-Pagan-Godfrey test output used for homoscedasticity testing is given in Table no. 8.

Table no. 8. Results of the Breusch-Pagan-Godfrey Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

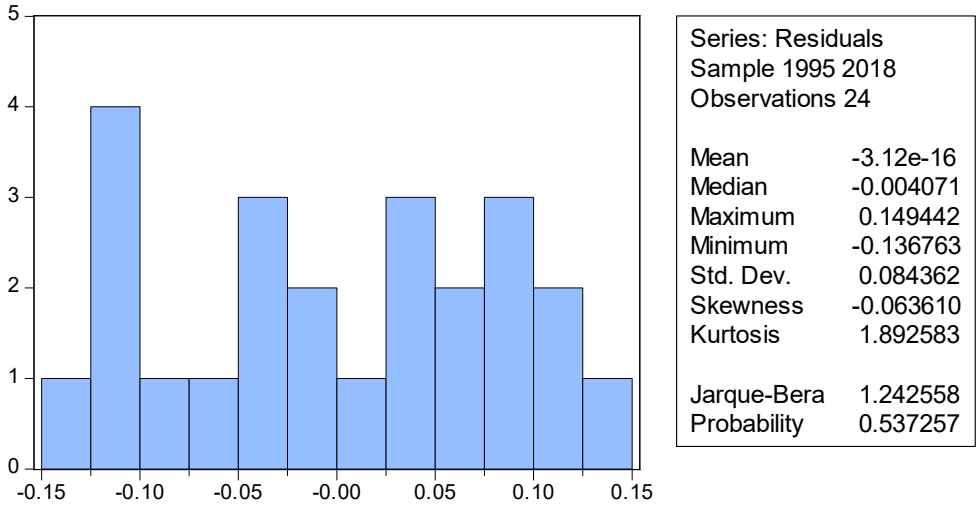
F-statistic	0.750816	Prob. F(4,19)	0.5697
Obs*R-squared	3.275800	Prob. Chi-Square(4)	0.5128
Scaled explained SS	0.916264	Prob. Chi-Square(4)	0.9222

Source: Personal processing in EViews based on the data in the Annex.

The null hypothesis of the Breusch-Pagan-Godfrey test is homoscedasticity and the alternative hypothesis indicates heteroscedasticity. All three statistics show that the null hypothesis cannot be rejected, i.e. the homoscedasticity of residuals (associated probabilities greater than 0.05).

Another condition that the errors must meet is to follow a normal distribution with mean 0. To verify the normality of the distribution of the residual variable, the Jarque-Bera test was used which provided us with the following output.

Figure no. 6. Results of the Jarque-Bera Test

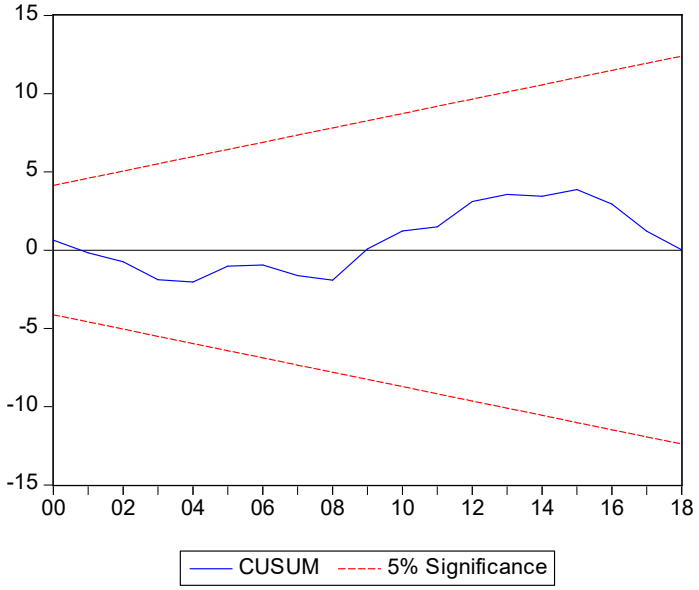


Source: Personal processing in EViews based on the data in the Annex.

According to the null hypothesis of the test, the errors have a normal distribution. The probability associated with the Jarque-Bera statistic (0.537257) is higher than the significance level of 0.05, so that the null hypothesis cannot be rejected which shows that the errors follow a normal distribution.

It is also necessary to verify that the model parameters are stable across various data samples. After applying the CUSUM test used for this purpose, we obtained the following graphical representation.

Figure no. 7. Results of the CUSUM Test

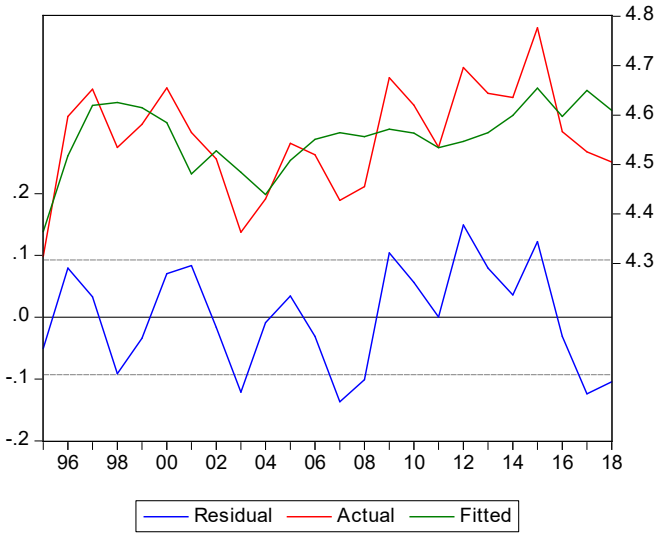


Source: Personal processing in EViews based on the data in the Annex.

From the graph above, it is concluded that the cumulative sum of the recursive residuals represented by the blue colored curve is maintained between the two red critical lines corresponding to the significance level of 5%, which shows that the parameters of the equation are stable.

In Figure no. 8. are represented the actual values and the fitted values of the natural logarithm of the GDP chain index and the values of the residual variable.

Figure no. 8. Actual Values and Fitted Values of the Natural Logarithm of GDP Chain Index and Values of Residual Variable



Source: Personal processing in EViews based on the data in the Annex.

The model shows that the number of transactions, the volume of transactions, the capitalization and the number of issuing companies have a positive influence on the GDP chain index. Thus, the estimate $\hat{a}_1 = 0.106807$ shows that a 1% increase in the number of transactions leads to an increase in the GDP chain index by 0.107%. Also, $\hat{a}_2 = 0.112805$ shows that a 1% increase in the volume of transactions produces a 0.113% increase in the GDP chain index. The estimate $\hat{a}_3 = 0.048896$ indicates that if the capitalization increases by 1%, then the GDP chain index also increases by 0.049%. At the same time, from the estimate $\hat{a}_4 = 0.186179$, it results that a 1% increase in the number of issuing companies has the effect of a 0.186% increase of the GDP chain index.

7. Conclusions

The article studies the dependence of economic growth on the capital market in Romania. The study was conducted on the basis of a multiple linear regression in which the response variable is the GDP chain index and the explanatory variables are: number of transactions, volume of transactions, capitalization and number of issuing companies.

According to the multiple linear regression model, the influence of the capital market (through the four variables considered: the logarithm of the number of transactions, the logarithm of the volume of transactions, the logarithm of the capitalization and the logarithm of the number of issuing companies) accounts for 39% of the variation of the logarithm of the GDP chain index. This suggests that the capital market must be included among the parameters that influence economic growth.

The four factors considered positively influence the GDP chain index. Specifically, an increase in the number of transactions, in the volume of transactions, in the capitalization and in the number of issuing companies by 1% (each factor being modified separately, the other

variables being kept at the same level) determines an increase in the GDP chain index by 0.107%, 0.113%, 0.049%, respectively, 0.186%.

Since the Bucharest Stock Exchange was reopened in 1995 (closed in 1945 by the communist regime), as to the time series of the variables that characterize the capital market we have values only for the period 1995-2018, which is relatively short for a consistent analysis. Additionally, the values of these time series are obtained only for one financial instrument – shares. These aspects are limitations of the study.

As the capital market has a long tradition and plays a more important role in the economies of other European countries, we intend to analyze its influence on the economic growth in the countries of the European Union in a future paper. The extension of the study to the level of the European Union will be accomplished via a panel data model.

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Annex. Dynamics of Model Indicators in Romania between 1995-2018

Year	GDP chain index, %	Number of transactions	Volume of transactions	Capitalization, lei	Number of issuing companies
1995	74.7568	379	42,761	25,900,000	9
1996	99.2132	17,768	1,141,648	23,100,000	17
1997	104.8608	609,651	593,893,605	505,600,000	76
1998	93.1620	512,705	986,804,827	392,200,000	126
1999	97.6254	415,045	1,057,558,616	572,500,000	127
2000	105.1279	496,887	1,806,587,265	1,072,800,000	114
2001	96.0372	357,577	2,277,454,017	3,857,300,000	65
2002	91.0480	689,184	4,085,123,289	9,158,000,000	65
2003	78.5040	440,084	4,106,381,895	12,186,600,000	62
2004	83.9888	644,839	13,007,587,776	34,147,400,000	60
2005	93.9628	1,159,060	16,934,865,957	56,065,586,985	64
2006	91.8329	1,444,398	13,677,505,261	73,341,789,546	58
2007	83.7456	1,544,891	14,234,962,355	85,962,389,149	59
2008	86.0956	1,341,297	12,847,992,164	45,701,492,619	68
2009	107.3125	1,314,526	14,431,359,301	80,074,496,090	69
2010	101.4881	889,486	13,339,282,639	102,442,620,945	74
2011	93.2011	900,114	16,623,747,907	70,782,200,350	79
2012	109.5266	647,974	12,533,192,975	97,720,863,603	79
2013	103.9728	636,405	13,087,904,925	133,829,707,066	83
2014	103.0809	787,753	11,615,242,311	129,958,141,655	83
2015	118.7193	685,248	6,696,750,556	146,002,473,957	84
2016	96.2201	653,270	11,048,103,360	146,549,746,292	86
2017	92.3760	808,429	9,105,130,182	164,376,159,957	87
2018	90.4863	536,222	8,290,217,224	142,986,113,235	87

Source: World Bank World Development Indicators Database – for calculation of chain index for GDP and Bucharest Stock Exchange (http://www.bvb.ro/TradingAndStatistics/Statistics/GeneralStatistics) – for the other indicators.

VAT AND TAX COMPLIANCE IN E-COMMERCE: AN ACCOUNTING APPROACH

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Abstract: *The development of e-commerce has led to changes in the field of accounting, requiring adaptation to new methods of financial recording and reporting. This paper analyzes the specific aspects of accounting in e-commerce, focusing on revenue recognition, tax reporting, and VAT application. Through a practical case study, product prices with and without VAT are compared, highlighting the fiscal effects on consumers and businesses. An essential aspect is the VAT applicable to products and services sold online, especially in the context of European legislation and the One Stop Shop (OSS) mechanism. The study examines the impact of VAT on the final product price, the differences between standard and reduced VAT rates, and how VAT influences the profitability of e-commerce businesses. Additionally, the paper highlights accounting challenges related to managing returns, adjusting VAT, and accurately declaring tax obligations. The conclusions emphasize the importance of effective VAT management and tax compliance in e-commerce to ensure transparency and cost optimization. A clear understanding of these aspects enables companies to avoid tax risks and improve their pricing and profitability strategies.*

Keywords*: accounting, fiscal impact, online transactions, E-commerce, One Stop Shop.*
JEL Classification*: M41, H25, L81. F15, K34.*

1. Introduction

Technological advances in recent decades have fundamentally reshaped the architecture of international trade, particularly through the development of e-commerce. (Agrawal et al. 2020). This article analyzes the implications of these transformations for tax systems, from both a theoretical and an applied perspective. Starting from classic models of tax competition and integrating recent developments such as the South Dakota V. Wayfair decision and the effects of the COVID-19 pandemic, the study explores the differential impact on tax jurisdictions, new compliance challenges and tax policy options, including the taxation of personal data. The conclusions highlight the need to adapt tax regimes to new digital realities, in parallel with international coordination efforts.

The digitalization of the economy has generated significant mutations in the way goods and services are produced, distributed and consumed. (Einav, 2014) E-commerce has become a major component of the global economy, and this process has been accelerated by recent events such as the COVID-19 pandemic. These changes challenge traditional tax systems, which are based on concepts such as physical presence and location of production.

2. E-commerce and tax competition: a review of theoretical models

Kanbur and Keen's (1993) seminal model looks at tax competition between two countries of different sizes, demonstrating that smaller countries tend to reduce taxes to attract economic activity, which can lead to revenue losses in larger countries. Nielsen (2001) expands this framework to include e-commerce, highlighting how destination taxation can mitigate the effects of tax competition in the context of online transactions.

Reducing online trading costs favors smaller jurisdictions, allowing them to attract additional tax revenue, while larger jurisdictions may experience base erosion. This dynamic suggests the need for international tax coordination to prevent a "race to zero" in setting tax rates. In the case of South Dakota v. Wayfair, the U.S. Supreme Court ruled that states may impose sales tax collection obligations on suppliers without a physical presence.

3. Case study

Within the European Union, Member States are free to set their own VAT and excise duty rates, provided that they comply with the minimum limits provided for by European legislation. The comparative analysis of Romania, Spain, Italy and Greece highlights the differences in terms of the level of indirect taxation, differences adapted to the economic and social particularities of each country. Standard VAT rates vary, with Romania applying the lowest level (19%), while Greece imposes one of the highest rates in the EU (24%). Italy and Spain are in the middle range, with 22% and 21% respectively.

These differences in VAT rates indicate the tax strategies of national governments. Romania aims to stimulate consumption through more moderate taxation, while Greece uses higher VAT to cover budget imbalances. With regard to reduced VAT rates, all four countries apply preferential rates for basic products and services.

Romania

SAF-T D406: Starting with January 2022, large taxpayers in Romania are required to file the SAF-T return (D406). Medium-sized taxpayers have been included in this obligation since January 2023, and small and non-resident taxpayers will have to comply by January 2025

e-Invoice: From January 1, 2024, all companies, both resident and non-resident, must report invoices issued within 5 working days. Failure to comply with this obligation may result in fines between 1,000 and 10,000 LEI.

OSS: Romania allows registration in the OSS scheme, making it easier for companies to declare and pay VAT on cross-border sales to consumers in the EU through a single quarterly declaration.

Greece

e-Invoicing: Greece has received approval from the Council of the European Union to introduce mandatory e-invoicing in B2B transactions. This measure is scheduled to enter into force from July 1, 2025 and will be valid until June 30, 2026. The implementation aims to support the myDATA platform, which requires full reporting of electronic invoices and registers to tax authorities.

OSS: Greece participates in the OSS scheme, allowing companies to manage VAT on cross-border sales to consumers in the EU through a single quarterly declaration.

Greece has not adopted SAF-T according to OECD standards, but has introduced the myDATA (My Digital Accounting & Tax Application) platform for the digitization of tax and accounting information. From 2020 onwards, taxpayers are obliged to submit transactional and accounting data to the Greek Tax Authority (IAPR) either in real time or periodically. This initiative aims to improve compliance

Italy

OSS: Italy participates in the OSS scheme, allowing companies to register and manage VAT on B2C sales in other EU member states through a single declaration.

OSS declarations must be submitted quarterly, with deadlines of 30 April, 31 July, 31 October and 31 January. Italy has not so far implemented SAF-T according to OECD standards. Instead, Italy uses its own electronic reporting system, mainly focused on mandatory electronic invoicing (FatturaPA) and the reporting of tax data through the Data Exchange System (SDI).

Spain

Spain: e-Invoice: Spain has planned to implement mandatory e-invoicing in B2B transactions. According to the draft regulation, companies with an annual turnover of more than €8 million will be obliged to use e-invoicing from 2024, and the other companies will follow until 2026. Invoices issued must include an identification code and QR code to facilitate digital tracking.

OSS: Spain participates in the OSS scheme, making it easier for businesses to declare and pay VAT on cross-border sales to consumers in the EU through a single declaration.

Table: Comparison of VAT and excise duties in Romania, Spain, Italy and Greece

Country	VAT standard (%)	VAT reduced 1 (%)	VAT reduced 2 (%)	Tobacco excise duties (€/1000 Tobacco)	Alcohol excise duties (€/hl pure alcohol)	Gasoline excise taxes (€/1000 liter)	Diesel excise duties (€/1000 liter)
Romania	19	9% (food, medicine, accommodation)	5% (textbooks, housing)	~94	1000	373	330
Spain	21	10% (food, transportation, hotel)	4% (basic food, books)	~123	950	400	379
Italy	22	10% (food, hotel)	5% & 4% (special products, books)	~119	800	728	617
Greece	24	13% (food, energy, hotel)	6% (books,	~156	1100	700	410

			medicines)				

The table above highlights the significant differences between the four countries in terms of the level of indirect taxation, reflected in the VAT rates and the level of excise duties. Greece has the highest standard VAT rate (24%), while Romania has the lowest (19%). This reflects different tax strategies, with Greece seeking to maximise indirect tax revenues, while Romania maintains a relatively low VAT policy to boost domestic consumption. Regarding the reduced VAT rates, all the countries analyzed apply discounts for goods considered essential (food, medicines, accommodation, transport). However, the extent and applicability of these quotas vary. For example, Romania applies 5% for textbooks and housing, while Italy uses differentiated rates of 4% and 5% for special products and books. Greece, on the other hand, applies 6% for medicines and books, but has a reduced 1 higher rate (13%).

In terms of excise duties, Greece stands out for the highest levels of excise duties on tobacco (~156 EUR/1000 cigarettes) and alcohol (1100 EUR/hl pure alcohol), which suggests an effort to discourage harmful consumption, but also a strategy to increase tax revenues. In contrast, Romania has the lowest excise duties on tobacco (~94 EUR) and moderate levels for alcohol (1000 EUR), gasoline and diesel. Italy imposes the highest excise duties on fuels (€728 for petrol and €617 for diesel), which may indicate an eco-oriented tax strategy or a greater dependence on transport tax revenues. Spain applies intermediate levels to all types of excise duties, highlighting a balanced approach.

In conclusion, the differences in the tax regime reflect the economic, social and political particularities of each state. Romania maintains lower levels to support domestic consumption and ease the tax burden on the population, while Greece and Italy use extensive indirect taxation to offset fiscal constraints. Spain is in a medium position, with a moderate approach to indirect taxation.

Recommendations

Expanding the range of products eligible for reduced VAT rates in Romania, especially for consumer goods and organic products. Simplification of tax procedures related to VAT, including through the complete digitization of the system (e-Invoice, SAF-T).

Increasing voluntary compliance through tax information campaigns and incentives for small businesses to apply VAT correctly.

Harmonisation of VAT policies at EU level, in order to reduce differences between Member States and prevent distortions of competition

Continuous monitoring of the impact of VAT rates on vulnerable consumers and adaptation of policies according to social and economic needs.

4. Conclusions

VAT is one of the most important sources of budget revenue in all the countries analyzed, having a significant impact on consumption and competitiveness of products. Although the standard VAT rate is relatively similar (between 19% and 24%), the reduced rates vary considerably depending on the social and economic policies of each country. Countries such as Spain and Italy apply multiple reduced rates for essential goods (food, medicines, public transport, etc.), while Romania applies only two reduced rates (9% and 5%). Differences in the application of reduced rates can affect the competitiveness of products within the European Single Market and create tax misalignment.

Digitalisation has amplified tax competition, eroded traditional tax bases and created new challenges for compliance. To respond to these changes, tax systems need to be more flexible, technological, and equity-oriented. Data taxation and the reform of VAT and sales tax regimes need to be addressed in a coordinated manner at international level.

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FINANCIAL EDUCATION THROUGH INNOVATIVE FINANCIAL INSTRUMENTS: BALANCING LEARNING MOTIVATION AND MENTAL WELL-BEING IN THE ERA OF ARTIFICIAL INTELLIGENCE

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Abstract: *In the digital age, financial education in innovative financial instruments is essential for fostering knowledge acquisition, academic advancement, and the psychological well-being of students. It also plays a critical role in shaping the motivation and performance of educators. A multidisciplinary, transdisciplinary, and pluri-disciplinary approach emphasizes the importance of equity, diversity, and multiculturalism while upholding high academic standards and quality expectations. This study explores the relationship between learning motivation and online learning performance in financial education, particularly in the context of artificial intelligence (AI)-driven financial tools. It examines how AI impacts mental well-being and learning engagement, offering insights into strategies that balance motivation and cognitive load. The research methodology is grounded in organizational socialization theory, investigating four key socialization strategies—informational feedback, interactive support, member education, and information provision—within digital learning communities. Findings indicate that these strategies enhance social identification, thereby increasing learning engagement and duration. Additionally, economic incentives (extrinsic motivation) influence learning behaviours, demonstrating that extrinsic factors can stimulate intrinsic motivation and sustained engagement. This research contributes to understanding how AI-powered financial education can optimize learning motivation while supporting mental well-being in academic settings.*

Keywords: *education, finance, AI (artificial intelligence), sustainability.*
JEL Classification*: Q01, G41, I22.*

1. Introduction

In the context of the profound transformations generated by the digital age, financial education takes on a strategic role in developing the skills needed to adapt to innovative financial instruments. These instruments, often powered by artificial intelligence (AI), not only influence the way economic resources are managed, but also determine new paradigms in the learning process. In this context, financial education becomes essential not only for the acquisition of knowledge and academic progress, but also for supporting the psychological well-being of students, as well as the motivation and performance of teachers.

This paper approaches financial education through a multidisciplinary, transdisciplinary and pluridisciplinary approach, in which equity, diversity and multiculturalism are central values. This conceptual framework supports adaptive and inclusive learning, capable of responding to both individual needs and contemporary academic demands.

In a time when AI is redefining educational processes and learning behaviors, a deeper understanding of how motivation for learning and performance in online environments correlate with the use of digital financial instruments is necessary. At the same time, cognitive

engagement and emotional balance of students are fundamental dimensions in the design of effective educational strategies.

Applying organizational socialization theory, this research investigates four key socialization strategies—informational feedback, interactive support, member education, and information provision—within digital learning communities. The results highlight the importance of social identification in increasing engagement and learning duration, while also highlighting the influence of extrinsic motivation, through economic incentives, on intrinsic motivation.

Thus, the proposed study aims to contribute to the shaping of an integrative financial education framework based on AI technologies, which would optimize motivation for learning, reduce cognitive load and support the psychological balance of participants in the educational process and connect students' professional training to industries, in the context of continuous adaptation to the new jobs of the future, jobs that correspond to current challenges in the context of the digital and green eras.

2. Literature review

Financial education has become a fundamental element of economic literacy, essential for developing the skills necessary for the efficient management of financial resources. In the context of rapid digitalization, access to financial information has diversified, and digital tools have brought about a significant transformation in the way individuals learn and apply financial principles. According to research by Lusardi and Mitchell (2014), financial education in the digital age must respond to new challenges, and new technologies offer both opportunities and risks. Also, recent studies (OECD, 2020) emphasize that students from current generations require more dynamic, interactive and personalized educational programs that allow them to cope with the complexity of a global financial market and at the same time meet the demands of student-centered education. This educational framework must include both fundamental notions of economics and skills related to the use of innovative financial instruments.

Financial innovation and emerging technologies

Innovative financial instruments, such as AI-based investment applications, cryptocurrencies and fintechs, have the potential to democratize access to financial services, but they are also accompanied by educational and ethical challenges. Arner, Barberis and Buckley (2017) emphasize that these emerging technologies are radically changing the architecture of the financial system and require a review of traditional educational paradigms. Financial education should not be limited to basic knowledge about savings, credit and investments, but should also include an understanding of the risks associated with AI, cryptocurrencies and cybersecurity (Bholat et al., 2016). In this regard, students need to acquire risk assessment skills, as well as knowledge of automated decision-making processes, essential in the use of modern financial instruments.

Motivation for learning and performance in the online environment

Motivation is a key factor in the learning process and is closely linked to academic performance and engagement in digital environments. Motivational theories, such as the self-determination theory proposed by Deci and Ryan (2000), suggest that there is an important balance between intrinsic and extrinsic motivation, and this balance is essential for achieving effective learning. In online environments, economic incentives or the use of gamification can support motivation, but must be carefully integrated so as not to affect students' genuine

interest (Deterding et al., 2011). Educational design in online environments must take into account the potential impact of external incentives on intrinsic motivation, thus maintaining an optimal level of cognitive and emotional engagement.

Artificial Intelligence and mental health in education

As AI becomes more integrated into educational platforms, questions about its impact on students' mental health are becoming increasingly relevant. Learning personalization algorithms can enhance the educational experience, but there is a risk that their excessive use can generate cognitive overload, anxiety, or social disconnection (Luckin et al., 2016). In the literature, Selwyn (2019) emphasizes the importance of adopting educational strategies that balance the benefits of technology with protecting students' mental well-being. It is also essential that AI-based educational platforms integrate mental health protection measures, given their impact on users' behavior and emotional state.

Organizational socialization strategies in digital communities

Organizational socialization theory provides a valuable framework for understanding how individuals adapt and integrate into digital educational environments. According to research by Bauer et al. (2007), strategies such as informational feedback, interactive support, continuous training, and access to relevant resources are essential for developing a strong social identity and increasing student engagement in digital learning communities. These strategies become essential in the context where AI mediates or replaces some of the traditional interactions, having a significant impact on social cohesion and individual motivation. In this context, future studies should further investigate how these strategies can be effectively implemented in virtual environments, considering the particular characteristics of digital education.

3. Research methodology

Research objective

The main goal of this research is to analyze how financial education based on innovative tools, integrated with artificial intelligence (AI) technologies, influences students' learning motivation and mental well-being. At the same time, the effectiveness of organizational socialization strategies in digital financial learning communities is investigated.

In order to answer the purpose of the study, we have structured several research questions and hypotheses. Regarding *the research questions* , we can mention the following:

1. What relationship exists between the use of innovative financial instruments and motivation for learning among students?
2. How do AI technologies influence the engagement and psychological well-being of learners?
3. To what extent do organizational socialization strategies enhance social identification and engagement in online learning?

Regarding the structured hypotheses, these are:

H1: Integrating AI into financial education positively contributes to extrinsic motivation and engagement in learning.

H2: Applying organizational socialization strategies increases the duration and quality of participation in educational platforms.

H3: AI-mediated cognitive overload has a negative effect on mental well-being, but can be counterbalanced by personalized feedback and interactive support.

Our study's research is approached from both a quantitative and qualitative perspective, to capture both the measurable dimension of motivation and performance, as well as the subjective aspects related to well-being and social identification.

Quantitative research , namely the application of an online questionnaire to students enrolled in digital financial education (Fintech) courses that use AI-integrated tools. For *the qualitative research ,* we conducted semi-structured interviews with a small sample of participants to explore perceptions related to motivation, cognitive difficulties and social support.

The target group is university students in the fields of economic and financial sciences who participate in online courses with AI components (e.g. financial simulation platforms, advisory robots, automated trading applications).

Sample size : 50–200 respondents (for quantitative analysis) and 10–15 participants (for interviews). Regarding the sampling technique, this is stratified sampling, based on year of study and level of familiarity with digital tools.

The data collection tool is the questionnaire consisting of sections on: the level of use of AI technology in financial education, motivation for learning (Academic Motivation Scale – adaptation), perception of cognitive load (Cognitive Load Scale), mental well-being (WHO-5 Well-being Index), *and* perception of socialization strategies (scale inspired by Bauer et al., 2007). Regarding the interview structure, it was developed to explore experiences related to the use of AI, perceptions of social support, emotional balance, and involvement in the educational process.

Data analysis methods were based on both *quantitative analysis* , namely Pearson correlation tests and multiple regressions to identify relationships between variables (motivation, involvement, cognitive load), as well as the ANOVA method for comparing groups according to exposure to AI, but also the *qualitative analysis method*, namely thematic analysis of interviews, through recurrent coding of responses related to motivation, stress, social identification and support.

Participants were informed in advance about the purpose of the research and signed informed consent agreements. The anonymity of the responses and the confidentiality of the data were ensured. The research respected the ethical standards of the academic institution and the GDPR provisions regarding the protection of personal data.

4. Results and discussion

Quantitative analysis results

Based on responses collected from a sample of 182 students, statistical analysis revealed the following results:

A first result is given by *motivation for learning* , namely students who frequently use financial education platforms integrated with AI showed a significantly higher level of extrinsic motivation ($M = 4.12$, $SD = 0.78$), but also a moderate increase in intrinsic motivation ($M = 3.65$, $SD = 0.91$), compared to students exposed to traditional methods.

Another specific element of the result is *cognitive load* , respectively 63% of respondents reported an increased level of difficulty in managing the information volume offered by smart platforms, indicating a *high cognitive load* , negatively correlated with well-being ($r = –0.41$, $p < 0.01$). *Mental well-being* representing another outcome element, namely the average score on the WHO-5 scale was 58/100, indicating a relatively low state of well-being among intensive users of AI in education.

Socialization strategies appreciated as a result, as well as Informational feedback and interactive support were the most effective predictors of *active involvement* in digital communities ($\beta = 0.48$, $p < 0.001$), supporting hypothesis H2 regarding the role of socialization strategies in online learning.

For the quantitative phase, data were collected from a sample of 182 students enrolled in digital financial education courses. The statistical analysis followed four main dimensions: motivation for learning, perception of cognitive load, mental well-being, and the effectiveness of organizational socialization strategies.

Table 1. Descriptive statistics for the main variables

vary	N	Average (M)	Standard deviation (SD)
Extrinsic motivation	182	4.12	0.78
Intrinsic motivation	182	3.65	0.91
Cognitive load	182	3.94	0.84
Well-being (WHO-5)	182	58.3	12.4
Involvement in online communities	182	3.87	0.89

Note: Motivation was measured on a Likert scale from 1 (very low) to 5 (very high); well-being is expressed as a percentage score.

Table 2. Pearson correlations between variables

Variable 1	Variable 2	Correlation coefficient (r)	Meaning (p)
Extrinsic motivation	Online involvement	0.52	< 0.001
Cognitive load	Well-being	–0.41	< 0.01
Interactive feedback	Online involvement	0.48	< 0.001
Member education	Social identification	0.36	< 0.01

Significant correlations indicate positive relationships between motivation and engagement, and negative relationships between overload and psychological well-being.

Fig.1. Means and standard deviations of the studied variables

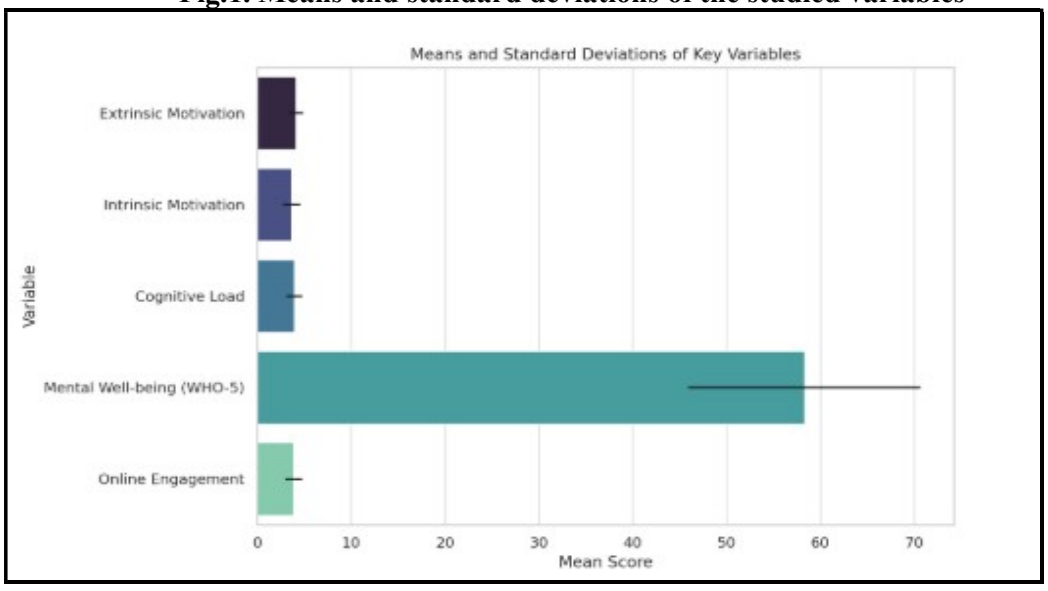
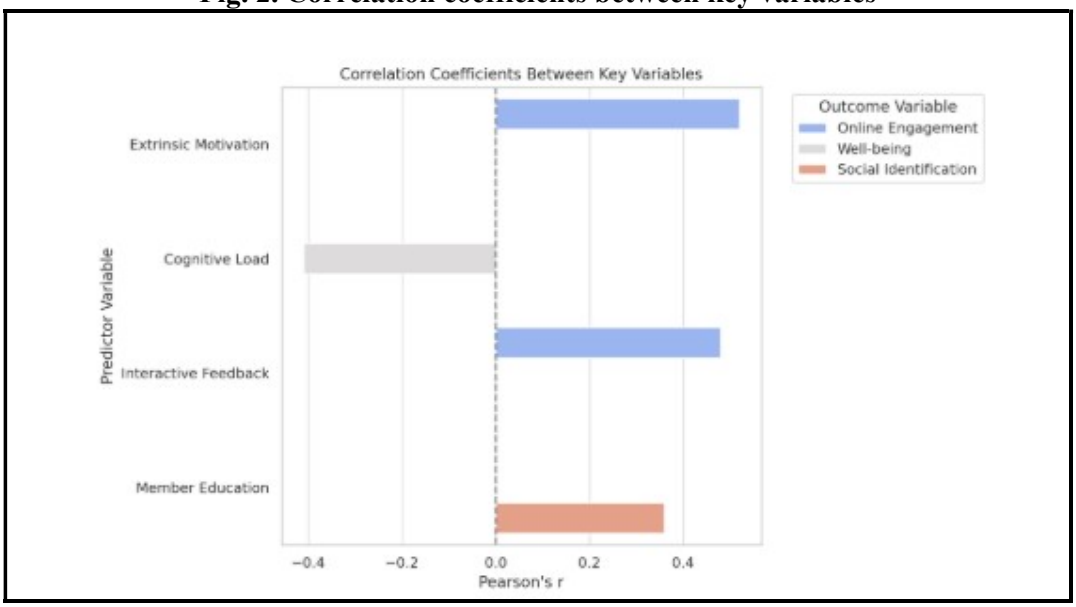


Table 3. Multiple regression analysis: Predictors of involvement in digital communities

Independent variable	Beta coefficient (β)	Std. Err.	t	p
Informational feedback	0.29	0.06	4.83	< 0.001
Interactive support	0.23	0.07	3.28	0.001
Extrinsic motivation	0.21	0.08	2.63	0.009
Cognitive load	–0.18	0.09	–2.00	0.046

The model is significant ($R^2 = 0.41$, $F(4,177) = 30.84$, $p < 0.001$), explaining 41% of the variance in online engagement.

Fig. 2. Correlation coefficients between key variables



As a *general interpretation* , we can mention that extrinsic motivation and informational feedback are the strongest predictors of learning engagement, confirming the importance of socialization and reward strategies. Moreover, cognitive load has a significant negative effect on well-being, suggesting the risk of mental overload in hyper-technological environments. At the same time, the positive correlations between members' education and social identification suggest that collaborative learning and mutual support can strengthen intrinsic motivation.

Qualitative analysis results

Thematic analysis of the interviews highlighted four main themes, namely:

Perception of AI , respectively, most participants described AI as a useful tool for personalizing learning, but mentioned the lack of human interaction as a source of stress and isolation.

Sources of motivation, namely the responses confirmed that *tangible rewards* (badges, scores, access to advanced simulators) increase motivation, but this is unstable in the absence of real interest in the subject.

Social identification , namely students who received support from peers or tutors in digital environments reported a higher degree of connection and engagement.

Psychological challenges , namely several respondents mentioned states of anxiety and mental fatigue following the intensive use of automated platforms, citing lack of breaks,

overload with notifications and pressure to perform at a fast pace. Within these, we present the subthemes identified for a better understanding of the qualitative results obtained in the study.

Table 4. Presentation of themes and identified subthemes

Main theme	Subtheme	Description/Observation
Perception of AI	The usefulness of personalizing learning	Most participants mentioned AI as a useful tool.
	Lack of human interaction	Source of stress and isolation due to lack of direct interaction with a teacher.
Sources of motivation	Tangible rewards	Badges, scores, and access to simulators increase motivation, but it is unstable.
	Lack of real interest	Motivation decreases when there is no real interest in the subject.
Social identification	Support from peers and tutors	Studies show a higher degree of engagement and connection in digital environments with social support.
Psychological challenges	Anxiety and mental fatigue	Lack of breaks, overload with notifications, and pressure to perform generate anxiety and mental fatigue.

*In the interviews conducted***,** the frequency with which the main themes appeared is given by the following results, namely the *perception of AI* in a proportion of 30% among those interviewed, *sources of motivation* represented 25%, *social identification* reached a percentage of 20%, and *psychological challenges* among those interviewed reached 25%. Furthermore, regarding the *distribution of subthemes* within each theme, respectively the diversity of responses on each theme, we can mention the following results, namely: *perception of AI* (the usefulness of personalized learning in 60%, and the lack of human interaction in 40% of those interviewed), *sources of motivation* (tangible rewards reached 70% of those interviewed, and the lack of real interest was given by 30% of those interviewed).

In the future, we plan to continue our research in order to analyze, based on our interviews, which words or phrases were included in the responses of the interviewees, such as: "motivation", "rewards", "personalized learning", "social support", "anxiety", "performance", "mental fatigue", etc., to highlight the most frequently mentioned concepts.

Discussions

The results confirm the hypothesis that integrating artificial intelligence into financial education stimulates both extrinsic motivation and engagement, but raise questions about *mental health and the sustainability of the learning process* .

Self-determination theory (Deci & Ryan, 2000) is supported in the sense that although extrinsic motivation can be increased through incentives, it is not sufficient for deep learning in the absence of authentic involvement. Furthermore, the theory of organizational socialization is validated in the digital environment: interactive support and constant feedback play a crucial role in reducing the feeling of isolation and maintaining involvement.

At the same time, the results bring a relevant contribution to the discussion about the design of AI-based educational platforms. Overstimulation and algorithmic complexity can

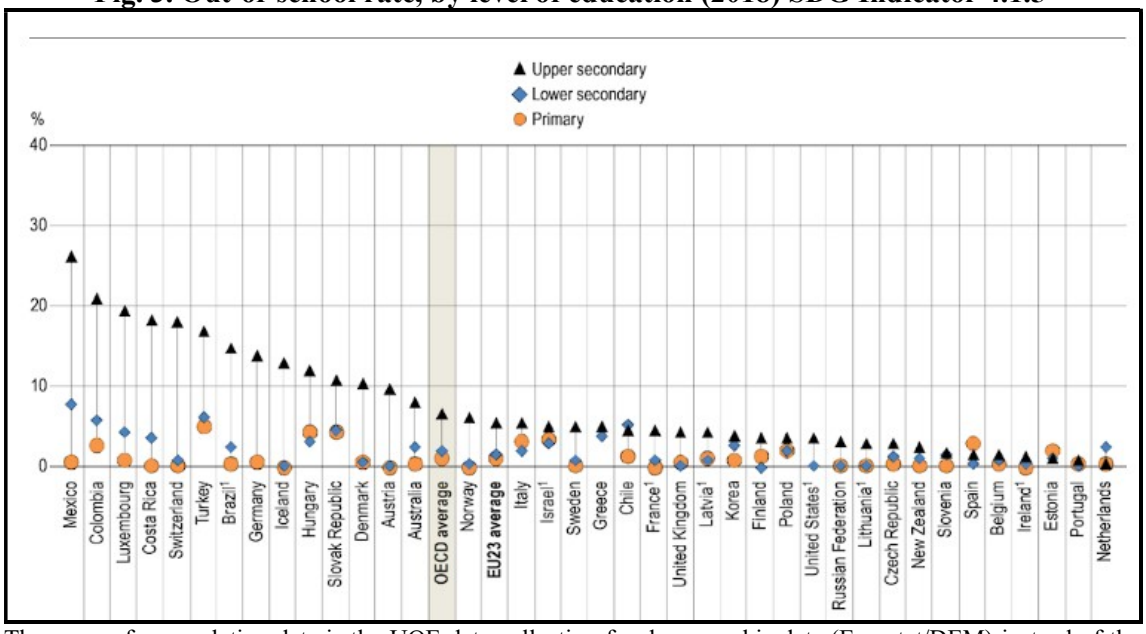
lead to *cognitive fatigue,* especially in the absence of emotional regulation mechanisms or human mentoring.

Practical implications of the study

- ✓ *The balance between AI and human interaction* is recommended to prevent negative effects on mental health.
- ✓ The design of educational platforms should include *empathetic feedback functionalities, adaptive breaks, and supportive communities.*
- ✓ Trainers must be prepared not only technically, but also psychopedagogically, to accompany the AI-assisted learning process in an empathetic and balanced way.

Participation in upper secondary education and the potential impact on labour market outcomes. Ensuring that all young people have the opportunity to succeed in education is essential, as poor outcomes can lead to difficulties in accessing further education and the labour market (OECD, 2019). One way to measure access to education is by assessing the early school leaving rate, which is the percentage of young people in the official age group for a given level of education who are not enrolled in school (SDG Indicator 4.1.5). According to average data across OECD countries, less than 3% of young people are in the educational business at primary and lower secondary levels, but this percentage increases to 8% at upper secondary education. This increase is particularly significant in countries such as Colombia and Mexico, where over 20% of young people are not enrolled in upper secondary education, compared to less than 3% at primary level. In our qualitative research, we explored these statistics from the perspective of participants' perceptions, who discussed how limited access to upper secondary education impacts not only educational opportunities but also the social and professional integrity of young women. Our study suggests that low participation in upper secondary education is closely linked to factors such as low motivation, lack of social support, and psychological challenges faced by young people in digital educational environments.

Fig. 3. Out-of-school rate, by level of education (2018) SDG Indicator 4.1.5



The source for population data is the UOE data collection for demographic data (Eurostat/DEM) instead of the United Nations Population Division (UNPD).

Countries are ranked in descending order of the out-of-school rate in upper secondary education.
Source: OECD (2020). The official data sources for this indicator are the UOE data collection for enrollment data and the United Nations Population Division (UNPD) for population data. See Source section for more information and Annex 3 for notes (https://doi.org/10.1787/69096873-en).

The data presented in Figure 5 on the dropout rate in upper secondary education, according to SDG Indicator 4.1.5, highlights a significant problem related to young people's access to and participation in higher education. While the dropout rate is relatively low in primary and lower secondary education (less than 3% in most OECD countries), it increases to around 8% in upper secondary education. This trend is exacerbated in some countries, such as Colombia and Mexico, where the dropout rate reaches values above 20%.

In the context of the qualitative research conducted, these statistics were confirmed by feedback from participants, who highlighted that, in upper secondary education, the lack of adequate support and lack of real motivation lead to low participation and school dropout. Also, during the interviews, young people discussed how the lack of human interaction and personalized support in digital educational environments contributes to isolation and feelings of inadequacy, factors that can lead to educational dropout.

On the other hand, the same difficulties identified in qualitative research, such as anxiety and mental fatigue, are correlated with statistics on dropout rates in upper secondary education, covering a wide range of experiences and challenges faced by young people who are in the educational business. Furthermore, perceptions of unstable motivation and lack of real interest in subjects are consistent with data suggesting a loss of trust in the education system when support and resources are insufficient.

In this context, qualitative research provides valuable insight into how these subjective factors may influence young people's decisions to drop out of upper secondary education and their impact on their future labor market prospects.

5. Conclusions, Limitations and Future Research

This research has made a significant contribution to the field of financial education, highlighting the impact that financial tools powered by artificial intelligence (AI) (Folcut O., Manta, O., Militaru. I., 2024) have on learning motivation and performance in online educational environments. In a digital era marked by rapid changes and the integration of advanced technologies in education, it has been shown that the use of these tools not only improves students' financial knowledge, but also supports their psychological health and academic motivation.

The study highlighted that organizational socialization strategies, such as informational feedback, interactive support, member education, and information provision, play a key role in increasing engagement in learning. These strategies contributed to improving students' social identification within digital learning communities, thereby increasing the duration and efficiency of the educational process. It was also found that economic incentives (extrinsic motivation) can positively influence students' intrinsic motivation, leading to sustained engagement and improved performance.

Another important aspect is the influence of AI on the cognitive and emotional balance of participants, and the study proposes educational strategies that optimize this balance. The integration of advanced technologies into the financial learning process proves to be an essential factor in supporting adaptive, diverse and inclusive education that responds to the individual needs of students and contemporary academic requirements.

The aim of this study was to investigate the impact of innovative financial instruments, especially those powered by artificial intelligence (AI), on students' motivation for learning, educational performance and psychological well-being. We also analyzed how organizational socialization strategies can influence social identification and engagement in online learning environments. In this regard, we structured the research questions and hypotheses to guide the analysis:

What relationship exists between the use of innovative financial instruments and motivation for learning among students?

The research response shows that the use of innovative financial tools, such as AI-based investment applications, has a positive impact on motivation for learning. These tools stimulate not only students' interest in the financial field, but also their active engagement in the educational process, thus contributing to the development of deeper financial skills and strengthening confidence in the use of financial technologies.

How do AI technologies influence the engagement and psychological well-being of learners?

The study demonstrated that AI technologies can positively influence student engagement in learning, providing personalized experiences that support better adaptation of learners to their learning pace and style. However, it is important to note that AI can also generate cognitive overload, which can lead to stress and anxiety. Thus, the impact on psychological well-being depends largely on how AI technologies are integrated, and personalized feedback and interactive support interventions are essential to minimize negative effects.

To what extent do organizational socialization strategies enhance social identification and engagement in online learning?

Research results have shown that organizational socialization strategies, such as informational feedback, interactive support, and continuing education, have a significant impact on social identification and engagement in online learning environments. These strategies contribute to the formation of a strong group identity and increased trust in the digital educational process, which leads to more active participation and quality learning.

Moreover, within our study, the research hypotheses were fully and/or partially confirmed, namely:

H1: Integrating AI into financial education positively contributes to extrinsic motivation and engagement in learning.

According to the research, this hypothesis was supported. The use of AI stimulated students' extrinsic motivation, especially by offering economic incentives, gamification and rewards that led to increased engagement in the educational process. At the same time, intrinsic motivation was also favored, as AI technologies provided more personalized and engaging learning experiences.

H2: Applying organizational socialization strategies increases the duration and quality of participation in educational platforms.

This hypothesis was confirmed by the research results. Organizational socialization strategies, including informational feedback, interactive support, and continuing education, led to longer and more intense participation in educational platforms. These strategies helped students feel more connected to the learning community and strengthened their commitment to educational goals.

H3: AI-mediated cognitive overload has a negative effect on mental well-being, but can be counterbalanced by personalized feedback and interactive support.

In this case, the hypothesis was partially validated. Cognitive overload associated with intensive AI use can lead to negative mental health effects, such as anxiety and stress. However, research has shown that these effects can be significantly reduced by implementing appropriate educational strategies, which include personalized feedback and interactive support. These interventions help manage cognitive load and maintain emotional and psychological well-being.

Study limitations

Although this study provided valuable insights into the impact of AI in financial education, there are several limitations that should be noted. First, the research focused on a limited number of AI-based financial instruments and did not include a wide range of educational platforms or applications that could influence different types of student motivation and performance. Also, the research methodology was based on the observation of digital learning communities, which may limit the generalizability of the results to other educational or cultural contexts.

Another limitation is that the study did not investigate in depth the long-term effects of using these technologies on students' mental health, especially given their continuous exposure to digital tools. A longitudinal study is needed to analyze how the impact of these technologies evolves over the long term.

Finally, the research did not examine in detail the socio-economic or cultural factors that might influence the degree of accessibility and effectiveness of these financial instruments, especially among students from diverse economic and cultural backgrounds.

Future research

To build on the findings of this study, future research is needed to further explore the impact of AI technologies in financial education, considering the following directions:

Diversifying AI-Powered Financial Instruments – It is essential to analyze a wider range of AI-powered financial educational instruments to better understand how each type of platform influences students' motivation, performance, and psychological well-being (Folcut O., Manta, O., Militaru. I., 2024) . Future studies should examine the differences between personalized and standardized instruments, as well as their impact on diverse learning styles.

Longitudinal Study – Longitudinal research is needed to assess the long-term effects of using AI in financial education, both from the perspective of academic performance and psychological well-being of students. Such a study could provide valuable data for the development of sustainable educational strategies.

Socio-Economic and Cultural Factors – Investigating how different socio-economic and cultural conditions influence access to and use of AI-based financial technologies could help identify potential barriers and solutions for integrating these tools in an equitable and inclusive manner. These studies could address inequalities in access and implementation across regions and cultures.

The Impact of Extrinsic and Intrinsic Motivation – Future research should explore the interplay between extrinsic motivation (economic incentives, tangible rewards) and intrinsic motivation (personal interest, learning satisfaction) in the context of online financial education. It is important to better understand how these types of motivation can be used to foster continued learning and long-term engagement.

Conducting a bibliometric analysis based on the words or phrases that were included in the responses of the interviewees, such as: "motivation", "rewards", "personalized learning", "social support", "anxiety", "performance", "mental fatigue", etc., to highlight the most frequently mentioned concepts.

In conclusion, this study provided a solid foundation for understanding the interaction between financial education, learning motivation, and AI-powered technologies. Future research will contribute to deepening knowledge on these topics and help develop innovative and effective educational practices that respond to the challenges of an increasingly digitalized world.

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SOCIALLY RESPONSIBLE ORGANIZATIONS AND SUSTAINABLE USE OF RESOURCES

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Abstract: *Sustainable development is the one that can ensure a balance between socio-economic systems and natural potential, through strategies and plans that contribute to solving the multiple problems that economic activities have generated and continue to generate. In the conditions of increasing pressure on the environment and the existence of a real competition for resources, between countries and enterprises, it is necessary to reach a cooperative relationship between industry, the largest consumer of resources, and the environment. Enterprises aware of the responsibility they have towards the environment, towards the community and towards shareholders adopt those strategies that ensure and maintain cooperative relationships with the environment, thus becoming increasingly competitive.*

Key-words: *corporate social responsibility, sustainable development, resources.*
JEL-Classification: *Q01, M14, Q20.*

1. Introduction

In the continuous attempt to achieve economic growth and progress at any cost, man has ignored, very often, the fact that he is part of the natural system and has intervened in this system, exceeding its support capacity. Thus, imbalances have emerged whose effects are already being felt, with worldwide concerns becoming increasingly intense in order to prevent, counteract and reduce these disastrous repercussions.

In this context, sustainable development is the one that can ensure a balance between socio-economic systems and natural potential, through strategies and plans that contribute to solving the multiple problems that economic activities have generated and continue to generate.

2. The concept of sustainable development

One of the first moments that favored the emergence of the concept of sustainable development was the United Nations Conference in Stockholm in 1972. During this event, the problems of pollution, resource destruction, environmental deterioration, the danger of species extinction and the need to increase people's living standards were highlighted, accepting the indissoluble link between the quality of life and the quality of the environment for current and future generations (The United Nations, 1972): "If current trends of world population growth, industrialization, environmental contamination, food production and resource depletion continue, this planet will reach the limits of growth within the next 100 years. The most likely result would be a sudden and uncontrollable decline in both population and industrial capacity". The conclusion was that the neoclassical development model practiced at that time could not be sustained in the long term.

Subsequently, in 1986, the World Commission on Environment and Development was created within the United Nations, with the aim of analyzing the dynamics of environmental deterioration and providing solutions regarding the long-term viability of human society. This commission also provided the most famous definition of sustainable development through the report "Our Common Future" (Brundtland Report): "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (The United Nations, 1987). At the Rio Summit in 1992, the issues of environment and economic

development were again highlighted (The United Nations, 1992). Agenda 21 identified two major directions of action: the development and promotion of sustainable production and consumption patterns; and the improvement and restructuring of the decision-making process for the simultaneous integration of ecological and socio-economic aspects. Recommendations related to consumption patterns referred to: assessing the relationship between production and consumption, the environment, technological innovation, economic growth, development and demographic factors; analyzing changes in the structure of industry to achieve economic growth with reduced material intensity; examining how economic growth and prosperity can be achieved simultaneously with reducing energy and material consumption and reducing the generation of harmful substances. Developing countries must ensure that the basic needs of the poor are met, avoiding unsustainable, environmentally harmful patterns. "The main cause of the continuing deterioration of the global environment is unsustainable patterns of consumption and production, especially in industrialized countries, which are a cause for concern, increasing poverty and imbalances" (Agenda 21, 1992). It was only in 2002 that the progress made towards sustainable development was reviewed at the Johannesburg Summit and the commitment to continue the process in the future was reaffirmed (The United Nations, 2002).

The issue of sustainable development is also a priority at the European Union level (European Commission, 2019). Since 2001, the European Sustainable Development Strategy has been adopted, together with a set of Sustainable Development Indicators, with the aim of monitoring the implementation of this strategy. In 2006 this strategy was revised, adopting a new governance model (European Union Council, 2006), with the aim of "identifying and developing actions that will enable the European Union to achieve a continuous improvement in the quality of life, both for present and future generations, by creating sustainable communities, capable of managing and using their resources efficiently, as well as of exploiting the innovative social and ecological potential of the economy, ensuring prosperity, environmental protection and social cohesion" (European Union Council, 2006).

"Sustainable development is a core principle of the Treaty on European Union and a priority objective for the EU's internal and external policies. The United Nations 2030 Agenda includes 17 Sustainable Development Goals (SDGs)" (European Commission, 2025).

The United Nations' 2030 Agenda and its SDGs, adopted in 2015, offer a comprehensive road map for global sustainability. Three guiding principles are essential: staying within planetary ecological limits, fostering economic growth that does not degrade the environment, and ensuring governance structures that uphold fairness and justice (EIPA, 2025, p.4).

In this context, it is necessary to support innovation and collaboration between states, organizations and communities for a better future for this world and for ecological growth. The "Rio+20 Corporate Sustainability Forum: Innovation and Collaboration for the Future We Want", organized by the United Nations in 2012, aimed to identify a better level and quality of sustainable practices of organizations, stimulate the diffusion of sustainable innovations and cooperation between companies, governments, civil society and the United Nations. The signal sent to the global community is that we need solutions launched on a large scale for the transition to an economic order based on growth, which contributes to the reduction of poverty and social injustices and which, at the same time, preserves natural resources for future generations.

3. Competition versus cooperation in the sustainable use of resources – challenges for socially responsible enterprises

We might ask how enterprises can get involved through social responsibility practices in supporting these objectives? Given the increasing pressure on the environment and the existence of a real competition for resources, between countries and enterprises, it is necessary to reach a cooperative relationship between industry, the largest consumer of resources, and the environment.

It is true that the world of business and relations between economies or organizations is based on competition, respectively on competitiveness. Supporting competition is explainable by the indisputable advantages it confers: better and cheaper products and services, diversity in creating the offer, motivations in supporting innovation and research. For organizations, competition is a powerful motivating factor in order to increase economic and social performance. Many business people believe that the only concern of enterprises should be to identify viable and efficient solutions to increase their capacity to face the increasingly fierce competition on the domestic and international markets.

Concerned only with increasing profits, some enterprises ignore their responsibilities towards the community or the environment, considering that adopting this type of activities would only lead to a decrease in profits. "This simplistic perception implies the idea that, due to competition, a good manager has no other option in the market economy than to buy as cheaply as possible and sell as expensively as possible. The existence of a legal framework that must be respected is accepted, without enthusiasm, but that is all: within the limits of the law, everything is permitted in order to achieve the sole goal of any serious business: maximizing profits" (Crăciun, 2005, p.203).

"Competition is an active form of free initiative, representing open confrontation, rivalry between economic agents to attract customers" (Moşteanu, 2000, p.31). It plays a major role in business, leading to continuous improvement and efficiency of production, eliminating waste and reducing costs, so that the selling price is lower than others (Ganescu, 2011, p.132). The factors that determine industrial competition, the ways in which companies gain and sustain competitive advantage and the principles on which they develop their own strategies represent the core of competition (Porter, 2008).

The environment, urban poverty, income inequality and health, among others, are normally problems of society. However, each of these is closely related to the economic environment and, in particular, to competition. Porter (2008) considered that it is a matter of time to identify the most appropriate solutions to solve these problems, namely the ability to effectively apply the most profound lessons of competition. Approaching the real problems of the community, the environment and the health of the population represents nothing but important opportunities for gain for both parties, society and companies. The attitude of some business people oriented towards maximizing profit to the detriment of others leads only to obtaining an opposite effect, namely to reducing the expected benefits (Crăciun, 2005). Fair competition is one of the first conditions for increasing the wealth of nations, making possible the fair distribution of goods and services within society.

Even though the benefits of competition and competitiveness are well-known and sufficiently strong, it is demonstrated that within any organization, economic, social and environmental objectives can be mutually supportive, thus contributing to increased long-term competitiveness. "Investment in human, social and environmental capital, as well as technological innovation, are conditions for long-term competitiveness and economic

prosperity, for social cohesion, quality jobs and environmental protection" (European Union Council, 2006). In this context, it is increasingly important for organizations and governments to make efforts to "enhance social dialogue, corporate social responsibility and public-private partnerships to promote the cooperation and shared responsibilities necessary to achieve sustainable consumption and production" (European Union Council, 2006). On the other hand, "at least in the coming decades, a significant reformulation of the cultural matrix in relation to the reduction of consumption, including due to the role of profit, is not foreseeable" (Ioan-Franc, 2006, p.14).

At the level of the European Union, the importance of transforming the European economy into a sustainable economy by 2050 is recognized, by identifying the economic sectors that consume the most resources and by instruments and indicators aimed at guiding the actions of governments and enterprises. "The current model of economic development in the world represents an increasing pressure on the finite natural resources of the planet and leads to harmful accumulations of greenhouse gases in the atmosphere and of numerous pollutants in the environment. It also does not create the conditions for satisfactory employment of the workforce and for general well-being for everyone" (Economic and Social Council, 2012).

These highly topical issues are of intense concern to the world community. As early as 1999, the United Nations Consumer Protection Guide included a chapter entitled "Promoting the Sustainable Use of Resources". In November 2011, 350 managers from Business 20 around the world debated a report that set out "concrete measures to enhance growth in a sustainable, balanced and beneficial manner for all market players". These managers recommended, among other things, "adapting global governance to new realities", not only by establishing better coordination of economic policies, but also by redefining the mandates of certain international organisations". Also in 2012, three of the most important international companies, Nike, Yahoo and Best Buy, founded Green Xchange, an innovative, revolutionary partnership that brought together companies, people and ideas to create sustainable change.

Sustainable use of resources is viewed differently in developing countries than in developed ones. Thus, in developing countries, where often there are not enough accessible resources to meet basic needs, sustainable use aims at more efficient use of resources. In developed countries, where resource use is often excessive, the emphasis is on changing consumption patterns to achieve reduced use of materials and energy, as well as reduced consumption per functional unit. An example would be the orientation of consumer preferences towards environmentally friendly products.

Increasing competitiveness between states or between organizations should involve: continuing to develop and improve competitive markets for electricity, natural gas, oil, uranium, coal, energy services; promoting renewable sources; liberalizing energy transit and ensuring constant and non-discriminatory access of market participants to transmission and distribution networks; developing energy infrastructure. At the same time, cooperation between states and enterprises must be maintained; Depending on the level of development of countries, a series of differentiated approaches can be applied regarding economic and financial obligations for environmental protection at local, regional and international levels, with developed countries recognizing that they have a greater responsibility, including in terms of providing assistance to developing countries or emerging market economies (Zaman and Vasile, 2006, p.14).

We believe that it is beneficial for the two aspects, cooperation and competition, to work together because they contribute to improving economic and social conditions at the state level or even at the global level. Cooperation between enterprises and governments, but also the social solidarity manifested at the level of each community, play a role in increasing the prosperity of people and countries.

At the level of our country, through the National Strategy for Sustainable Development of Romania 2030 (Romanian Government, 2020) concrete objectives are established for the transition to a development model generating high added value, based on knowledge and innovation, the continuous improvement of the quality of life and the harmonious relationship with the environment, but the expected results are not yet visible.

Organizations must be stimulated to implement the circular economy, a new concept based on the elimination of waste from the design phase, the use of consumable and durable components, and the use of energy from renewable sources. At the level of the European Union, a project has already been established aiming at "establishing incentives to encourage companies to adopt measures, establish evaluation criteria and continuously improve the efficient use of their own resources" (European Parliament, 2012). This project highlights the importance of research, development and innovation to accelerate the "transformation into a resource-efficient Europe" and the need to stimulate innovation and reduce energy consumption. A very detailed report by a group of experts presents scenarios for the adoption of a circular economy for European Union countries and estimates that the savings in terms of material costs will be significant.

Sustainable use of resources and pollution control can be applied by businesses in order to move towards a circular economy, by reducing the consumption of non-renewable resources, reusing and recycling (3R). Businesses aware of their responsibility towards the environment, the community and shareholders adopt those strategies that ensure and maintain cooperative relations with the environment, thus becoming increasingly competitive.

A first plan follows the relationship of the enterprise with the natural environment and aims to reduce the consumption of natural resources in the context of identifying alternative, non-polluting and environmentally friendly resources, and the second plan aims to adapt and improve the technological process so as to optimize energy consumption and make production more efficient. In relation to the social environment, the sustainable enterprise is the one that aims to offer consumers healthy, ecological products, thus ensuring premises for increasing the quality of life. The third plan aims to reduce residues and waste, reuse and recycle them, processes possible in the context of a circular economy. In support of these practices, sustainable enterprises create their own innovative technologies that facilitate the application of the 3R principles within the technological process.

4. Conclusions

Even though implementing the circular economy within enterprises seems to be very difficult, it should be mentioned here that awareness of the need for sustainable use of resources and reduction of pollution in all areas of human activity is required in order to ensure the well-being of society.

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MANAGEMENT AND LEADERSHIP: CONCEPTS AND EXPECTED OUTCOMES

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Abstract: *The leadership is the piece of resistance of any organization. Its role is to maintain and actively participate to the improvement organizational performance. The essay is based on various specialized studies, which embodies the idea that, the leadership style adopted by the leader, directly influences success and development, both among the organization and among the employees. The purpose of this essay is to highlight the impact of leadership styles on organizational performance, how they manage achieving the objectives of the organization in terms of the pawns coordinated by the employees. At the same time, the essay is meant to discover the most beneficial leadership style for current enterprises in the labor market. The focus was mainly on leadership styles, on the skills needed for a successful leader and stood out the close connection between how an organization is run and its results. The conclusion obtained is based on the cause-effect relationship between leadership and its success, exclaiming that the leadership style and effectiveness of the leader play an extremely important role in the success of organizational performance.*

Keywords: *leadership, organizational performance, leadership styles, influence, employes, motivation, vision, ideals.*

JEL Classification*: M21, L25, M12.*

1. Introduction

In the dynamic context of the global economy and rapid changes in the organizational environment, the concepts of management and leadership have become essential for the success and sustainability of organizations. Although often used interchangeably, these two concepts represent distinct dimensions of the process of leading and influencing human and material resources. While management involves planning, organizing, coordinating, and controlling activities to achieve.

This theoretical distinction is also reflected in practice, where the balance between effective management and authentic leadership becomes a key factor for organizational performance. Moreover, digital transformations, the emphasis on innovation, and the need for adaptability emphasize the importance of leadership as a change force, while managerial rigor remains essential for stability and operational efficiency.

The aim of this article is to analyze the fundamental concepts of management and leadership, highlight the differences and complementarities between them, and explore the expected outcomes in an organizational context. We will address relevant theoretical models, discuss practical implications, and provide an integrated perspective on the role of the modern leader.

2. Differences and Complementarity between Management and Leadership

Although both management and leadership aim to lead organizations effectively, the two concepts differ in nature, means, and objectives. Essentially, management focuses on stability, order, and control, while leadership aims at change, influence, and inspiration (Kotter, 1990).

Key Differences:

- **Focus:** Managers focus on short-term objectives and results, while leaders look toward the future with a strategic vision.

- **Roles**: Management involves planning, organizing, resource allocation, and control. Leadership involves motivating teams, developing organizational culture, and influencing behaviors.
- **Method of Action**: Managers use formal authority and hierarchical structures; leaders influence through charisma, values, and interpersonal relationships.
- **Complementarity:**
  Although distinct, the two concepts are not antagonistic. On the contrary, high-performing organizations are those where management and leadership coexist harmoniously. Managers who integrate leadership traits become more effective in managing teams, and leaders who understand managerial mechanisms can translate vision into concrete results (Mintzberg, 2009).

3. Relevant Theoretical Models

In the academic literature, the concept of leadership has been developed through various theoretical models, each offering useful perspectives on the role and behavior of leaders and managers in organizations:

- John P. Kotter's Model: Leadership vs. Management
  Kotter (1990) proposes a clear distinction between management and leadership, asserting that management deals with complexity, while leadership addresses change.
- Trait Theory
  This theory suggests that successful leaders possess innate traits such as self-confidence, intelligence, integrity, and charisma (Stogdill, 1948).
- Behavioral Theory
  This approach focused on what leaders do. Two dominant styles were identified: task-oriented and people-oriented.
- Transformational and Transactional Leadership
  Burns (1978) and Bass (1985) distinguish between transactional leadership (based on rewards) and transformational leadership (based on motivation and vision).
- Henry Mintzberg's Managerial Model
  Mintzberg (1973) identified ten managerial roles that reflect the complexity of the leadership function.

4. Impact of Leadership and Management on Organizational Performance

Leadership and management are two fundamental dimensions of organizational governance, playing complementary roles in achieving performance. While management provides structure, planning, and control of processes, leadership contributes through vision, motivation, and the mobilization of human resources. Nowadays, the success of an organization depends not only on managerial efficiency but also on the leaders' ability to inspire and drive change in an increasingly complex and dynamic environment.

The Role of Management in Organizational Performance

- Management aims at the efficient use of resources and the achievement of planned results.
- A competent manager sets clear objectives, plans activities, coordinates teams, and monitors outcomes.

- Standardizing processes and implementing effective procedures ensure organizational stability and predictability.
- In this way, management contributes to maximizing operational efficiency and creating a favorable framework for growth.

The Role of Leadership in Organizational Performance

- Leadership goes beyond the technical sphere of coordination and focuses on people.
- A leader manages to inspire, mobilize, and create a positive organizational climate. By communicating a clear vision, leaders give meaning to daily activities and stimulate employee commitment.
- Moreover, leadership fosters innovation and adaptability, essential elements for long-term performance.
- Employees who feel valued and motivated tend to show loyalty and contribute more actively to the success of the organization.

The Interdependence between Leadership and Management

- Management without leadership risks becoming rigid and bureaucratic, while leadership without management may generate visions impossible to implement.
- Organizational performance is achieved when the two dimensions complement each other: management ensures stability and control, while leadership brings energy, strategic direction, and inspiration.
- The integration of these dimensions helps build a balanced organizational environment capable of delivering both financial and non-financial results.

The Impact on Organizational Performance

The impact of leadership and management is reflected in:

- **Financial performance** – increasing profitability and competitiveness;
- **Non-financial performance** – employee satisfaction, customer loyalty, social responsibility;
- **Innovation and adaptability** – the ability to respond quickly to environmental changes;
- **Human capital development** – attracting and retaining talent.
- Leadership and management should not be viewed as antagonistic dimensions but as complementary processes that together can ensure organizational success.
- Efficient managers need to develop leadership skills, while inspirational leaders must understand the importance of managerial rigor.
- Only through a balance between these two dimensions can organizations achieve sustainable performance in a competitive and dynamic environment.
- Organizational performance is directly influenced by the quality of leadership. While effective management contributes to operational stability, leadership drives engagement and innovation.

Role of Management

- Managers contribute to achieving objectives by implementing clear procedures, resource control, and performance monitoring (Drucker, 1999).
- Impact of Leadership
  Empathetic and inspirational leadership contributes to organizational culture, employee engagement, and resilience (Goleman et al., 2002).

- Synergy
  The highest-performing organizations create synergy between leadership and management, supporting sustainable performance (Yukl, 2013).

5. Expected Outcomes in Practice

The integrated application of leadership and management generates results such as:

- Increased Efficiency and Productivity
- Employee Engagement and Retention (Bass and Riggio, 2006)
- Adaptability and Innovation (Northouse, 2021)
- Reputation and Competitive Advantage
- Sustainable Performance in the Long Term

6. Conclusions

The relationship between management and leadership is one of complementarity. Management provides structure and control, while leadership offers vision and inspiration. Together, they contribute to sustainable organizational performance. The modern leader must combine managerial skills with leadership qualities to become an architect of change and progress in a complex environment.

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CIRCULAR ECONOMY AFTER COVID-19 PANDEMIC

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Abstract. *Managerial practice focuses largely on performance management. But because the Covid-19 pandemic has revealed the painful fragility of many of our systems, leaders are focusing on resilience; and with the loss of biodiversity, climate action and sustainable resource management should be a priority in the recovery phase. Sustainable management of natural resources, including smarter use of materials, has many benefits: it reduces the rate of depletion of natural resources. It generates opportunities, including low material supply dependencies and economic diversification towards resilient business models with a circular economy and jobs. Lower input levels help reduce waste streams and emissions and reduce costs for producers and consumers. In addition, it stimulates innovation, the creation of new industries and stimulates economic competitiveness. Objective: This article will examine the measurement of post-pandemic resilient business in the Republic of Moldova through circular economy indicators. Building and managing resilience and circularity in the private sector today will ensure a swifter and more sustainable economic recovery for the coming years; Method: Among many other aspects, we have highlighted the number of citations, their intertemporal evolution, those authors and publications with the greatest impact, the most common keywords, etc. In order to assess measurement of post-pandemic resilient business in Moldova through circular economy indicators, was conducted an interview based on perception of experts within analysed firms from food industry; Results: Finally, our study, has allowed us to carry out a deep analysis and focus on resilience post-Covid-19 that emphasizes sustainable resource management and the circular economy's potential to diversify feedstocks, localize resource sharing, and redesign manufacturing systems, necessitating extensive innovation and stakeholder engagement for a zero-waste, resilient future. Originality: The study's unique approach centers on merging post-Covid-19 resilience thinking with an emphasis on sustainable resource management, specifically highlighting how the circular economy can diversify feedstocks, facilitate local resource sharing, and transform manufacturing systems to realize a waste-free, resilient future through comprehensive innovation and engagement of stakeholders.*

The article was developed within the framework of Subprogram 030101 „Strengthening the resilience, competitiveness, and sustainability of the economy of the Republic of Moldova in the context of the accession process to the European Union", institutional funding.

Keywords*: Circular economy, Covid-19 pandemic, resilient business, performance management.*
JEL Classification*: M19, L25, Q01.*

1. Introduction

With the onset of the Covid 19 pandemic, humanity began to rethink how to address not only the recovery of the current situation, including lifestyle; The Covid crisis 19 is related not only to the health crisis, but also to the vulnerabilities related to the economic and social activity of mankind.

Sustainable management of natural resources, including smarter use of materials, has many benefits: it reduces the rate of depletion of natural resources. It generates opportunities, including reduced material supply dependencies and economic diversification to circular economy models. Lower input levels help reduce waste streams and emissions and reduce costs for producers and consumers. Smarter use of resources also limits the impact on the environment in different sectors of the economy. In addition, it stimulates innovation, the creation of new industries and stimulates economic competitiveness.

We believe that biodiversity loss, climate action and sustainable resource management should be a priority in the recovery phase. Decisions made by global leaders about resource use will shape our economies and societies for decades to come. Properly measuring the elements of resource efficiency can lead to cost savings and stimulate economic growth and is the cornerstone of crisis prevention and resilience.

This investigation has been organized into three main phases: 1) a literature review to derive the theoretical framework to operationalize circular economy under the environmental sustainability paradigm; 2) Systematization of the resilience and circularity indicators for business; and 3) measurement of circularity and firm's resilience in Moldova.

2. Literature review

Organizational resilience is a term used in business management to describe companies that face certain difficulties and must reinvent part or all their business strategy to survive (Briones, 2021). To continue to adapt, companies must combine digital tools and technologies, managerial practices, market insight and agility. This is more relevant in the context of the current pandemic, which has weakened many parts of the economy.

It is to be mentioned that the circular economy (CE) approach reduces externalities and resource depletion as small improvements in sustainable product design can result in resource efficiencies in production processes (Cooper, 1999; Camilleri, 2018). The concept focuses on the redesign of manufacturing and service systems. Closed loop systems reduce resource throughput in industrial production and consumption (Ghisellini et al., 2016; Camilleri, 2018). The recycling of resources has been a significant part of sustainability practices for many years (Barnes, 1982; Butler & Hooper, 1999; Geyer et al., 2016; Camilleri, 2018). The unwanted outputs of one industrial process may be used as raw materials in another industrial process. Redesigned manufacturing systems within the industry can improve resource utilisation as opposed to natural resource depletion and environmental degradation (Liu et al., 2009; Camilleri, 2018). As a result, the CE and its closed loop systems may lead to the sustainable development of the economy, environment, and society (Camilleri, 2017; Murray et al., 2017; Camilleri, 2018). The circulation of resources could regenerate the organizations' operational performance, whilst ensuring the protection of our environmental resources. The adoption of closed loop systems would increase the firms' operational efficiency of resource use in production (Bocken et al., 2014; Mont, 2002; Shrivastava, 1995; Zhang et al., 2017; Camilleri. 2018). According to Camilleri (2018), industrial operations can be improved through redesigned processes, the elimination of some of them, the modification of certain systems, and/or by introducing new technology. Prakash (2002) suggested that the businesses could adopt management systems that create the right conditions to reduce their negative impact on the natural environment (Camilleri, 2018). He posited that this could take place in the following ways: (a) repair—extend the life of a product by repairing its parts, (b) recondition—extend the life of a product by significantly overhauling it, (c) remanufacture—the new product is based on old ones; (d) reuse—design a product so that it can be used multiple times; (e) recycle—products can be reprocessed and converted into raw material to be used in another or the same product, and (f) reduce— even though the product uses less raw material or generates less disposable waste, it could still deliver benefits that are comparable to its former version. These preventative and restorative practices are related to the CE. The biological and/or technical nutrients that are used to produce goods and resources are either designed to re-enter the biosphere "safely," or to recirculate at high quality, without entering the biosphere (UNEP, 2006). Murray et al. (2017) suggested that sustainable production is optimized via biomimetic, wherein the structure and function of natural systems would inform responsible industrial processes (Camilleri, 2018). Therefore, closed loop systems emit lower emissions of pollutants and will result in high efficiencies for a sustainable industrial economy which is, by design or intention, restorative in nature. Similarly, in industrial symbiosis, eco-industrial parks (EIPs) use each other's waste as resources, where CE models would increase the longevity of products through better manufacturing and maintenance. Hence, the rate of replacement decreases, and the use of resources is considerably reduced. Firms of all sizes could engage in the CE's closed loop systems to extend the producers' liability, life-cycle analyses, material-use, and resource flows, for eco-efficiencies. Cooper (2012) pointed out that individual consumers would prefer using longer lasting products (Camilleri, 2018). Notwithstanding, such durable products would appear to provide added value for money to customers. The businesses as well as their consumers bear mutual responsibility on their consumption patterns

and on the collection of resources before their recycling or disposal. The consumers are expected to do their part in terms of sustainable consumption (EU, 2018). However, the targeting of consumers seems much more complicated than regulating the industrial production of goods and services (McDonald et al., 2009; Pollex, 2017; Camilleri, 2018).

Table 1. Summary of insights from the circular economy and resilience literature

Dimension	Circular economy	Resilience
Seminal works	Boulding (1966); McDonough and Braungart (2008); Pauli (2010)	Natural sciences: Holling (1973); Gunderson and Holling (2002) Management sciences: Meyer (1982)—environmental jolts; Weick and Roberts (1993)—collective mindfulness; Weick et al. (1999)—high reliability organizing
Definition	'Industrial systems that are restorative or regenerative by intention and design' (Ellen MacArthur Foundation, 2013, p. 7).	Natural sciences: 'The capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks' (Walker et al., 2004, para. 7) Management sciences: 'Organizations that are able to respond more quickly, recover faster or develop more unusual ways of doing business under duress than others' (Linnenluecke, 2017, p. 4)
Key principles	Material health (e.g., non-toxic products) Material recirculation Eliminate waste Renewable energy	Adaptability Transformability
Business practices	Narrowing loops Slowing loops Closing loops	Slack and buffer capacities diversification Redundancy

Source: Kennedy S, Linnenluecke M.K. (2022).

3. Methods

For the third part of the investigation (measurement of circularity and firm's resilience in Moldova) was conducted an interview based on perception of experts within analyzed firms from food industry. Most of the firms represents SMEs. The period of conducting interview covered first half of 2022. In Moldova restricting measures were removed starting from March 2022.

While analyzing resilience we took into consideration such indicators as: complexity, uncertainty, interdependence, systems thinking, and a multi-timescale perspective. Resisting, regenerating, reinventing are key catchphrases that have been considered in present paper.

4. Results

4.1. Building resilience and performance in the private sector

The pandemic has shown the strength of community - globally, locally, and across the private and third sectors. Harnessing this collaborative spirit will help us rebuild and secure a prosperous future for people and planet. Building this resilience in the private sector today will ensure a swifter and more sustainable economic recovery in the months and years to come. Resilience is especially important today because the business environment is becoming more dynamic and unpredictable. This is a result of several enduring forces stressing and stretching business systems - from accelerated technological evolution to a greater interconnectedness of the global economy to broader issues such as rising inequality, species depletion, and climate change (Reeves, Whitaker, 2020).

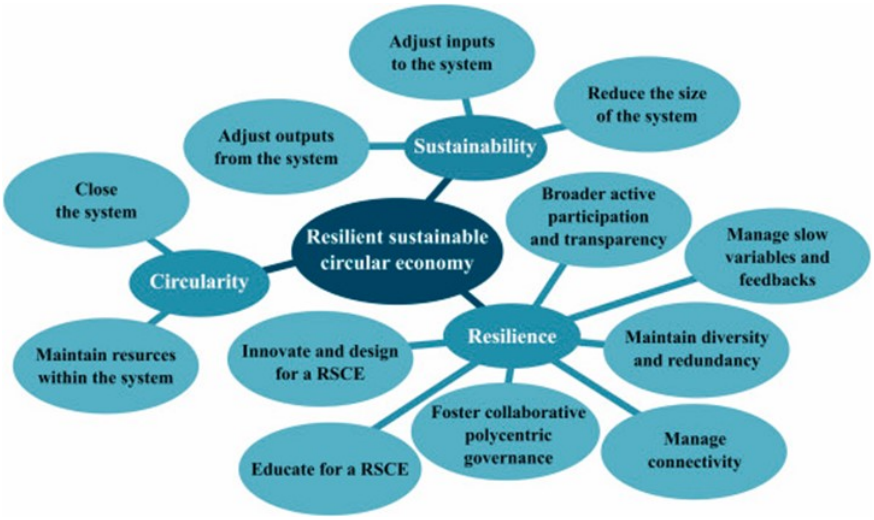

Figure 1. Operational principles for a resilient, sustainable and circular economy[19]

Source: Suárez-Eiroa, Fernández, Méndez (2021)

Circulytics represents the most comprehensive tool for companies interested in measuring their circular economy performance. Its development brings a series of improvements. If we consider circulytics there is a need to link it with (The Ellen MacArthur Foundation):

- *Circularity performance* - Measures a company's entire circularity, not just products and material flows;

[19] Note: Sustainability refers here to the analysis of the production-consumption system as a black box within the natural system, addressing inputs, outputs, and the size of the production-consumption system. Circularity makes reference to the maintenance of resources within the systems once they have been introduced addressing close-loop production-consumption patterns. Resilience represents the ability of the system to change, addressing elements that enhance and boost CE under the environmental sustainability paradigm.

• *Decision making* - Supports decision making and strategic development for circular economy adoption;
• *Strengths and blindspots* - Demonstrates strengths and highlights the areas for improvement;
• *Transparency* - Provides transparency and generates brand value to investors and customers about a company's circular economy adoption – if the company chooses to publish it;
• *Opportunities* - Delivers unprecedented clarity about circular economy performance, opening up new opportunities to generate brand value with key stakeholders.

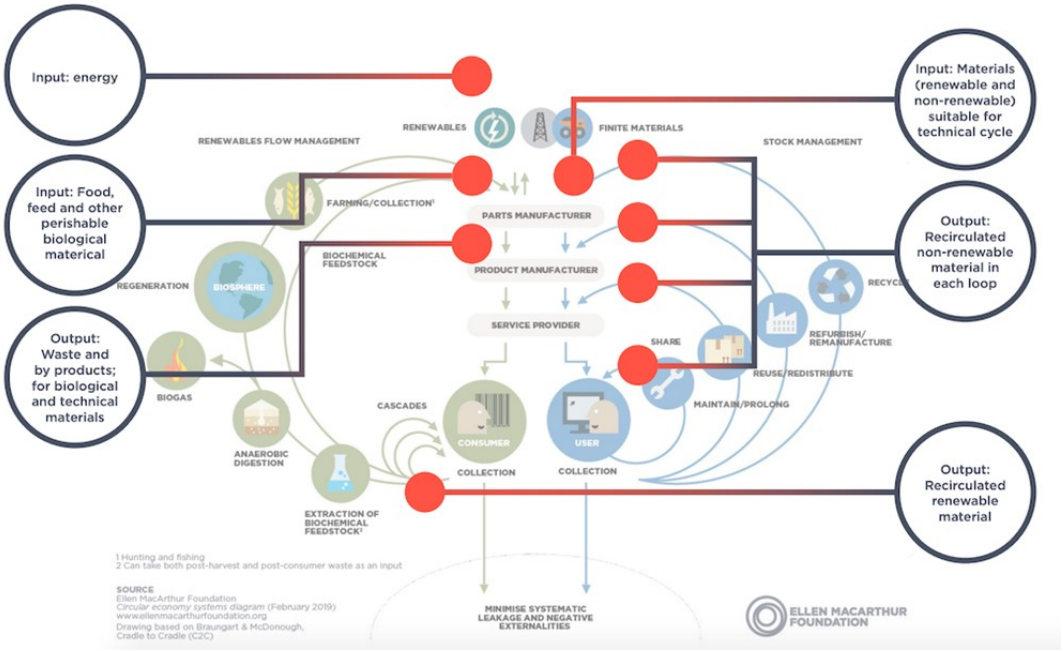

Figure 2. Circular economy systems

Source: Ho S. (2020)

We consider that many companies worldwide face misunderstanding how to evaluate their own circularity performance. In this regard a good base for them could serve provided systematization of the indicators for the firm's reference. Table 2 present main indicators for circularity performance.

Table 2. Firm's Circularity performance

Indicator	Formula
1. Resource productivity	$\text{Resource productivity} = \frac{\text{Total sales in \$}}{\text{Mass of virgin material inflow}}$
2. Percentage of non-virgin (renewed) material used	$\%\text{ of non virgin material inflow for production} = \frac{\text{Mass of renewed raw materials}}{\text{Mass of total raw materials}} \times 100$
3. Percentage of recyclability of product	Biodegradable, recyclable materials throughout the manufacturing process. The higher the percentage of recyclability of your product, the more likely other companies, including your own, will be able to use it as a source of raw material after recycling.
4. Percentage of circular water consumption	$\%\text{ of circular water consumption} = \frac{\text{Quantity of treated waste water consumption}}{\text{Quantity of total water consumption}} \times 100$
5. Percentage of circular water discharge	$\%\text{ of circular water discharge} = \frac{\text{Quantity of circular water discharge}}{\text{Quantity of total water consumption}} \times 100$
6. Percentage of renewable energy consumption	$\%\text{ of renewable energy consumption} = \frac{\text{Annual renewable energy consumption}}{\text{Total energy consumption}} \times 100$
7. Estimated environmental saving of rentals	Using "pay as you use" goods and services
8. Reparability of product	The greater reparability of the product is associated with longer usage duration since consumers can fix them. firms should focus on their design and produce as a decomposable way to enhance reparability.
9. Warranty period	Longevity of firms products
10. Progress towards goals	Analysis of the performance of a company's CE strategy

In regard to the *Circulytics,* Ellen MacArthur Foundation developed a tool Circulytics 2.0 that helps to inform action strategies. Such feature allows that users understand their performance level in relation to the industry. It provides practical insight for those moving away from the current linear economy of extracting logic, to produce, to waste (BiO3, 2021).

4.2. Circular economy and firm's resilience in Moldova

In the circular economy, material usage is reduced through narrowing, slowing and closing resource loops. However, from a resilience perspective, such strategies are seen as problematic as they may reduce the slack resources, diversity, and buffers required for adaptation and change (Biggs et al., 2012; Walker & Salt, 2006). Consequently, there appears to be a need to examine how circular economy business practices impact resilience.

Table 3. Firm's resilience in response to Circular economy business practice

Circular economy business practice	**Firm resilience**	
	Congruence	Contestation
Narrowing resource loops	Reduces firms dependences on virgin natural resources for value creation	Reduces functional and response diversity in search of optimal resource use; Firms may experience trade-offs between redundancy and the drive for efficiency
Slowing resource loops	Reduces firm's dependences on virgin natural resources for value creation; Stimulates improved functional and response diversity of product offerings and	Business models within sequential loops can be highly vulnerable to shocks such as changes in technology or fashion.

	customer segments	
Closing resource loops	Types of supply may become diverse; By increasing partners for exchange, firms may improve the availability of material substitutes; High interconnectivity may mean a faster and stronger response to shocks as resources can be quickly moved where they are needed.	Number of suppliers may become more limited; Firms may become exposed to a wider scope of shocks and disturbances.

Source: Kennedy S, Linnenluecke M.K. (2022).

At the firm level, resource efficiencies are generally expected to decrease dependence on virgin material resources for value creation (subject to rebound effects, discussed above) and thus improve firm resilience against supply shortages and price volatility (Ellen Mac-Arthur Foundation, 2013). Yet, maximizing resource efficiencies could increase brittleness and vulnerability by decreasing functional diversity (i.e., the range of current and future products and services that can be offered) and response diversity (i.e., the ability of a firm to switch to different products or services when a shock occurs). For instance, a firm may choose to optimize its production capabilities and sell only one product that requires the least materials. While such a strategy achieves resource savings, it might leave the firm susceptible to rapid changes in technology, sudden changes in fashion or product controversies. Relatedly, the drive for efficiency may lead a firm to remove redundancies that can protect against disruption (Skene, 2018; Kennedy S, Linnenluecke M.K., 2022).

Table 4. Results of the analysis of social-ecological resilience of the Moldovan firms

RESILIENCE PILLAR	Maintain diversity and redundancy	Manage connectivity	Manage slow variables and control feedback loops	Foster complex adaptive systems	Encourage learning	Broaden participation	Promote polycentric governance
Resource efficiency	+	✓					
Shared resources			✓			✓	✓
Regenerative resources	✓			✓			
Decentralization	✓	+				✓	✓
Lack of sociological foundation			+	+	+		
Labour mobility and skills transferability	✓						
Lifelong learning	✓				✓		
Flexibilisation of labour contracts	+						

Note: representation of the symbols : + risks; √ Opportunities

Source: Author's investigations

Transitioning to a circular economy means moving towards a system that builds natural capital and allows nature to thrive. With the circular economy, we can build a food system (e.g.) that ensures minimization of waste. It prevents food waste, redistribute surplus edible food to people who need it and inedible food by-products and human waste become inputs for new products (The Ellen MacArthur Foundation).

Table 5. Prioritization of CE metrics based on requirements and perception of experts within analyzed Moldovan firms

Material flow		Metric	Results
Input	Energy	Energy productivity (EC, 2015) Cumulative energy consumption (BMU, 2016) Share of renewable energy in gross final energy consumption (EC, 2015)	+
	Resources	Total Material Requirement (Mayer, 2019), Total Raw Material Productivity (BMU, 2016)	+
	Secondary materials	DERec (UBA, 2012), DIERec (UBA, 2012), National Circularity Metric (De Wit et al., 2019)	-
Use and stocks	Anthropogenic stocks	In-use stocks (Mayer et al., 2019)	+
	Material use	Consumption related material productivity (EC, 2014), Raw Material consumption per capita (Haas et al., 2015) Share of circular products in total number of products (Potting & Hanemaaijer, 2018) Circular Material Use Rate (EC, 2018)	+
R-Strategies	R1 Rethink	Number of new revenue models (Potting & Hanemaaijer, 2018)	-
	R2 Reduce	Value based resource efficiency indicator (Di Maio & Rem, 2017)	-
	R4 Repair	Household spending on product repair and maintenance (Magnier et al., 2017)	-
	R6 Remanufacture	Share of remanufacturing business in the	-

		manufacturing economy (EEA, 2016)	
	R8 Recycle	Substitutions quote (KRU, 2019) Recycling rate of all waste excluding major mineral waste (EC, 2018), Value based recycling index (Van Schaik and Reuter, 2016), Recycling process efficiency rate (Graedel et al., 2011), End of life recycling input rate (Graedel et al., 2011) Share of materials where safe recycling options exist(EEA, 2016), Material quality indicator (Steinmann et al., 2019)	-
Output	Waste generation	Generation of municipal waste per capita (EC, 2018), Quantities of waste sent to landfill (Magnier et al., 2017), Food waste (EC, 2018), Municipal waste collected selectively in relation to the total amount of municipal waste collected (Avidushchenko et al., 2019)	+

Sourse: author's investigations based on Kick M., Kadner S., Greiff K. et al. (2021)

5. Discussion

Analyzing the resource efficiency of Moldovan firms we found out that is still present the issue of application of *Reducing strategies* (minimizing consumption and waste) by the top management. Another issue is the fragile system that is vulnerable to shocks. A system with a sole focus on redundancy could result in wasteful supply chains, while a sole focus on resource efficiency could result in fragile supply chains. Importantly, any circular economy strategy striving for an effective system should strike the balance between the two (Dufourmont, Papú Carrone, Haigh, 2020).

In Moldova, businesses implementing circular practices own and manage private resources. So, waste flows are governed by regional waste management systems, cardboard municipal collections, or by collaborations between private entities. Other types of shared resources, such as knowledge, constitute the virtual commons and are governed globally through networks and in sharing economy settings. Shared resources in a circular economy can therefore broaden access and participation while supporting a transition towards a more just and equitable society.

Within Moldova's business environment it is considered that access to alternative strategies and resources enhances the resilience of a system by diversity. So, in this regard all

the companies tend to use less virgin materials and to shift towards regenerative or recycled resources in order to contribute to this diversity. But despite this believes, still many companies utilize heavily non-renewable options especially fossil fuels. In order to increase a system's resilience there is a stringent need to provide ways in which a material can circulate for longer in consecutive cycles of repair, reuse, refurbish, remanufacture, and recycle.

The successful implementation of the circular economy depends on efficient management of material flows, the governance of these will have to be decentralized in certain instances, such as food, energy and waste, as well as repair and maintenance services (Dufourmont, Papú Carrone, Haigh, 2020).

The transition to the circular economy requires a set of transferable skills such as customer service, creating solutions, developing critical thinking, solving problems and assessing risks that consistently arise as sectors adapt their business models and see increased needs for business models such as servitisation (Dufourmont, Papú Carrone, Haigh, 2020). Comparing the education distribution of employed people in Moldova across all economic activities and in the category of industry, it is evident that workers with a vocational education profile are more likely to find job opportunities in energy sector. By contrast, the share of workers with a low level of education is lower than in the overall employed population. This suggests, as expected, the need for a skilled workforce (Chilari, Gribincea, 2021). Therefore, developing a workforce with ample transferable skills contributes to resilience by creating surplus in labor and skills supply. Further, circular transition should be underpinned by a culture of lifelong learning, as such directly contributing to resilience. As the transition to the circular economy continuously develops, so do the related skills requirements. For this reason, a culture of lifelong learning should be promoted as part of the circular economy in Moldova.

It is to be considered that circular economy tends to focus on economic and environmental impacts such as resource depletion, resource efficiency, innovation rates and air pollution. Important slow social variables to the circular economy have not received sufficient attention globally, and Moldova is not an exception. It includes legal systems, behaviors, value systems and traditions. Moldova need to develop circular economy governance systems as well as the currently variable indicators.

6. Conclusion

Managerial practice focuses largely on performance management. But because the Covid-19 pandemic has revealed the painful fragility of many of our systems, leaders are focusing on resilience; and with the loss of biodiversity, climate action and sustainable resource management should be a priority in the recovery phase. Sustainable management of natural resources, including smarter use of materials, has many benefits: it reduces the rate of depletion of natural resources. It generates opportunities, including low material supply dependencies and economic diversification towards resilient business models with a circular economy and jobs. Lower input levels help reduce waste streams and emissions and reduce costs for producers and consumers. In addition, it stimulates innovation, the creation of new industries and stimulates economic competitiveness.

It can be stated that there are a multitude of synergies between resilience thinking and the circular economy. According to Dufourmont, Carrone, Haigh (2020) several circular economy trends increase resilience. In cycling resources, the circular economy increases resilience by increasing the diversity of feedstocks; in sharing resources, it increases

resilience through localized management and participation of stakeholders; and decentralized activities and infrastructure increase resilience by bringing governance bodies closer to communities, enhancing broader participation and moving away from the hyper specialization that characterizes the linear economy.

The circular economy can contribute to the sustainability of the environment by redesigning industrial organizations and internal life as a whole, relying mainly on the school of ecology that makes a deeper and more sustainable transformation in order to reduce the impact of human activities on the environment through the intelligent reuse of waste.

The fundamental goal to be pursued is to rethink manufacturing systems and to intervene in the way of consumption through technological, social and organizational innovation with a global involvement of several stakeholders. Under the new approach, products will be characterized by a longer shelf life, at the end of which the resources that made it up will have to be reused in new manufacturing cycles to create new value, which will drastically reduce waste production.

For the implementation of a circular economy, the starting point is a new design of manufacturing processes, products and services to ensure longer product durability, simple repairs, the possibility of modernization, mass recycling of components and raw materials before the end of life of life. Thus, the whole value chain should be revised, from the use of raw materials, to the technological innovation applied to production, to the development of efficient distribution systems, to a more responsible use of the product, to its recycling, which has a significant effect. on all elements of the value chain; the use of raw materials by providing recycled materials and natural resources, changes the manufacturing processes and the distribution chain and, finally, contributes to the determination of a longer product life.

Therefore, there is a need for strong innovation-based change and focus, capable of technological, organizational, behavioral and regulatory change, and to design new business-to-consumer models in the medium to long term. Implementing a circular economy model requires the involvement of society and businesses to achieve zero waste, zero urban emissions and material recycling practices.

***Acknowledgement**: The article was developed within the framework of Subprogram 030101 „Strengthening the resilience, competitiveness, and sustainability of the economy of the Republic of Moldova in the context of the accession process to the European Union”, institutional funding.*

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