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PARTICULAR FEATURES CONCERNING TANGIBLE FIXED ASSETS

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Abstract: *Fixed assets refer to those assets that are intended to serve the activities of the entity for a long period of time, namely more than one year. Depending on their form of existence, fixed assets are divided into three categories: tangible fixed assets, intangible fixed assets and financial fixed assets. The approach to tangible fixed assets is based on the benefits generated as a result of their use, which contribute to the long-term sustainable development of the entity. As a result, the objective of this research is to present tangible fixed assets both from a theoretical point of view, through a general overview of the aspects related to the definition, forms of fixed assets, recognition and measurement, and from an accounting point of view, through the presentation of individual studies that particularize the approach taken to this balance sheet component.*

Keywords: *entity, fixed assets, economic benefits, economic environment.*
JEL Classification: *M41.*

1. Introduction

Stage of knowledge

Assets are considered to be tangible, intangible or financial economic assets that are held by an entity for more or less than one year and generate economic benefits through their use. They are divided into fixed assets and current assets.

Fixed assets are assets that are intended to serve the business of the entity for an extended period of time, namely more than one year. In contrast, current assets are assets that: are expected to be performed or held with the intention of being sold or consumed in the normal course of the entity's life in less than one year; are held primarily for the purpose of trading; they are expected to be realized within 12 months after the balance sheet date; and are represented by cash or cash equivalents.

According to the OMFP 1802/2014 accounting regulations, the three specific forms of fixed assets are presented as follows:

Tangible fixed assets are fixed material assets, tangible, held to be used in the production of goods or the rendering of services, to be rented to third parties or to be used for administrative purposes and are used for a period of more than one year;

Intangible fixed assets, are identifiable non-monetary assets, without physical form, held for use in the production or supply of goods or services, for rental to third parties or for administrative purposes and used for a period longer than one year;

Financial fixed assets, are amounts held in affiliated entities in the form of shares, loans granted to affiliated entities, shares held in associates and jointly controlled entities, loans granted to associates and jointly controlled entities, other investments held as fixed assets and other loans.

2. Delimitations and forms of tangible fixed assets

Tangible fixed assets are considered to be tangible assets, having a material form, participating in several production cycles, and consequently not consumed on first use.

The structure of tangible fixed assets includes the following categories of items:

1. Land and buildings;
2. Plant and machinery;
3. Other plant, machinery and furniture;
4. Real estate investments;
5. Tangible assets for the exploitation and evaluation of mineral resources;
6. Productive biological assets;
7. Advances and tangible assets in the course of construction.

Tangible assets are recognized by adopting the general asset recognition criteria, namely: generation of economic benefits and credible measurement.

In relation to the nature of the assets and the time of measurement, several forms of measurement of property, plant and equipment are presented, such as: measurement on entry, measurement on disposal, inventory valuation and balance sheet valuation.

Measurement on entry into the entity is at the cost of the asset, determined on the basis of how the asset entered the entity, namely the acquisition cost, production cost, contribution value, fair value.

The exit valuation is done at the entry book value.

Inventory valuation is done at the current value of the asset, also called inventory value.

The valuation on the balance sheet is done at the entry accounting value agreed with the results of the inventory.

II. Current accounting of tangible fixed assets

The accounting treatment of tangible fixed assets will be approached by looking at: the ways in which tangible fixed assets are brought into and out of an entity, revaluation issues and the depreciation regime, by presenting several individual case studies.

The entry of property, plant and equipment into an entity presents a number of accounting particularities, depending on the means of entry, such as: contribution in kind to share capital, acquisition, construction, leasing, addition to inventory, donation.

With regard to the capital contribution of a tangible fixed asset, we consider the subscribed share capital of a company of 500,000 lei, divided into 500,000 shares, with a nominal value of 1 leu/share.

The shareholders subscribed the issued shares as follows:

- 300,000 shares in cash;
- 200,000 shares in kind (150,000 shares representing a plot of land and 50,000 shares representing a means of transportation).

The following steps must be taken in the registration procedure:

1. Determining the value of the share capital:

500,000 shares x 1 leu/share = 500,000 lei

2. Subscription of the contribution to the share capital:

456 "Capital settlements with shareholders/associations"	1011 "Unpaid subscribed capital"	500,000

3. Deposit of the contribution to the capital:

%	456		500,000
5121 "Bank accounts in lei"	"Capital settlements with shareholders/associations"	300,000	
2111 "Lands"		(300,000 shares x 1leu/share)	
2133 "Transport equipment"		150,000	
		(150,000 shares x 1leu/share)	
		50,000	
		(50,000 shares x 1leu/share)	

4. Transfer of capital from subscribed unpaid share capital to subscribed paid-up share capital:

1011 "Unpaid subscribed capital"	1012 "Paid-in subscribed capital"	500,000

With regard to the acquisition of tangible fixed assets, we start from the following consideration:

An entity purchases a working plant at a purchase price of 4,000 lei, transportation costs 200, VAT 19%. It should be noted that the installation does not require commissioning assembly. This operation entails the following entries in the entity's accounting as follows:

1. Determining the value of the fixed asset:

The value of the fixed asset consists of: purchase price + transportation costs + VAT

Value of fixed asset = 4.000 + 200 + (4.200 x 19%) = 4.000 + 200 + 798 = 4.998 lei

2. Registration of the acquisition of the fixed asset:

%	404	4,998
2131 "Technological equipment"	"Suppliers of fixed assets"	4,200
4426 "Deductible VAT"		798

If the immobilization would have required assembly, the previous example is repeated, the purchase dates being the same, except that the assembly and commissioning are carried out by a specialized company, which invoiced the service provided at 800 lei, VAT 19%.

The system of entries is as follows:

1. Purchase of work equipment:

%		404	4
231		"Fixed assets suppliers"	,998
"Tangible fixed assets in course of construction"			4,200
4426			
"Deductible VAT "			798

2. Recording the installation and commissioning of the asset through the installation company:

%		404	
231		"Fixed assets suppliers"	952
"Tangible fixed assets in course of construction"			8 00
4426			
"Deductible VAT"			1 52

3. Reception of the work:

2131	231	
"Technological equipment"	"Tangible fixed assets in course of construction"	5,000

With regard to the construction of property, plant and equipment, we present the following situation:

A company realizes on its own, a working plant, for which a number of expenses were incurred. Thus, in year N: expenditure on raw materials 1,500 lei, expenditure on spare parts 800 lei and expenditure on wages 700 lei. In year N+1, a further 500 lei is spent on staff salaries and, at the end of the period, the building is handed over and put into use.

The basic recording of the acceptance of the installation at entity level involves:

Accounting operations recognized in year N:

1. Recording of raw materials expense:

601	301	
"Expenditure on raw materials"	"Raw materials"	1,500

2. Recording expenditure on spare parts:

6024	3024	
"Spare parts expenditure"	"Spare parts"	800

3. Recording expenditure on salaries:

641	421	
"Expenditure on staff salaries"	"Staff - salaries due"	700

4. Settlement of the production cost in the amount of 3.000 lei on the fixed assets in progress:

231 "Tangible fixed assets in course of construction"		722 "Income from production of tangible fixed assets"	3,000

Accounting operations highlighted in year N+1:

5. Recording of payroll costs:

641 "Expenditure on staff salaries"		421 "Staff - salaries due"	500

6. Settlement of expenditure on staff salaries on fixed assets in course of construction:

231 "Tangible fixed assets in course of construction"	500	722 "Revenue from the production of tangible fixed assets"	

7. Reception of the installation at production cost of 3,500 lei (expenditure incurred in year N, 3,000 lei and expenditure incurred in year N+1, 500 lei):

2131 "Technological equipment (machinery, plant and equipment)"	3,500	231 "Tangible fixed assets in course of construction"	

Similar to the entry, operations regarding the exit of tangible fixed assets from the entity, present particularities depending on the exit paths, namely: sale, scrapping, donation, shortages in the inventory, causes of force majeure, participation in the capital of other entities,

Regarding the exit of tangible fixed assets through sale, we start from the following consideration:

An entity sells a plant at a price of 7,000 lei, VAT 19%, the book value of entry being 12,000 lei and the calculated depreciation 9,000 lei. Posting the sale and delisting generate the following entries.

1. The sale of the plant is recorded:

461 "Sundry debtors"	8 ,330	% 7583 "Proceeds from the sale of assets and other capital operations"	7 ,000
		4427 "VAT collected"	1 ,330

2. The de-registration of the installation shall be recorded:

%	2131		1
2813	"Technological	2,000	
"Depreciation of installations and means of transport"	equipment"	9,000	
6583			
"Expenditure relating to transferred assets and other capital operations"			3 ,000

Another way of disposing of tangible fixed assets relates to scrapping. Thus, we present the following study: a company takes a machine out of service at a book value of 90,000 lei, depreciated at 70,000 lei. The decommissioning is carried out by a third party, which invoiced the service rendered at 5,000 lei, VAT 19%.

These operations involve the following entries in the entity's accounting records:

1. Recording of the service rendered by the third party, in relation to the scrapping of the equipment:

%	401		
628	"Suppliers"	5,950	
" Other expenditure on services performed by third parties "		5,000	
4426			
"Deductible VAT"			950

2. De-registration of the machine:

%	2131		
2813	"Technological	90,000	
"Depreciation of plant and means of transport "	equipment"	70,000	
6583			
"Expenditure relating to assets disposed of and other capital operations"		20,000	

3. Revaluation of tangible fixed assets

As a result of economic, social and political fluctuations, the initial value of a tangible fixed asset may increase or decrease. In such situations, revaluation of tangible fixed assets is performed.

OMFP 1802/2014 provides that entities may revalue existing tangible fixed assets at the end of the financial year, so that they are presented in the accounts at fair value, with the results of this revaluation reflected in the financial statements prepared for that year.

The revaluation of an item of property, plant and equipment may result in;

- a gain when fair value is greater than the net carrying amount;
- a write-down when the fair value is less than the net carrying amount.

To illustrate the recording in the accounts of a positive revaluation of tangible fixed assets, we start from the situation in which an entity, at the end of year N when performing the first revaluation of buildings, found that the fair value of tangible assets (buildings) is higher by 40,000 lei, compared to the book value of 80,000 lei. The calculations and accounting entries are as follows:

In year N:
- book value of tangible assets: 80,000 lei
- fair value of tangible assets: 120,000 lei
- positive difference from the revaluation of tangible assets: 40,000 lei

212 "Buildings"	105 "Revaluation reserves"	40,000

In order to illustrate the recording in the accounts of a negative revaluation after a previous positive revaluation, we repeat the previous situation with the mention that in the year N+1, for the same depreciable tangible fixed asset, a depreciation of 44,000 lei is recorded.

In N+1, the revaluation difference is recorded:
- book value: 120,000 lei
- fair value: 76,000 lei
- revaluation differences: - 44,000 lei
- revaluation reserves created: + 40.000 lei
- impairment adjustment expenses: 4,000 lei

%	212 "Buildings"	44,000
105 "Revaluation reserves"		40,000
6813 "Operating expenditure on adjustments for depreciation of fixed assets"		4,000

If a new revaluation is carried out at the end of N+2 and an increase of 20,000 lei in the fair value is found, the following procedure is followed:

In N+2, recording the revaluation difference:
- book value: 76,000 lei
- fair value: 96,000 lei;
- current revaluation differences: +20,000 lei;
- depreciation (adjustment expenses) recorded in previous years: - 4,000 lei;
- revaluation reserves to be established: 16,000

212 "Buildings"	% 7813 "Income from fixed asset impairment adjustments" 105 "Revaluation reserves"	0,000 ,000 16,000	2 4 1

4. Depreciation of tangible fixed assets

Accounting standards define depreciation as the systematic allocation of the depreciable amount of a fixed asset over its useful life.

The determination of the computed amount for allocating the depreciable amount of an asset is determined by: the useful life of the asset, the depreciable amount and the depreciation method used.

Depreciation is calculated and allocated according to the depreciation methods, namely: straight-line depreciation, declining balance depreciation and accelerated depreciation.

Straight-line depreciation consists of the calculation and uniform allocation of the carrying amount of tangible fixed assets over their useful life.

Declining depreciation consists of the uneven calculation and allocation of the book/depreciable value of the tangible fixed asset over its useful life, in the sense that declining-balance depreciation is higher than straight-line depreciation in the early years and lower in the later years. Declining depreciation is calculated in two ways, taking into account the moral wear and tear or not taking the moral wear and tear into account.

The accelerated method consists in including in operating expenditure in the first year of operation a proportion of up to 50% of the book value of the fixed asset, with depreciation calculated using the straight-line method in subsequent years.

The principle of recording depreciation is as follows:

6811 "Operating expenditure on depreciation of fixed assets"	281 "Operating expenditure on depreciation of fixed assets"	Depreciation amount

5. Conclusions

The approach to events and transactions in tangible fixed assets presents both the essential theoretical aspects of these structures and a number of ways of accounting for them according to the transactions in which they are found.

Due to their importance, as a result of the benefits generated by their use and starting from the fact that this balance sheet structure is vital for the proper functioning of economic entities, we can conclude that from an accounting point of view it should be treated with the utmost care.

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DEFINING BUSINESS PROCESS REENGINEERING

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Abstract*: Globalization has made possible the simultaneous competition among business organizations from any country of the world on every market. This is why companies have sought to rethink their strategies, identify and implement innovative and enduring business models, and use appropriate concepts, tools and methods in their business processes. The 1990s witnessed the emergence of a new concept, entitled business process reengineering (BPR), aimed at allowing companies to reinvent themselves in order to boost their performance. The aims of the paper are to review and analyse several key definitions of this concept, and to emphasize its main characteristics. The study is based on a qualitative research method. The paper provides a better understanding of the BPR concept and highlights its importance both in theory and practice.*
Keywords*: business process reengineering, business processes, company, improvement.*
JEL Classification*: L25, M00.*

1. Introduction

Today's turbulent global business environment imposes companies, irrespective of their size and industry, to face various and difficult challenges, such as increasing hypercompetition, climate change and decreasing natural resources. Since the fall of the communist regimes in Central and Eastern Europe, the pace of change has accelerated all over the world (Toma, 2013; Toma and Marinescu, 2015). The rapid spread of the economic globalization process led to an unprecedented economic integration worldwide (Sideri, 1997; Toma, 2005) and the expansion of multinational and transnational corporations at a global scale (Grădinaru and Toma, 2018; Toma, 2019). It is said that companies has clearly benefited from globalization due to new business opportunities, lower production costs and higher productivity (Erixon, 2018; Marr, 2022).

On the other hand, globalization has made possible the simultaneous competition among business organizations from any country of the world on every market, either local, national, regional, or global. To contend with this tough confrontation, companies have sought to rethink their strategies (Hatzichronoglou, 1996), identify and implement innovative and enduring business models (Tohănean and Toma, 2018; Toma and Tohănean, 2019), and use appropriate concepts, tools and methods in their business processes, such as Six Sigma (Truscott, 2003; Toma, 2008a), balanced scorecard (Toma et al., 2010; Perkins et al., 2014) and agile management (Denning, 2017; Toma, 2023a). The 1990s witnessed the emergence of a new concept, entitled business process reengineering (BPR), aimed at allowing companies to reinvent themselves in order to boost their performance (Hammer and Champy, 1993). Since then, there has been a widespread interest in the BPR concept all over the world.

The aims of the paper are to review and analyse several key definitions of the BPR concept, and to emphasize its main characteristics. The study is based on a qualitative research method. The structure is as follows: the next part deals with the literature review. The third part of the paper illustrates the research methodology. Results and discussion are shown in the fourth part. Conclusions are displayed at the end of the paper.

2. Literature review

Since its appearance, the concept of BPR has become a topic of interest for many researchers and practitioners all over the world. It is worthy to notice that during the time it has been defined in various ways from different perspectives (Table no. 1).

Table no. 1. Definitions of BPR

No.	Period	Definitions
1	1990s	• „the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed" (Hammer and Champy, 1993, p.32). • „an approach to achieving radical improvements in customer service and business efficiency" (Talwar, 1993, p.23). • „a well-known managerial approach for increasing firm competitiveness" (Paolucci et al., 1998, p.196).
2	2000s	• „redesigning business processes using a radical IT-enabled approach to organisational change" (Al-Mashari and Zairi, 2000, p.11). • „the implementation of hard solutions dealing with soft problems, thus suggesting that the use of IT for instance will go a long way to making businesses more effective and securing future competitiveness" (Al-Mashari et al., 2001, p.439). • „methodologies to change their internal business processes in response to environmental change requirements or internal needs" (Holland et al., 2005, p.1000).
3	2010s	• „a technique by that organizations basically rethink and improve their work to dramatically improve client service" (Sunil Kumar and Harshitha, 2019, p.2766). • „a radical redesign of processes in order to gain significant improvements in cost, quality, and service" (Ozcelik, 2010, p.7). • „an approach that seeks to redesign processes and practices in order to support the organisation's mission, reduce costs and improve efficiency" (McGrath and Bates, 2017, p.20).
4	2020s	• „the radical redesign of business processes to achieve dramatic improvements in productivity, cycle times, quality, and employee and customer satisfaction" (Bain & Company, 2024, p.1). • „a strategic management approach that is focused on fundamentally rethinking and redesigning core business processes to achieve significant improvements in performance and efficiency" (Finio and Downie, 2024, p.1). • „an integrated set of management policies, project management procedures, and modeling, analysis, design and testing techniques for analyzing existing business processes and systems; designing new processes and systems; testing, simulating and prototyping new designs prior to implementation; and managing the implementation process." (Gartner, 2024, p.1).

Sources: Hammer and Champy, 1993; Talwar, 1993; Paolucci et al., 1998; Al-Mashari and Zairi, 2000; Al-Mashari et al., 2001; Holland et al., 2005; Sunil Kumar and Harshitha, 2019; Ozcelik, 2010; McGrath and Bates, 2017; Bain & Company, 2024; Finio and Downie, 2024; Gartner, 2024

The above-mentioned definitions have shown the historical evolution of the BPR concept since the 1990s. Their analysis in the fourth part of the paper leads to the identification of the main features of this concept.

3. Research methodology

In order to achieve the purposes of the paper, the author utilised a qualitative scientific research method based on a desk research. In the beginning, he searched the information in the main secondary sources of data, such as articles and books. Then, the author classified, analysed and synthesised the information within the literature review. Finally, the author elaborated the study.

4. Results and discussion

Starting from the 12 definitions of the BPR concept enumerated in the section Literature review, this part of the paper highlights its main features. The analysis of these definitions reveals the following issues:

- There is no universal definition of the term BPR. It is defined differently by numerous authors in a plethora of books and articles published in the last three decades.
- As a multifaceted construct, BPR is considered not only a concept but also an approach, a methodology, a technique, and a set of policies and procedures (Figure no. 1).

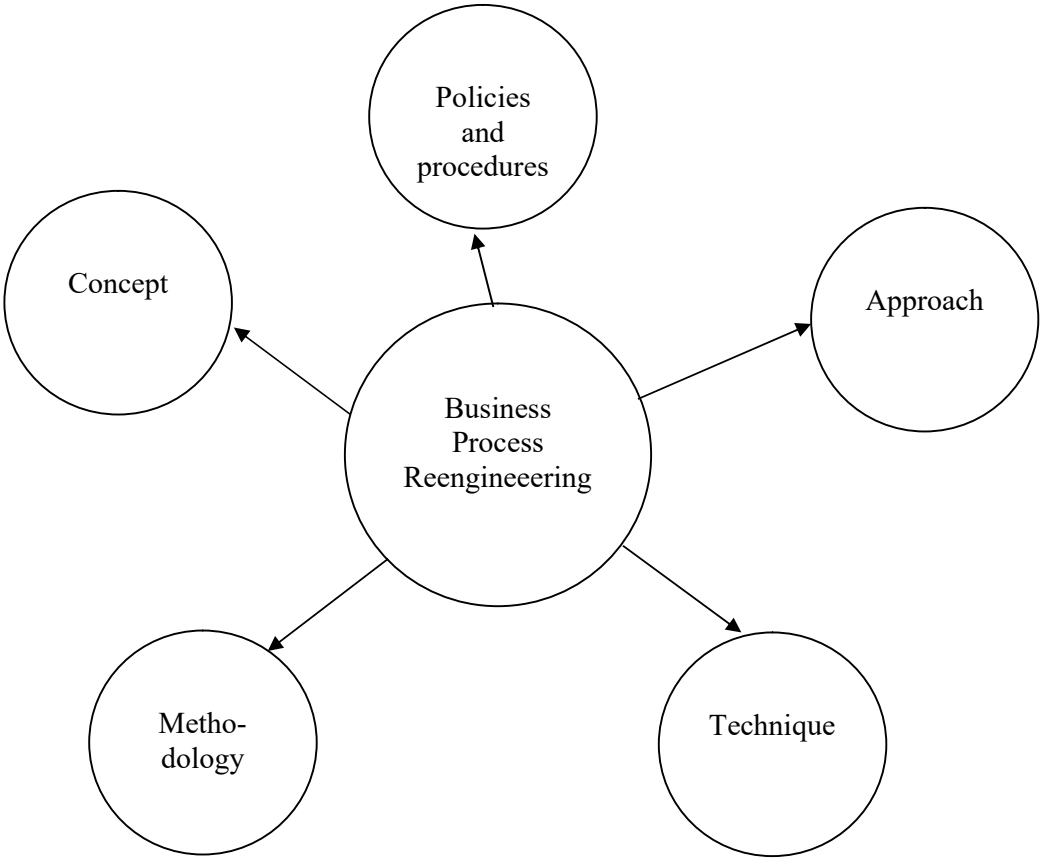

Figure no. 1. BPR: a multifaceted construct

- BPR aims at attaining profound improvements in several domains:
    - efficiency,
    - organizing,
    - competitiveness,
    - productivity,
    - employee satisfaction,
    - cycle time,
    - cost,
    - quality,
    - customer satisfaction,
    - service,
    - speed
- The implementation of BPR leads to radical changes within the business organizations.
- BPR means the rethinking and redesign of business processes within an organization in order to obtain significant improvements.
- BPR is related to business strategies (Toma and Grădinaru, 2016; Toma et al., 2016a; Toma et al., 2016b; Toma, 2023) and models (Toma and Marinescu, 2012; Marinescu and Toma, 2015).
- BPR often involves the use of information technology (IT) in an increasing digitalized business world (Tohănean et al., 2018; Toma and Tohănean, 2018).
- In order to achieve business success, BPR should be combined with other concepts, methods and techniques, such as lean management (Naruo and Toma, 2007; Marinescu and Toma, 2008), quality management (Toma, 2006; Toma and Naruo, 2009), creativity (Toma et al., 2013; Toma and Marinescu, 2017) and innovation (Toma et al., 2016c; Toma and Săseanu, 2017), marketing mix (Grădinaru and Toma, 2017; Catană and Toma, 2021a; Catană and Toma, 2021b) and customer experience (Toma and Catană, 2021a; Toma and Catană, 2021b), employees' motivation (Marinescu and Toma, 2013; Săseanu and Toma, 2019) and organizational learning (Toma, 2012).
- The deployment of BPR within companies, regardless of their size, requires in a mandatory manner the existence of a strong and transformational leadership (Săseanu et al., 2014; Grădinaru et al., 2020).

- By embracing the interests of several stakeholders (e.g., employees, customers), BPR illustrates its socially responsible approach (Toma, 2008b; Marinescu et al., 2010; Toma et al., 2011; Imbrișcă and and Toma, 2020).

These characteristics show the complexity of the BPR concept and its widespread use in the activity of business organizations.

5. Conclusions

Since the 1990s, the dramatic expansion of the globalization process has led to worldwide hypercompetition in any industry. This is why increasing performance has become a business mantra for companies, irrespective of their size and field of activity. Consequently, companies have been constrained to design/identify and implement suitable techniques and methods to boost their performance. BPR has proved to be one of them.

The paper tries to provide a better understanding of the BPR concept. Also, it identifies its main characteristics on the basis of a comprehensive analysis of numerous definitions. Finally, the paper emphasizes the importance of BPR concept both in theory and practice.

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STRATEGIES FOR OPTIMIZING INVENTORY MANAGEMENT WITHIN THE OPERATIONAL MANAGEMENT OF AN ENTITY'S ECONOMIC ACTIVITIES

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Abstract: *In a complex and volatile global economy, but full of opportunities and challenges, managers can add value to entities by optimizing operational management in general and operational management of financial-accounting activities in particular, by identifying and implementing ways to increase profitability and earning capacity. Thus, the objective of the research is to present a number of strategies on the optimization of inventory management in order to meet the entities' desideratum, namely to increase the entity's efficiency through efficient management and correct analysis of inventories, being considered as basic elements of the production process.*

Keywords: *entity, performance, management, strategies, stocks.*
JEL Classification: *A10, M1, M41.*

1. Interdependence between general management and operational management

The organization and management of entities in the production environment considers both strategic and operational approaches.

General management consists of the ability to lead and represents all the activities of organizing, leading and managing entities. Moreover, general management encompasses an accumulation of theoretically and practically conceived alternatives in terms of the organization and management of an entity, the description of the operations carried out within the entity, the results obtained, in conditions of efficiency, effectiveness and economy, in order to achieve objectives.

Operational management is the application of strategies to achieve the entity's objectives. Moreover, it is seen as a process of coordinating human, material, informational and financial resources, carried out within a planned timeframe, in order to achieve overall objectives.

"In the modern conception, operational management is concerned with the establishment of leadership at the level of all functions and activities carried out in industrial and service enterprises. In conclusion one can identify:

- operational management of Research & Development
- operational production management
- operational management of business activities
- operational management of financial-accounting activities
- operational management of human resources activities" (Burghelea and Iacob, p.52).

2. Operational management of the financial-accounting activity

The operational management of these categories of activities takes into account:

- preparation of the financial plan;
- calculation and forecasting of financial indicators based on the financial plan;
- production plan drafting and production cost anticipation;
- accounting for intangible assets, in particular fixed assets;
- stock accounting and stock management;
- payroll accounting;
- production cost accounting and identification of production costs by orders, goods, services;

- revenue accounting.

In a volatile, threat-driven global economy, where the business environment is becoming increasingly complex, entities are looking for solutions to increase performance by optimizing operational management through a range of strategies.

► In the context of the digital economy, automating business flows can contribute to increased profitability of entities. Investments in technology and innovation generate entity development. Thus, with the help of technology, the entire operational activity can be optimized and efficiency can be remedied through automation.

► Increasing profitability is the goal of any entity. Therefore, managers adopt various strategies to maximize the performance, efficiency and profitability of companies, aiming to increase revenues and reduce costs.

► Digitization and implementation of information systems updated to the economic and social context, allow entities to improve operational management.

► The correct management and use of stocks of raw materials, materials, consumables, spare parts contribute to the optimization of the production process within an entity.

3. Stock management optimization strategies

Inventories are economic goods held and used by an entity within a period of up to one year.

They are included in current assets, together with accounts receivable, cash balances and short-term financial investments.

Stocks are current assets:

- held for sale in the course of doing business at entity level;
- considered as work in progress for sale within the entities;
- in the form of raw materials, materials, consumables and other products to be used in the production process or for the rendering of services in entities.

The delineation of stocks, based on the main classification criteria, is as follows (Tiron, p.2):

"a) By source of origin:

- bought;
- manufactured.

b) By membership to an estate:

- are part of the estate and are located in the company's own premises or with third parties: custody, processing, consignment, repair;
- are not part of the estate but are under the management of the facility, received from third parties.

c) According to the degree of individualization and management:

- identifiable, individualized by items, elements;
- fungible, interchangeable."

According to the Order of the Ministry of Public Finance (OMFP) 1802/2014 stocks include:

"(a) goods, i.e. goods that the entity purchases for resale or products that are handed over for sale to its own stores;

(b) raw materials, which participate directly in the manufacture of products and are found in the finished product wholly or partly, either in their original state or processed;

(c) consumables (auxiliary materials, fuels, packaging materials, spare parts, seed and planting materials, fodder and other consumables) which participate in or assist in the manufacturing or operating process but are not normally included in the finished product;

d) materials in the nature of inventory items;

(e) products, namely:

- semi-manufactured products, which are products whose technological process has been completed in one section (stage of manufacture) and which are further processed in another section (stages of manufacture) or delivered to third parties;
- finished products, i.e. products that have completed all stages of the manufacturing process and do not require further processing within the entity, and can be stored for delivery or shipped directly to customers;
- scrap, recoverable materials and waste;
- agricultural products;

(f) biological assets in the nature of stocks are those to be harvested as agricultural products or sold as biological assets;

g) packaging, which includes reusable packaging, purchased or manufactured, intended for the products sold and which may be temporarily held by third parties, with the obligation to return it under the conditions laid down in the contracts;

(h) work in progress, i.e. products which have not passed through all the stages of processing provided for in the technological process and products which have not been subjected to technical testing and acceptance or have not been fully completed. Work in progress also includes services and studies in progress or unfinished" (OMFP 1802/2014).

One of the strategies for optimizing inventory management is the correct recognition of inventories and the optimal application of evaluation methods, especially at the point of disposal.

Inventories are recognized in the accounts when the recognition criteria in the Framework for the Preparation and Presentation of Financial Statements (*General framework for the preparation and presentation of financial statements*) are met:

- 'any economic benefit associated with the item is likely to flow into or out of the entity; and
- the item has a cost or value that can be reliably measured."

Inventories are valued according to the accounting valuation rules at the four points in time: when entering the entity, when leaving the entity, at inventory and on the balance sheet.

(a) The valuation of inventories on entry shall be performed according to the sources of input, i.e. acquisition cost, production cost, fair value or contribution value.

- The acquisition cost is used for the valuation of stocks purchased against payment: raw materials, materials, goods, consumables;
- Cost of production is used to value inventories produced in the entity: finished goods, semi-finished goods, work in progress;
- Fair value is used when inventories are obtained free of charge or recognized as inventory additions;
- The contribution amount is used for inventories contributed to the entity's equity capital.

(b) The valuation of outward stocks shall be at cost, but the particularity arises in the case of fungible stocks, which provide for the following valuation methods:

- Weighted average cost method (WAC);
- The first in first out (FIFO) method;
- The last in first out (FIFO) method.

The approach of these methods is realized through the following exemplification, presented to highlight the characteristics of each of the above-mentioned paths.

An entity records the following transactions in raw materials during November N:

01.04 N: Initial stock: 500 kg × Lei 10 /kg;

05.04 N: Purchases: 300 kg × Lei 12;

10.04 N: Outputs: 600 kg;
17.04 N: Purchases: 800 kg × Lei 12,75;
29.04 N: Outputs: 900 kg.

The valuation of raw materials at the disposal from the facility is carried out alternatively by the three methods CMP, FIFO, LIFO, as follows:

The weighted average cost involves assigning to each issue of inventories an amount based on the weighted average of the cost of inventories in inventory at the beginning of the period and the cost of inventories purchased or realized during the period.

The method can be calculated both periodically and after each output.

CMP - after each entry:

05.04 N: CMP = (500kg x Lei 10 /kg) + (300 kg x Lei 12 /kg) / 500 kg + 300kg = Lei 10,75 /kg

10.04 N: Output cost: 600 kg x Lei 10,75 /kg = Lei 6,450

17.04 N: CMP = (200 kg x Lei 10,75 /kg) + (800 kg x Lei 12,75/kg) / 200 kg + 800 kg = Lei 12,35/kg

29.04 N: Cost of asset disposal: 900 kg x Lei 12,35/kg = Lei 11.115

Final stock: 100 kg x Lei 12,35 /kg = Lei 1,235

CMP - monthly:

CMP = (500 kg x Lei 10 /kg) + (300 kg x Lei 12 /kg) + (800 kg x Lei 12.75 lei/kg) / 500 kg + 300kg + 800 kg = Lei 11.75 /kg

Cost of asset disposal:

10.04 N: 600 kg x Lei 11,75 /kg = Lei 7,050

29.04 N: 900 kg x Lei 11,75 /kg =Lei 10, 575

Final stock: 100 kg x Lei 11.75 /kg = Lei 1,175

The monthly CMP method has the advantage of calculating a weighted average cost only once a month, close in value to that calculated in the CMP variant after each entry, which reduces the workload. The disadvantage is that this method does not allow for the evaluation and recording of assets disposal during the month, thus not knowing the daily situation of assortment management.

The first-in-first-out (FIFO) method involves valuing outgoing stocks at the acquisition (or production) cost of the first entry. As the batch is depleted, the outgoing stocks are valued at the acquisition (or production) cost of the next batch, taking into account the chronological order of their entry.

Keeping the initial data, the calculation of outgoing stocks according to the FIFO method is as follows:

FIFO

01.04 N: Initial stock: 500 kg x Lei 10 /kg = Lei 5,000

05.04 N: Purchase: 300 kg x Lei 12 /kg = Lei 3,600

10.04 N: 600 kg output, divided as follows: 500 kg x Lei 10 /kg = Lei 5,000 and 100 kg x Lei 12 /kg = Lei 1,200

Stock: 200 kg x Lei 12 /kg = Lei 2,400

17.04 N: Purchase: 800 kg x Lei 12,75 /kg = Lei 10,200

29.04 N: 900 kg output, divided as follows: 200 kg x Lei 12 /kg = Lei 2,400 and 700 kg x Lei 12,75 /kg = Lei 8,925

Final stock: 100 kg x Lei 12.75 /kg = Lei 1,275

The FIFO method consists of evaluating the outflows of stocks in the order of their inflows at the lowest cost.

The last-in-first-out (LIFO) method involves valuing stocks disposed from the management of the entity at the acquisition (or production) cost of the last entry. As the batch is reduced, the stocks disposed from the management are valued at the acquisition (or production) cost of the previous batch, in chronological order.

The initial data is still maintained and the calculation of stocks exited according to the LIFO method is as follows:

LIFO

01.04 N: Initial stock: 500 kg x Lei 10 /kg = Lei 5,000

05.04 N: Purchase: 300 kg x Lei 12 /kg = Lei 3,600

10.04 N: 600 kg output, divided as follows: 300 kg x Lei 12 /kg = Lei 3,600 and 300 kg x Lei 10 /kg = Lei 3,000

Stock: 200 kg x Lei 10 /kg = Lei 2,000

17.04 N: Purchase: 800 kg x Lei 12,75/kg = Lei 10,200

29.04 N: 900 kg output, divided as follows: 800 kg x Lei 12,75 /kg = Lei 10,200 and 100 kg x Lei 10 /kg = Lei 1,000

Final stock: 100 kg x Lei 10 /kg = Lei 1,000

This method, being the opposite of the FIFO method, values the outgoing stocks in the reverse order of their inflow, i.e. at the highest cost.

(c) Inventory valuation of stocks shall be carried out at the inventory value of each item. The inventory value shall be identified as the book value of the goods, established at the time of the inventory, i.e. the value entered on the inventory lists.

(d) The valuation of stocks on the balance sheet shall be made at book value, adjusted in accordance with the results generated by the inventory.

Optimizing stock management can also be achieved through optimal stock management, which is also considered another strategy.

Inventory management is an economic process carried out at the level of producing entities, which includes activities such as receiving, storing and holding stocks on the one hand, and tracking, controlling, redistributing and using them on the other.

Stock management contributes to:

- Ensuring the continuity of the production process, which leads to the generation of constant income through the commercialization of products;
- sales efficiency, when goods are produced on time, in the quality and quantities demanded by consumers;
- avoid production gaps by ensuring the continuous flow of raw materials;
- safeguarding the entity's assets through continuous internal control of inventories to minimize wastage and spoilage and to prevent stock-outs;
- providing relevant information to the entity's management on the stock situation by determining the optimal quantities to be stocked and when to replenish, establishing the stock turnover rate and reducing errors in the documentation of these structures;
- maintaining production stocks at planned levels within the units;
- maintaining the quality characteristics of raw materials and materials during storage.

In order to avoid problems related to the limitation or overstocking of stocks at the production level, as well as for the smooth production and sale of goods, stock management identifies a number of methods to address these issues, namely:

A. The classic stock management model

This model helps to determine the quantity needed for each order to build up the stock, taking into account a number of indicators such as: fixed costs of the order, turnover and the unit cost of stock. In this type of model, a number of variables are identified, namely: quantity required, sales and delivery intervals are assumed to be constant.

B. ABC method of stock management

The ABC method is a management system that groups materials supplied and stored into three groups. This method divides stocks into three broad categories:

a) Group A: stock items with a high value, but small share in total stock;

b) Group B: stock items with average value and average weight;

c) Group C: stock items with low value but high share in total stock.

The method makes a detailed tracking of stocks in groups A and B by mathematically determining their optimum to minimize the related expenses, and a global tracking of those in group C, which will be supplied in large batches for long periods of time.

C. The Wilson Model - Within

This type of model considers the balance between ordering costs and warehousing costs in determining the order quantity needed in the replenishment process. A high reorder quantity reduces the frequency of reorders and ordering costs, but results in high average inventory value, which increases warehousing costs. On the other hand, a smaller order quantity reduces the average stock, but leads to an increase in the frequency of orders and thus to higher ordering costs. The order quantity that minimizes costs is called the economic order quantity.

3. Conclusions

On the basis of the arguments presented, it is obvious that the motivation for the choice of the research topic was precisely the growing importance given to operational financial-accounting management at entity level and the streamlining of the production process through the correct management of stocks held and used.

Thus, inventory management is essential for a well-functioning entity, in particular by helping entrepreneurs to avoid certain risks with regard to: insufficient stocks, surplus of raw materials and products or incorrect labelling of them. Poor management of these balance sheet structures can lead to the loss of customers when orders are not fulfilled on time or, why not, to significant losses for the entrepreneurs, especially if they have invested in the purchase of raw materials and components and the demand is not significant to sell finished products.

In other words, inventory management is meant to streamline operational management so that performance targets are met.

The development of strategies aimed at the sustainability of stock management is an essential requirement for the efficient functioning of the entity and the achievement of the expected return.

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BRIDGING AUDIT EXPECTATION GAP IN NIGERIAN QUOTED FIRMS: THE ROLE OF BOARD MEMBERS WITH FINANCIAL EXPERTISE

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Abstract: *The study investigated the influence of board financial expertise on the "Audit Expectation Gap" (AEG) in the Nigerian quoted firms. The AEG was measured with external auditors' independence factor. The "cross-sectional survey research design" was utilised via "online structured questionnaire" with Google form link shared among the respondents. A total of three hundred and ten (310) valid responses through the purposive sampling method were used for the analysis. Meanwhile, the validity (through independent evaluators) and reliability (Cronbach Alpha 0.83 to 0.86) of the questionnaire were earlier established. The data were later analysed using the "Partial Least Square Structural Equation Model" (PLS-SEM) at 5 percent "level of significance". The result showed that board financial expertise (β = 0.419; t = 7.109) has a significant positive influence on the independence factor of "external auditors". The study concluded that having board members with financial expertise is a good practice to be employed by the Nigerian quoted firms in addressing the danger of AEG in our society. Therefore, the study recommended that quoted firms should uphold the independence of "external auditors" through the engagement of board members with financial expertise to reduce the AEG.*

Keywords: *Board financial expertise, Audit expectation gap, External auditors, PLS-SEM, Nigerian quoted firms.*
JEL Classifications: *M12, M42.*

1. Introduction

The audit profession undertakes an indispensable economic activity which helps in protecting the interests of stakeholders in corporate entities by strengthening their reliance on the financial reporting processes. The perception and efficacy of auditing are impacted by the "Audit Expectation Gap" (AEG), a global problem. The disparity between what the general public and other stakeholders anticipate from auditors and what auditors believe their responsibilities involve is called the "AEG". Cultural, economic, and legislative considerations cause the AEG to vary in tenacity and nuance throughout different locations. The AEG is a multifaceted problem that differs globally. Although regulatory changes, audit education, application of good corporate governance practices/principles, and enhanced communication are some of the important channels to close the gap.

Besides, Alao et al. (2022) and more recently Alao (2024), documented that "AEG can be reduced in any society through the defensive and constructive approaches". "The defensive approach deals with the use of audit education while the constructive approach considers the

adoption of corporate governance principles/practices in narrowing the AEG". Furthermore, Soyemi et al. (2021) had earlier argued that corporate governance is one of the indispensable practices that stimulate "financial reporting processes" and as well ensure the accuracy of the financial information contained therein. "Corporate governance" according to Alao et al. (2020) was described as the nexus among shareholders and those charged with the responsibility of governance along with the manner in which corporate entities are managed.

Corporate governance mechanisms/factors can be grouped into two (2) – "internal and external" (Almutairi & Quttainah, 2019; Aditya, 2020; Payne & Moore, 2022). According to Payne and Moore (2022), the internal mechanisms include board structures, ownership arrangements and managerial incentives while the external factors originate from outside forces that promote internal governance structures. Additionally, the "Association of Chartered Certified Accountants" (ACCA) documented that the internal factors of corporate governance comprise board of directors, internal controls and risk management, executive compensation, ethical standards, and corporate culture while the external mechanisms include regulatory framework, market discipline, external auditors, disclosure and transparency (ACCA, 2020). This documentation was also in line with the "Nigerian Code of Corporate Governance" (NCCG, 2018).

In support of the previous studies on the existence of the AEG all over the world, Alao (2024) further established the presence of the AEG in the Nigerian quoted firms. Consequently, the present study is premised on one of the hypothetical statements "*board financial expertise has no significant effect on the independence factor of the external auditor*" as developed in the work of Alao et al. (2023). The authors posited that the presence of board members with financial expertise in the Nigerian quoted firms can assist in upholding the independence of the external auditors thereby narrowing the AEG. Board of director is one of the internal mechanisms of corporate governance as contained in the aforementioned documentations (NCCG, 2018; ACCA, 2020; Payne & Moore, 2022). Therefore, the above hypothetical statement is validated in the present study.

Furthermore, the presence of financial experts on the board can enhance the quality of financial oversight and potentially narrow the expectation gap by improving the effectiveness and credibility of the audit process especially when such board members serve on audit committees. Board financial expertise means "the presence of board members with finance/accounting expertise" (Alao, 2024). According to DeFond et el. (2005) financially literate board members, especially those with audit and accounting expertise, are better equipped to understand complex financial issues and audit processes, hence this improved understanding allows them to provide more effective oversight of the company's financial reporting and internal controls.

There is no doubt about the fact that the literature is full regarding studies on the approaches to narrowing the AEG in our society. However, some of the studies (Fulop et al. 2018; Kumari et al. 2017; Elad 2017) focused on the role of "audit education" in narrowing the AEG, scholars like Jabbar (2018) and Albeksh (2016) examined the influence of audit quality on the AEG while Fijabi (2020); Alaraji (2017) and Shbeilat (2013) investigated the role of corporate governance principles in reducing the AEG. Therefore, adopting the constructive approach and improving on the subsisting works on the AEG, the present study considered one of the constructs of "internal corporate governance mechanisms" by investigating the effect of board financial expertise on the AEG in the Nigerian quoted firms.

In addition, the present study contributed to the literature in two (2) ways. The study examined the effect of board financial expertise on the AEG in the Nigerian quoted firms, and employed the Partial Least Square Structural Equation Model (PLS-SEM) via SmartPLS version 4.0 to test the nexus between board financial expertise and the AEG. Meanwhile, the study has five (5) sections. Section one is the introduction, section two deals with the literature review and development of hypothesis, section three covers the methodology, section four presents the results, and section five gives the conclusion and recommendations.

2. Literature Review and Development of Hypothesis

The term AEG was first conceptualised by Liggio in 1974 though, the perceptions of the general public regarding auditors' roles were first investigated in the United Kingdom by Lee in 1969 (Porter, 1990). Liggio (1974) conceptualised AEG as the difference between the perceived levels of performance anticipated by the users of financial statements and those expected by auditors. Recently, Ashibogwu et al. (2023) described AEG as the variance between users' expectations and the contents of the audit report while Alao (2024) conceptualised AEG as the variation in the opinion of the auditors and stakeholders as regards auditors' duties. According to Alao et al. (2022), the AEG was classified into four (4) factors – "going concern, independence, responsibility and reliability". Meanwhile, the present study used the independence factor as the proxy for the AEG. That is, "external auditors' independence factor".

As documented in the introductory part of this study, board structure is one of the components of internal corporate governance mechanisms. Also, "board structure and composition" is one of the corporate governance principles as contained in the NCCG (2018). Meanwhile, one of the recommended practices under the principle of "board structure and composition" in the NCCG is the ability of board members "to attain the appropriate balance of knowledge, skills, and experience that allow them to effectively discharge governance responsibilities". According to DeFond et al. (2005), the financial literacy of the board members of corporate entities allows them to ensure robust supervision of the company's "financial reporting and internal controls" processes. Recently, Alao (2024) described board financial expertise as "the presence of board members with finance/accounting expertise" in the Nigerian quoted firms.

Theoretically, this study is based on the propositions of the "theory of inspired confidence". A foundational concept in the auditing area is the "theory of inspired confidence", which was developed in 1932 by a Dutch scholar "Theodore Limperg". His in-depth observations and examination of the auditor's duties in the larger framework of stakeholder interactions and financial reporting led to the development of Limperg's thesis. This hypothesis has had a significant impact on how auditing can ensure that financial statements are credible and trustworthy, which in turn helps the capital markets operate as intended.

A pillar of auditing philosophy, the theory of inspired confidence emphasises the crucial role that auditors play in building credibility and trust in financial reporting. Auditors help close the confidence gap and bridge expectations by acting as impartial validators of financial information. Besides, findings from the present study validate Limberg's viewpoint of the "theory of inspired confidence". Therefore, the "theory of inspired confidence" is explained in this study as a theory that explains enhancing stakeholders' confidence in the audit process of the Nigerian corporate entities via upholding the independence of external

auditors by having "board members with financial expertise" thereby narrowing the AEG in our society.

Empirically, Girbina et al. (2012) examined the nexus between the financial education of board members and firms' performance in Romania. Using a sample of forty (40) companies quoted on the Bucharest Stock Exchange, the authors used educational qualifications of board members as proxy for financial education. Results from the analysis revealed a positive correlation between board members with financial education and market-based performance indicator, Tobin's Q of Romanian non-financial listed companies. Sarwar et al. (2019) investigated the effect of board financial expertise on debt policy of non-financial firms in Pakistan from 2010 to 2015. The authors measured board financial expertise with financial knowledge/expertise of board members. The results showed a significant positive influence of board financial expertise on firms' leverage.

Yun et al. (2021) examined the influence of "board financial expertise" on cash holding policy of listed non-financial firms in Pakistan with the moderating role of multiple large shareholders. The authors measured "board financial expertise" with board members' degree and professional certificates. The results showed that board financial expertise has a significant negative effect on cash holdings while the moderator exhibited a significant positive effect. Recently, Nugraha (2023) investigated the effect of board of directors/executives' expertise on firms' performance. Academic degrees of directors/executives' members were used as proxies for expertise. The study's finding unlike that of Girbina et al. (2012) showed that board of directors/executives' expertise has no effect on firms' performance.

On the other hand, several other scholars have worked on the approaches for narrowing the AEG. For instance, Shbeilat (2013) worked on the influence of particular principles of the "Jordanian Corporate Governance Code" (JCGC) on the dependability of audit reports and the extent to which the JCGC assists in reducing the AEG. The results demonstrated that the JCGC's principles contributed to an enhanced perception of the audit report's dependability. Furthermore, it was reported that these principles helped in narrowing the AEG. Also, Alaraji (2017) utilised the analytical descriptive method to assess how corporate governance principles influence the reduction of the AEG between external auditors and stakeholders in Iraq. The results indicated that implementing corporate governance practices had a positive effect on narrowing the AEG within the external audit career in Iraq.

Ocheni and Adah (2018) focused on two objectives including the determination of the level of familiarity among "users of financial statements" with the responsibilities of auditors under Nigerian law and the assessment of the impact of the AEG on stakeholders' decision-making based on their perceptions. The findings showed that majority of stakeholders were not familiar with the statutory duties of auditors. Additionally, the study reported that the AEG had a lesser significance in influencing stakeholders' decision-making. Akther and Xu (2020) worked on the existence of AEG and its influence on stakeholders' confidence in Bangladesh. The results showed that the existence of AEG in Bangladesh whereas it was further reported that AEG harms stakeholders' confidence. More so, the study maintained that the phenomenon can be reduced via auditors' independence, effective communication and the presence of independent oversight functions by relevant government agencies. Fijabi (2020) examined the nexus between corporate governance and auditors' expectation with a focus on Pension Fund Administrators (PFAs) in Nigeria. Findings from the study revealed that

effective accountability as a corporate governance practice has a positive contribution to the expectation gap.

Above all, as indicated in the above empirical review, studies have been conducted on "board structure and composition" on one hand, and "the nexus between corporate governance practices/principles and the AEG" on the other hand. However, as far as we know, much studies have not been conducted on the connection between board structure/composition and the AEG hence, the gap identified. Therefore, the present study improved on the previous works by examining the influence of "board financial expertise" on the AEG in Nigerian quoted firms. Arising from the above discussions, the following hypothesis was developed to guide the present study;

Ho: "Board financial expertise has no significant effect on the independence factor of the external auditor"

3. Methodology

This study employed the "survey research design" where questionnaire was designed and administered among directors, external auditors and shareholders of the "Nigerian quoted firms" using the purposive sampling technique. The use of questionnaire as a research instrument is supported by the previous of works of Akther and Xu (2020); Olojede et al. (2020); and Nguyen and Nguyen (2020). Meanwhile, a pilot test was earlier conducted physically in Abeokuta, Ogun State among twenty-three (23) respondents (directors, external auditors and shareholders) and, on that basis, some questions in the questionnaire were removed/modified (based on Cronbach Alpha results) before the final administration. Consequently, the adjusted questionnaire was shared among the respondent groups with the use Google forms.

The link was shared among the groups through various Associations' Mail and/or WhatsApp platforms. At the end of the exercise, a total of three hundred and ten (310) valid responses were used for the study. However, there was no rejection of responses as all the questions were made required for the respondents with the aid of the Google form designed questionnaire and the respondents had no chance of choosing two (2) options at the same time. The details of the responses/respondents are presented in Table 2 below. The "Partial Least Square Structural Equation Model" (PLS-SEM) was employed in testing the influence of "board financial expertise" on the AEG in "Nigerian quoted firms" via SmartPLS version 4.0. The use of PLS-SEM for this kind of study is supported by previous studies of Sarstedt at al. (2021); Akther and Xu (2020); and Adedeji (2020).

Table 1: Reliability Test

S/N	Constructs	Items	Cronbach Alpha Coefficients
1.	Board Financial Expertise (BFE)	6	0.83
2.	Independence Factor (IF)	7	0.86

Source: Authors' Computation (2024)

Table 1 showed the results from the pilot test. The test was conducted to ascertain the "reliability of the items" contained in the questionnaire. The "Cronbach Alpha coefficients" range from 0.83 to 0.86 (which is greater than 0.70) showed that it is within the acceptable range as outlined by George and Mallery (2003).

4. Results and Discussions

Table 2: Demographic Data of the Respondents

Variables	Label	Frequency	Percentage
Respondents' Group	Auditors	201	64.8
	Directors	34	11.0
	Shareholders	75	24.2
	Total	**310**	**100.0**
Gender	Female	268	86.5
	Male	42	13.5
	Total	**310**	**100.0**
Age (Years)	Less than 30	21	6.8
	30 – 39	43	13.9
	40 – 49	105	33.9
	50 – 59	104	33.5
	60 and above	37	11.9
	Total	**310**	**100.0**
Highest Educational Qualification	OND/NCE	7	2.3
	B.Sc./HND	113	36.5
	MBA/M.Sc.	148	47.7
	PhD	35	11.3
	Others	7	2.3
	Total	**310**	**100.0**
Professional Qualification	ACA/CNA/ACCA	94	30.3
	ACTI	25	8.1
	CISA/CFA	2	0.6
	FCA/FCNA/FCCA	120	38.7
	Others	69	22.3
	Total	**310**	**100.0**

Source: Authors' Computation (2024)

Table 2 displayed the "demographic pattern" of the study's respondents. The table revealed that 65% of the respondents are external auditors hence, they possess the required expertise about the subject matter; 79% of the respondents are above 40 years of age hence, majority of the respondents are adults; 37% have B.Sc./HND while 48% have MBA/M.Sc. hence, majority of the respondents possess the required educational qualifications; 39% have FCA/FCNA/FCCA hence, majority of the respondents are professionally qualified to understand the subject matter being investigated in the study.

Furthermore, the study employed SmartPLS version 4 in testing the formulated hypothesis. Consequently, the "Confirmatory Factor Analysis" (CFA) otherwise known as "measurement model" analysis was conducted on the latent variables. The process led to the deletion of certain manifest latent variables whose factor loadings are below the threshold of 0.50. This is supported by the rules governing the application of SmartPLS (Ramayah et al., 2018). Therefore, Independence Factor (IF) 1 and 2 as well as Board Financial Expertise (BFE) 1 and 3 were deleted accordingly.

Table 3: Descriptive and Normality Analysis

Name	Type	Missings	Mean	Median	Scale min	Scale max	Obs. min	Obs. max	Std dev.	Excess kurtosis	Skws	Cramér-von Mises p value
IF3	ORD	0	3.558	4	1	4	1	4	0.575	1.330	-1.099	0.000
IF4	ORD	0	3.813	4	1	4	1	4	0.422	7.005	-2.377	0.000
IF5	ORD	0	3.761	4	1	4	1	4	0.509	6.423	-2.365	0.000
BFE2	ORD	0	3.165	3	1	4	1	4	0.613	1.022	-0.449	0.000
BFE5	ORD	0	3.081	3	1	4	1	4	0.614	0.593	-0.300	0.000
BFE6	ORD	0	3.055	3	1	4	1	4	0.658	0.248	-0.332	0.000

Source: Authors' Computation (2024)

Table 3 showed the results of the descriptive and normality tests of the study's data. The result showed the least and highest values as 1 and 4 respectively. The standard deviation ranges from 0.422 to 0.658. Also, kurtosis ranges from 0.248 to 7.0 while skewness ranges from -2.365 and -0.300. These are within the acceptable range (-7 to 7 and -2 to 2 respectively) as recommended by Bryne (2010), Kline (2011), and Ryu (2011).

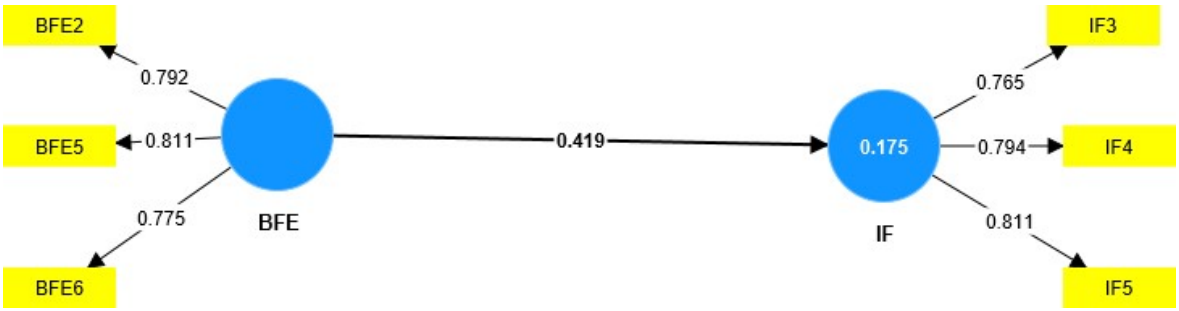

Figure 1: Measurement Model
Source: Authors' Computation (2024)

Table 4: Constructs' Convergent Validity and Reliability Tests

Constructs	"Measurement Items"	"Factor Loadings"	"Cronbach's Alpha"	"Composite Reliability (rho_a)"	"Composite Reliability (rho_c)"	"Average Variance Extracted (AVE)"
BFE	BFE2	0.792	0.707	0.712	0.835	0.628
	BFE5	0.811				
	BFE6	0.775				
IF	IF3	0.765	0.705	0.707	0.833	0.625
	IF4	0.794				
	IF5	0.811				

Source: Authors' Computation (2024)

Figure 1 showed the "measurement model" meanwhile the valuation of the "constructs' convergent validity and reliability" were further explicitly displayed in Table 4. From Table 4, the manifest variables' factor loadings values ranged from 0.765 to 0.811 which are higher than the threshold of 0.70 [Hair Jr. et al., (2010); Hair Jr. et al., (2017)]; "Cronbach Alpha and composite reliability" values ranged from 0.705 to 0.835 while "Average Variance Extracted (AVE)" values ranged from 0.625 to 0.628 which are higher than the threshold of 0.50 [Hair Jr. et al., (2017); Ramayah et al., (2018)]. In conclusion, the study has no problem of constructs' convergent validity and reliability as each of the values computed is higher than the respective threshold.

Table 5: Fornell & Larcker's Analysis Test

	BFE	IF
BFE	**0.793**	
IF	0.419	**0.790**

Source: Authors' Computation (2024)

Table 6: Heterotrait-Monotrait ratio of correlations (HTMT) Test

	BFE	IF
BFE		
IF	0.572	

Source: Authors' Computation (2024)

Tables 5 and 6 showed the results of the discriminant validity. Fornell and Larcker's test revealed that the values on the diagonal ranged from 0.790 to 0.793 and these are higher than the off-diagonal value. On the other hand, HTMT test revealed a value of 0.572 which is below the threshold of 0.90. Therefore, for each of the tests, discriminant validity is justified.

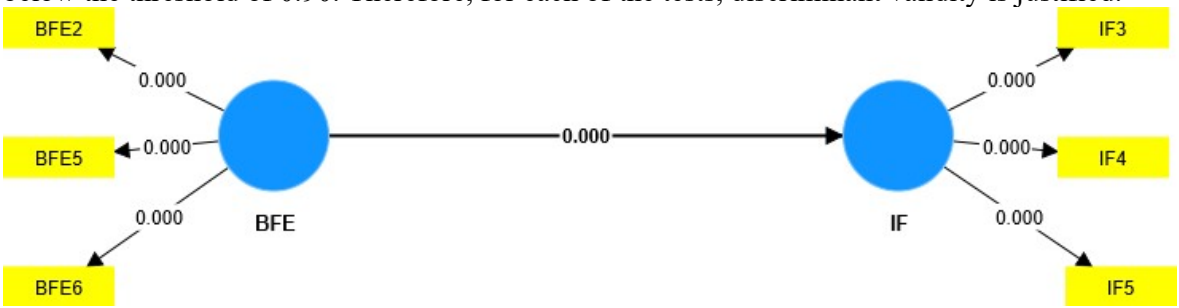

Figure 2: Structural Model
Source: Authors' Computation (2024)

Figure 2 displayed the study's structural model analysis. The bootstrapping with 5000 resamples that were introduced with "the aid of PLS-SEM" assisted in the determination of path coefficients, standard errors, t-value and significant levels to examine the relevance of the hypothesised nexus between board financial expertise and external auditors' independence factor.

Table 7: Model Fit Test

	"Saturated model"	"Estimated model"
SRMR	0.114	0.114
d_ULS	0.274	0.274
d_G	0.088	0.088
Chi-square	170.3	170.3
NFI	0.62	0.62

Source: Authors' Computation (2024)

Table 7 revealed the results of the "Goodness of Fit" (GoF). "Standardised Root Mean Square Residual" (SRMR) equals 0.114 which is a bit higher than 0.10 while Normed Fit Index (NFI) equals 0.62 which is below 1 but close to 1 hence, the model is a good fit.

Table 8: Collinearity Check Test

	VIF
BFE2	1.285
BFE5	1.457
BFE6	1.456
IF3	1.174
IF4	1.727
IF5	1.719

Source: Authors' Computation (2024)

Table 8 revealed the results of the collinearity check test. For the test, the values for the "Variance Inflation Factor" (VIF) ranged from 1.174 to 1.727 which are below 5 hence, there is no collinearity problem with the data set.

Table 9: Path Coefficients Test

	"Original sample" (O)	"Sample mean" (M)	"Standard deviation" (STDEV)	"T statistics" (|O/STDEV|)	"P values"
BFE -> IF	0.419	0.423	0.059	7.109	0.000***

Source: Authors' Computation (2024)
*Note: *** implies 1% Significance Level*

Table 9 displayed the results for the path coefficients. The coefficient value (β) equals 0.419; *t*-value equals 7.109 while the *p*-value equals 0.000. The coefficient value of 0.419 indicated a positive effect of board financial expertise on the external auditors' independence factor while the "*t*-value of 7.109" and "*p*-value of 0.000" indicated a significant effect of "board financial expertise" on the external auditors' independence factor. Meanwhile, the *p*-value of 0.000 is an indication of significance at all levels of significance (10%, 5% and 1%). Therefore, the null hypothesis which stated that "board financial expertise" has no significant effect on the external auditors' independence factor is rejected. Above all, it can be concluded

that board financial expertise has a significant positive effect on the external auditors' independence factor.

Table 10: Coefficient of Determination (R^2)

	"R-square"	"R-square adjusted"
IF	0.175	0.173

Source: Authors' Computation (2024)

Table 10 showed the results for the study's coefficient of determination (R^2). The R^2 value of 0.175 revealed that eighteen (18) per cent variation in the endogenous construct (IF) is accounted for by the exogenous variable (BFE) hence, according to Cohen (1988), BFE has a moderate level of predictive accuracy on IF.

Table 11: Assessment of Effect Size (f^2)

	BFE	IF
BFE		0.213
IF		

Source: Authors' Computation (2024)

Table 11 showed the result for the effect size (f^2). From the table, BFE has a value of 0.213 hence, according to Cohen (1988), BFE has a medium effect on IF.

Table 12: Assessment of Predictive Relevance for Manifest Variable

	"Q^2predict"	"PLS-SEM_RMSE"	"PLS-SEM_MAE"	"LM_RMSE"	"LM_MAE"
IF3	0.134	0.537	0.465	0.542	0.457
IF4	0.057	0.411	0.299	0.411	0.293
IF5	0.089	0.488	0.359	0.489	0.357

Source: Authors' Computation (2024)

Table 12 showed the results for the predictive relevance of the manifest variables. The Q^2predict values ranged from 0.057 to 0.134. Each of the values is greater than zero (0) hence, the indication that the exogenous variable (BFE) has predictive relevance on the endogenous construct (IF).

The present study investigated the influence of board financial expertise on the AEG in Nigerian quoted firms. In this study, the AEG was measured via external auditors' independence factor. The results as shown in Table 9 revealed that board financial expertise has a significant positive effect on external auditors' independence factor in Nigerian quoted firms. That is, the higher the number of board members with financial expertise, the more independent the external auditors. This means that quoted firms with board members that are expert in financial matters can uphold the independence of external auditors especially with reference to ensuring that external auditors carry out their statutory duty without bias and undue influence from those saddled with governance responsibilities. Thus, upholding the

external auditors' independence factor would in turn lessen the AEG in Nigerian quoted firms.

Besides, finding from this study aligned with the proposition of the theory of inspired confidence. That is, the study alluded to the fact that stakeholders' confidence in the audit process of the Nigerian corporate entities can be enhanced when the independence of external auditors is upheld via the presence of board members with financial expertise. Furthermore, the finding is in tandem with that reported in the works of Sarwar et al. (2019) and Girbina et al. (2012). The authors found a positive nexus between board financial expertise and firms' performance in Romanian quoted firms and Pakistan non-financial firms respectively. On the other hand, the finding varied from what was reported in the work of Yun et al. (2021). The author reported a significant negative effect of board financial expertise on cash holding in Pakistan non-financial firms. Recently, Nugraha (2023) reported that board financial expertise has no effect on firm' performance in Indonesian listed manufacturing firms.

5. Conclusion and Recommendations

The study concluded that board financial expertise is a good internal corporate governance practice that can be employed by corporate entities in addressing the problem of the AEG especially, in Nigerian quoted firms. According to this study, firms that put in place a good internal corporate governance practice especially, board financial expertise, are capable of improving the independence of their external auditors, particularly with reference to the maintenance of external auditors' supposed freedom to guarantee stakeholders' confidence, and auditors carrying out their work without bias and undue influence. The uphold of external auditors' independence factor via the presence of board members with financial expertise would in turn reduce the AEG. The study, therefore, recommended based on its findings that Nigerian quoted firms should have board members with financial expertise. That is, most if not all the members of the board of these firms should have the knowledge of financial matters. This would help to uphold the independence of external auditors; boost stakeholders' confidence and in turn narrow the AEG in our society.

Besides, the present study is limited to one of the approaches for narrowing the AEG. That is, the constructive approach. Furthermore, the study has only considered the influence of one of the internal corporate governance mechanisms in narrowing the AEG. That is, board composition. Lastly, the study has used only the primary source of data. Therefore, future researches are encouraged in the aspect of narrowing the AEG via the defensive approach as well as the consideration of other corporate governance mechanisms (internal or external) to further enrich the literature. Meanwhile, the study has contributed to the existing literature on the AEG from three (3) perspectives. Conceptually, the study was able to examine the effect of board financial expertise on the AEG; methodologically, it tested the nexus between board financial expertise and the AEG via PLS-SEM; and theoretically, the finding was alluded to the theory of inspired confidence.

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TRANSFORMATION OF THE FRUIT SECTOR IN THE REPUBLIC OF MOLDOVA: CHALLENGES AND OPPORTUNITIES IN THE FACE OF TECHNOLOGICAL MODERNIZATION

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Abstract: *The fruit sector in the Republic of Moldova is undergoing a period of transformation, influenced by global market developments and the demands of external markets. With an annual apple production ranging between 400,000 and 600,000 tons, the Republic of Moldova is in a continuous process of modernizing cultivation technologies, particularly through the adoption of intensive and super-intensive technologies. These changes are essential to meet international market requirements and enhance the sector's competitiveness. At the same time, the sector faces challenges related to ensuring the quality of planting material, as the production of grafted trees for these technologies is costly and complex. Although local producers have begun adopting new varieties and technologies, many nurseries are not sufficiently equipped to meet market demands, leading to dependence on imports. In this context, the authorities in the Republic of Moldova support farmers in adopting modern technologies and improving the production of planting material, while collaboration between scientific institutions and producers is essential to enhance quality and efficiency in this field. The modernization of the fruit sector represents an opportunity for diversifying marketing channels and expanding exports.*

Keywords: *fruit growing, technologies, productivity, planting material, export.*
JEL Classification: *Q10, Q16, Q17, Q18, Q20, Q57.*

1. Introduction

The evolution of the global apple market has a direct impact on the fruit-growing sector in the Republic of Moldova. In a dynamic and ever-changing global economic context, the diversification of external markets requires not only adaptation to consumer preferences but also compliance with international standards regarding the quality and quantity of production. Thus, the domestic fruit-growing sector is undergoing a profound transformation, and the adoption of modern cultivation technologies is becoming crucial for maintaining competitiveness and economic efficiency. This entails achieving high yields of superior-quality apples by establishing orchards with productive, attractive, and internationally competitive varieties, as well as utilizing the most advanced technologies for their establishment and maintenance (Cimpoies, 2012, p.7).

In this context, the relevant authorities in the Republic of Moldova support farmers in adopting new agricultural technologies to improve yields and meet the demands of international markets. The transition from traditional apple cultivation techniques to more innovative methods has become a national priority.

2. State of knowledge on the issue

The state of knowledge regarding the horticultural sector in the Republic of Moldova is well developed; however, significant challenges persist, particularly in terms of modernization and the implementation of intensive technologies. Despite considerable progress in increasing production and diversifying export markets, the sector continues to face difficulties in ensuring high-quality planting material, especially for super-intensive technologies.

Research in this field has documented the evolution of the sector, clearly identifying modernization trends such as the transition to super-intensive orchards and the implementation of advanced technologies, which enable higher productivity and more efficient land use. At the same time, a reliance on imported planting material has been observed, highlighting the need for structural reforms in the production of grafted trees.

Furthermore, studies have examined the impact of geopolitical and economic changes, such as the conflict in Ukraine, on Moldova's export markets, emphasizing the necessity of market diversification. Regarding regulations, authorities have introduced measures to ensure the quality of planting material, with the National Food Safety Agency (ANSA) overseeing the production process.

3. Materials and methods

Several research methods were employed in the preparation of this report. A documentary analysis was conducted by examining official sources, legislative documents, and reports related to the horticultural sector in the Republic of Moldova, as well as statistical data on apple production and exports of planting material. Additionally, statistical data were used to analyze the evolution of the horticultural sector and the impact of market changes.

Another key method was market analysis, which involved studying external market trends and requirements, as well as the diversification of sales markets in the context of geopolitical and economic shifts. This approach aimed to understand the evolution and adaptation of apple exports from the Republic of Moldova. Observing the sectoral phenomenon was essential in evaluating the implementation of intensive and super-intensive technologies, as well as the challenges faced in the production of planting material.

Furthermore, a comparative study was conducted on the evolution of the horticultural sector from the Soviet period to its transition to a market economy, in order to identify specific changes and challenges. These methods provided a comprehensive understanding of the current context of the horticultural sector in the Republic of Moldova and the factors influencing its development.

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4. Results and discussion

The continuous evolution of the global apple market is driving significant transformations in the apple production sector of the Republic of Moldova. The diversification of external markets has led to increased variability in consumer preferences and has imposed higher standards regarding the quality and quantity of marketed production. To meet these demands, the adoption of modern cultivation technologies has become a necessity, requiring a fundamental shift in the current production model.

In this context, central authorities encourage local producers to accelerate the transition from traditional apple cultivation methods to innovative technologies that ensure both competitiveness in foreign markets and compliance with current quality and economic efficiency requirements.

The Republic of Moldova is among the leading apple producers in the region, with an estimated annual production ranging between 400,000 and 600,000 tons. This quantity comes from apple orchards covering a total area of 56,000 hectares, of which 21,767 hectares are

managed by agricultural enterprises specializing in fruit growing. These agricultural units, through the adoption and implementation of modern cultivation technologies, ensure an annual production of approximately 250,000 tons of high-quality apples, primarily intended for export to international markets. The main apple varieties cultivated in Moldova include *Golden Delicious, Idared, Gala, Fuji*, and *Granny Smith* (MoldovaFruct, 2025). However, there is a constant trend of varietal renewal, adapted to the dynamic market demands, to meet both consumer preferences and the international quality standards.

Until 2022, the Republic of Moldova annually exported between 200,000 and 250,000 tons of apples, with an average value of 89 million USD. The majority of shipments were directed towards the countries of the Commonwealth of Independent States (CIS). In 2022 alone, apples worth 65.3 million USD were exported to the Russian Federation (World Bank, 2025). However, the conflict in Ukraine has led to a reconfiguration of export markets, redirecting shipments toward the European Union and the Middle East. This shift has resulted in a significant reduction in the exported volume, which currently ranges between 120,000 and 140,000 tons annually. In 2023, the Republic of Moldova exported apples to 49 countries, diversifying its sales markets while maintaining a significant dependency on the post-Soviet space. The Russian Federation remained the primary destination, accounting for 52.9% of total exports. Kazakhstan was the second-largest importer, with a share of 17.4%, followed by Romania, which purchased 10.1% of Moldovan apples.

Other significant sales markets included Belarus (5.3%), the United Arab Emirates (3.8%), and Saudi Arabia (3.3%), reflecting a gradual expansion of exports to the Middle East. Additionally, smaller quantities of apples were exported to Uzbekistan (1.9%), Kyrgyzstan (1.3%), Oman (0.5%), and Qatar (0.5%). The remaining 3% of exports were distributed among 39 other countries, demonstrating the continuous effort of Moldovan producers to access new international markets and reduce dependency on traditional partners (Procopciuc, 2024).

Currently, the domestic apple production sector is entering a new stage of development, focused on increasing productivity, improving quality, and diversifying the varieties offered to consumers. In this context, the Republic of Moldova has begun implementing super-intensive technology, characterized by a density of up to 6,000 trees per hectare, advanced irrigation systems, and protection against adverse climatic phenomena, as well as intensive use of organic and chemical fertilizers. This method allows harvesting to begin as early as the third year after planting, reaching a maximum yield of 60-70 tons per hectare during the optimal fruit-bearing period. While this technology is relatively new for the Republic of Moldova, it is already widely implemented in countries such as Italy, Poland, the USA, Belgium, and the Netherlands. Regarding productivity, the highest average yields per hectare are recorded in Libya (56.9 t/ha), New Zealand (52 t/ha), and Chile (48.7 t/ha). The United States, the second-largest apple producer in the world, achieves a total harvest of 3.6 million tons, with an average yield of 35.6 t/ha. Notably, the total area of apple orchards in the U.S. is only 130.5 thousand hectares, reflecting the exceptional efficiency of this crop both in terms of quantity and quality (AtlasBig, 2025).

For the Republic of Moldova, this evolution, both in terms of quantity and quality, is attributed to the modernization process of the technologies in the domestic fruit-growing sector. Through the increasingly active implementation of intensive technologies, a steady increase in productivity has been achieved, accompanied by a reduction in the land area dedicated to this crop. In this context, agricultural systems with a high tree density, ranging

from 400 to 1,250 trees per hectare, have been developed. This approach has significantly reduced the total area of apple orchards while simultaneously increasing production.

Currently, the Republic of Moldova is in the phase of implementing super-intensive technology, which involves a density of up to 6,000 trees per hectare, along with the use of advanced irrigation systems and protection against extreme weather phenomena. This method allows for harvesting starting from the third year after planting, with a maximum yield of 60-70 tons per hectare during the optimal fruit-bearing period. The implementation of these advanced technologies brings the Republic of Moldova closer to international standards, representing a strategic direction for increasing competitiveness in the global market.

However, the transition of the domestic fruit-growing sector to intensive technologies faces various challenges. One of the major obstacles is ensuring quality planting material. Producing grafted trees on dwarf rootstocks, such as M9, which are essential for intensive and super-intensive technologies, is a costly and technologically complex process. Although the Republic of Moldova produces this type of planting material, many local nurseries are not sufficiently equipped to meet market demands, and many farmers prefer to import trees from countries such as Italy, Poland, or the Netherlands.

Looking back, during the Soviet era, the Republic of Moldova was known as the "garden of the Soviet Union," with extensive orchards supporting a steady demand for planting material. In this context, the State Enterprise "Codru," the main producer of grafted trees, achieved a production of 6.9 million seedlings in 1976, and by 1980, this figure had exceeded 10.3 million units. During this period, there were also mother plantations for rootstock material: 238 hectares dedicated to the production of grafting branches and over 120 hectares for rootstocks such as MM106, M26, and M27 (Rusu and Bratco, 2017).

Simultaneously, research efforts were initiated to develop rootstocks and varieties adapted to super-intensive orchards. However, the transition from a planned economy to a market economy led to major difficulties in the agricultural sector, significantly affecting the development of fruit-growing. The demand for planting material decreased significantly, and many nurseries could no longer market their production. As a result, in 2003, national production of grafted trees sharply declined, barely reaching the threshold of 300,000 units.

This situation prompted authorities to intervene through various support programs, leading to a revitalization of the sector. Initially, the production of fruit tree planting material in the Republic of Moldova was regulated by Law no. 728-XIII of February 6, 1996, regarding fruit growing, which establishes the requirements for the production, testing, control, certification, and commercialization of this material (Legis.md, 2024). To ensure the quality and health of planting material, the responsibility for its certification lies with the National Food Safety Agency (ANSA), which monitors the entire production process, ensuring compliance with international standards. As a result, in 2016, the production of grafted trees reached approximately 7.7 million units (iroul Național de Statistică, 2025).

However, current requirements impose new standards for the production of planting material, dictated both by the necessity of cultivating specific apple varieties and by the preference of orchardists for super-intensive orchards. A significant portion of local producers cannot meet these requirements, prompting farmers to import grafted trees from Italy, Poland, and other countries, at a cost of approximately 5 to 10 euros per unit. This dependence on imports highlights the need for a structural reform of the tree planting material production sector. Modernizing this sector would not only meet the domestic market's needs but would also facilitate the exploitation of growing demand in the international market. Although, in

2022, Moldova received permission to export apple (Malus domestica) and walnut (Juglans regia) planting material to the European Union, there are still significant opportunities for expanding and strengthening exports.

One of the key features of the superior biological value tree planting material production system is the direct involvement of institutions and scientific researchers in the production process, especially in the stages of breeding and biotechnology. Thus, the integration of science with the production process becomes evident and necessary, with the optimal form of organization being the scientific and production association (Babuc, p.51). In a market economy, the activity of the association is based on partnership principles, established through mutually beneficial contracts between partners, with the board of directors and owners serving as the supreme coordinators of the activity.

4. Conclusions

In conclusion, the fruit sector in the Republic of Moldova is undergoing a crucial period of transformation. Superintensive technologies represent the future of fruit growing in the country, offering a unique opportunity to increase productivity and meet the demands of the international market. However, for this sector to become competitive in the long term, the modernization of the nursery production sector is essential. Only through investments in modern nurseries and the adoption of best agrotechnical practices can the Republic of Moldova become a significant global player in the apple industry.

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THE IMPACT OF NEGATIVE INTEREST RATES: FOUR MAIN LESSONS LEARNED

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Abstract: *The European Central Bank's (ECB) adoption of a negative interest rate policy (NIRP) marked a pivotal moment in modern monetary policy. Implemented in June 2014 in response to the financial instability caused by the 2008 global financial crisis and the subsequent European sovereign debt crisis, NIRP aimed to stimulate credit supply and guide inflation back towards the ECB's medium-term target of "below, but close to 2%." Alongside extensive bond purchase programs and long-term refinancing operations, NIRP became a central part of the ECB's expansionary monetary policy strategy. However, the gradual exit from this unconventional policy has raised critical questions about the lessons learned from NIRP and its potential future use as a targeted monetary tool. This paper systematically reviews the effects of NIRP on banks, businesses, households, and capital markets, assessing whether the ECB's initial objectives were achieved. Additionally, it focuses on the unique institutional role of the ECB as the central bank of a currency union with 20 member states, each with diverse fiscal frameworks. The complexity of the Eurozone's monetary system introduces challenges that differentiate the ECB from other central banks, such as the Federal Reserve or the Bank of Japan, significantly affecting the efficacy of negative interest rates. The aim of this paper is to synthesize insights from the past decade of NIRP implementation and propose how this instrument could be deployed more effectively in future phases of expansive monetary policy. Emphasis is placed on minimizing potential adverse effects, such as financial instability and excessive strain on the banking sector, while enhancing the tool's effectiveness in achieving its goals.*

Key-words*: negative interest rate policy (NIRP), monetary policy, Eurozone.*
JEL Classification*: E43, E52, E58, E63.*

1. Introduction

The introduction of the negative interest rate policy by the European Central Bank (ECB) marked an unprecedented turning point in the history of modern monetary policy. In response to the ongoing economic turmoil triggered by the global financial crisis in 2008 and the subsequent European sovereign debt crisis, the ECB was forced to significantly expand its traditional monetary policy instruments. In addition to extensive bond purchase programs and long-term refinancing operations, the ECB introduced the deposit rate for commercial banks into negative territory for the first time in June 2014. This measure was intended to stimulate greater lending, bring inflation back towards the medium-term target of "below, but close to, 2%" and combat deflationary tendencies. The negative interest rate policy, which was expanded several times in the following years, was thus an essential part of the ECB's expansionary monetary policy strategy.

The ECB has now found a way out of this unconventional policy. Interest rates have been gradually raised from negative territory and the economic framework in the euro area has stabilized. This development provides cause for critical reflection: the question of what lessons can be learned from the period of negative interest rate policy is of great importance for the future design of monetary policy measures. In particular, the question arises as to what extent negative interest rates can be used as a targeted monetary policy instrument in the future and what conditions must be met in order to maximize their effectiveness.

This paper aims to systematically review the experiences with the ECB's negative interest rate policy and to draw conclusions for the future use of this instrument. It examines the effects that negative interest rates have had on banks, companies, households and the capital markets and the extent to which the ECB's original objectives have been achieved. In

addition, the focus is on the specific role of the ECB as the central bank of a currency area with 20 member states and different fiscal policy frameworks. This institutional peculiarity of the ECB leads to additional challenges compared to other central banks, such as the Federal Reserve or the Bank of Japan, and has a significant impact on the effectiveness of negative interest rates.

The aim of this work is to systematize the findings of recent years and to derive suggestions on how negative interest rates can be used more effectively in future phases of expansionary monetary policy. This could help to increase the effectiveness of this instrument while minimizing possible undesirable side effects, such as a threat to financial stability or an excessive burden on the banking sector.

Overview of monetary policy instruments of the European Central Bank

The European Central Bank (ECB) has a range of monetary policy instruments at its disposal to achieve its primary objectives, in particular to ensure price stability in the euro area. These instruments are divided into standard instruments and special or unconventional instruments. First, we will look at the standard instruments that are traditionally used to implement monetary policy and are aimed at controlling short-term interest rates, providing liquidity to the banking sector and controlling the money supply.

Standard monetary policy instruments

a. The three key interest rates of the ECB

The key monetary policy rates are the ECB's main tool for influencing conditions on the financial markets and thus ultimately economic growth and inflation. There are three main key interest rates:

i. Interest rate on main refinancing operations (MRO)

This interest rate is the ECB's main reference interest rate and determines the cost at which commercial banks can refinance themselves with the ECB for a period of one week. The main refinancing operations are the primary source of liquidity for commercial banks. Changes in the MRO rate have a direct impact on short-term interest rates in the euro area and thus indirectly influence lending and savings behaviour.

ii. Deposit facility rate

This rate indicates the interest rate at which commercial banks can park short-term excess liquidity overnight with the ECB. It represents the lower bound for short-term interest rates in the money markets, as banks would otherwise invest their excess reserves with other banks at a lower interest rate. By introducing a negative deposit rate in 2014, the ECB tried to encourage banks to pass on excess liquidity to the real economy in the form of loans instead of keeping it with the central bank.

iii. Marginal lending facility rate

This rate indicates the rate at which commercial banks can obtain liquidity from the ECB overnight if they experience unexpected liquidity shortages. The marginal lending facility rate is usually higher than the main refinancing rate and thus represents the upper limit for short-term money market rates.

b. Open market operations

Open market operations are an essential tool for managing liquidity in the banking system. The ECB conducts these operations mainly through reverse transactions (repos), in

which securities are exchanged for liquidity. These operations are carried out through weekly and monthly refinancing operations, with the main refinancing operations (MRO) and longer-term refinancing operations (LTRO) being the most important. By adjusting the size and terms of these operations, the ECB can influence the liquidity situation in the banking system and thus control short-term interest rates. In addition, the ECB also uses structural open market operations to adjust the longer-term liquidity situation and fine-tuning operations to balance out short-term liquidity fluctuations.

c. Standing facilities

The ECB's standing facilities include the deposit facility and the marginal lending facility (already described above). These instruments offer commercial banks the opportunity to obtain liquidity or invest excess liquidity at any time. They serve to limit short-term money market rates and provide banks with clear guidance on the maximum cost of short-term refinancing and the minimum return on excess liquidity.

d. Maintenance of minimum reserves

Another important standard instrument of the ECB is the minimum reserve requirement. Commercial banks in the euro area are required to deposit a certain percentage of their deposits as minimum reserves with their national central banks. These minimum reserves help to stabilize money market interest rates and provide the ECB with an instrument for managing liquidity in the banking system. By adjusting the minimum reserve ratio, the ECB can influence the available liquidity and thus also control lending and the money supply.

The combination of these standard instruments enables the ECB to control short-term money market interest rates, regulate the liquidity situation in the financial system and thus indirectly influence inflation, economic growth and financial stability in the euro area.

Special monetary policy instruments

In addition to the standard instruments, the European Central Bank (ECB) has been using a number of unconventional instruments since the global financial crisis to ensure monetary policy transmission and stability in the euro area. These special instruments have been used in particular in phases of extreme economic instability and low interest rates to achieve the desired effects on inflation and economic growth.

a. Asset Purchase Programs (APP)

The ECB's asset purchase programs involve the purchase of various financial assets in order to increase liquidity in the banking system and lower long-term interest rates. These programs are part of the so-called quantitative easing (QE), which expands the money supply in an unconventional way when conventional interest rate policy reaches its limits. The main components of the APP are:

- Public Sector Purchase Program (PSPP): purchases of government bonds and other public debt securities.
- Corporate Sector Purchase Programme (CSPP): Purchases of corporate bonds to reduce the financing costs of the private sector.
- Covered Bond Purchase Programme (CBPP): Purchases of covered bonds from banks.
- Asset-Backed Securities Purchase Programme (ABSPP): Purchases of asset-backed securities.

The aim of these programmes is to reduce the interest rate level of long-term bonds, promote lending and thus stimulate economic activity and inflation in the euro area.

b. Unlimited Bond Purchases (Outright Monetary Transactions, OMT)

The Outright Monetary Transactions (OMT) are an instrument that the ECB introduced in 2012 to combat the fragmentation of the financial markets in the euro area and to ensure that monetary policy is uniformly effective in all member states. As part of the OMT programme, the ECB announced that it would purchase unlimited government bonds from member states on the secondary market under certain conditions.

OMT was developed specifically in response to the sovereign debt crisis to prevent individual member states from being excluded from the capital markets due to rising risk premiums on their bonds. The condition for the use of OMT is that the country in question accepts an EU stabilization program (e.g. the ESM) and commits to structural reforms.

c. Transmission Protection Instrument (TPI)

The Transmission Protection Instrument (TPI) is a new instrument introduced by the ECB in July 2022. It is intended to ensure that monetary policy transmission, i.e. the effectiveness of monetary policy measures, functions smoothly in all member states of the euro area. TPI allows the ECB to specifically purchase bonds from individual countries in order to prevent the rise in yields caused by market turbulence or speculation and not justified by fundamental economic factors.

The TPI is particularly important in a currency area such as the euro area, where member states have different fiscal frameworks and risk premiums. It is designed to prevent differences in financing costs between countries from undermining the effectiveness of the common monetary policy.

d. Indications of Future Interest Rate Policy (Forward Guidance)

Forward guidance is a monetary policy communication strategy in which the ECB provides indications of the future course of interest rate policy. This is usually done by making clear statements about the conditions under which key interest rates could be raised or lowered, as well as the expected duration of current interest rate levels.

Forward guidance has been increasingly used, particularly after the global financial crisis in 2008, to manage market participants' expectations and strengthen the impact of monetary policy even when key interest rates were already close to zero or negative. This strategy helps to reduce uncertainty in financial markets and allows the ECB to strengthen monetary policy transmission by building confidence in the stability of future interest rates.

e. Longer-Term Refinancing Operations (LTRO)

The Longer-Term Refinancing Operations (LTRO) are refinancing operations in which the ECB provides liquidity to commercial banks for a longer period than the weekly main refinancing operations. These instruments are used primarily in times of liquidity shortages to stabilize the banking sector and support lending to the real economy.
A special form of this instrument is the Targeted Longer-Term Refinancing Operations (TLTRO), which have been introduced since 2014 to specifically support lending to households and companies (with the exception of the real estate sector). Banks receive particularly favorable conditions in these programs if they achieve certain lending targets. The LTRO and TLTRO have strengthened lending in times of crisis and reduced banks' financing costs.

These unconventional monetary policy instruments significantly expand the ECB's arsenal and help to maintain the transmission of monetary policy even in extreme economic conditions. The targeted use of these instruments has helped to ensure the stability of the euro area and to support the economy through periods of low inflation and weak growth.

3. The effect of negative interest rates – Four Main Lessons Learned

The European Central Bank's (ECB) negative interest rate policy (NIRP) was one of the most unconventional monetary policy measures applied in modern economic history. It was designed to stimulate lending and bring inflation back to target levels in an economic environment characterized by low inflation, weak growth and the consequences of the global financial crisis. Despite some successes, important lessons have become clear in retrospect about the effectiveness and limitations of this policy. Four key lessons from the application of the negative interest rate policy are briefly summarized below.

1. Effectiveness of negative interest rates

Negative interest rates are effective as a monetary policy tool, but they mainly affect the short-term interest rate structure. The transmission to long-term interest rates is limited.

2. Need for yield curve steepening measures

To achieve a normal yield curve, measures at the long end, such as quantitative easing (QE), are needed. Negative interest rates alone are not sufficient for this.

3. Limited effectiveness of forward guidance

Forward guidance has not proven to be an effective tool. Markets often react only to a limited extent to communication announcements if these are not accompanied by further measures.

4. Fast exit from NIRP

The exit from a negative interest rate policy must be swift, especially when inflation is rising. A delayed exit increases the risk of a liquidity trap and uncontrolled inflation.

1st Lesson Learned: Effectiveness of negative interest rates

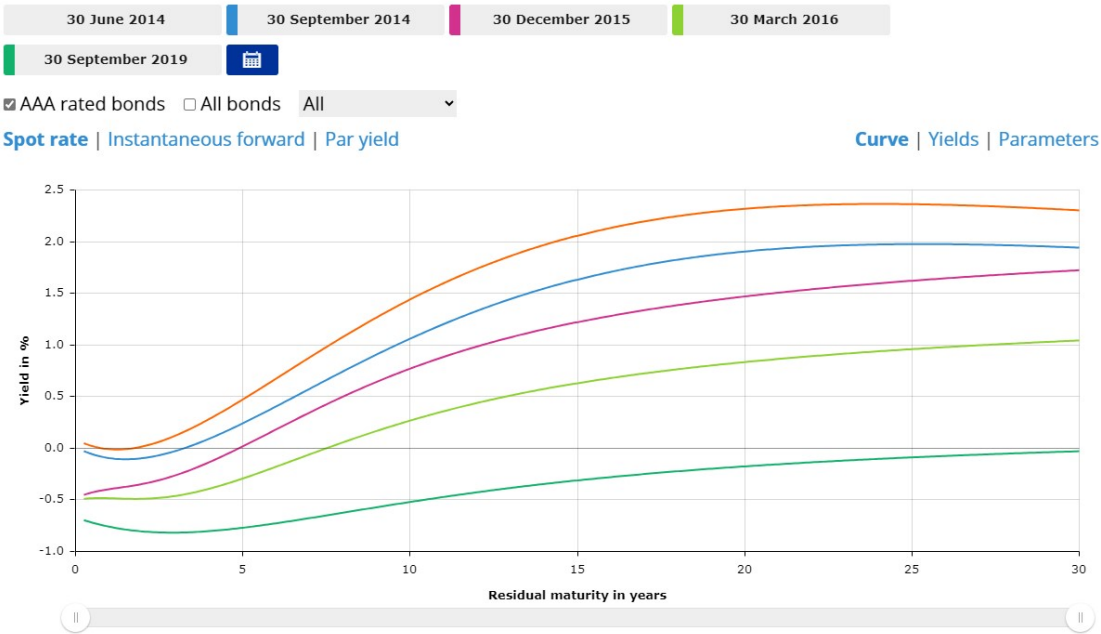
The introduction of negative interest rates as a monetary policy tool by central banks, in particular by the European Central Bank (ECB), was implemented in response to the challenges of the financial crisis and the subsequent economic stagnation. The basic assumption behind the negative interest rate policy is that it should encourage banks to lend more and save less money in order to stimulate economic activity. However, the analysis of the existing literature shows that this policy mainly affects the short-term interest rate structure, while its effect on long-term interest rates and general lending is limited.

Effect on short-term interest rates

Eggertsson et al.'s (2020) research argues that negative interest rates initially effectively penetrate short-term interest rates, but quickly lose effectiveness once deposit rates hit a lower bound (DLB). This DLB arises because banks are under pressure to pass negative rates on to their customers, but often do not do so in order not to lose the customer base. Once rates fall close to or below zero, many banks are unable to continue to lower their deposit rates as this could cause customers to withdraw their money. This results in the transmission of negative rates to bank deposits and thus to lending rates being greatly dampened.

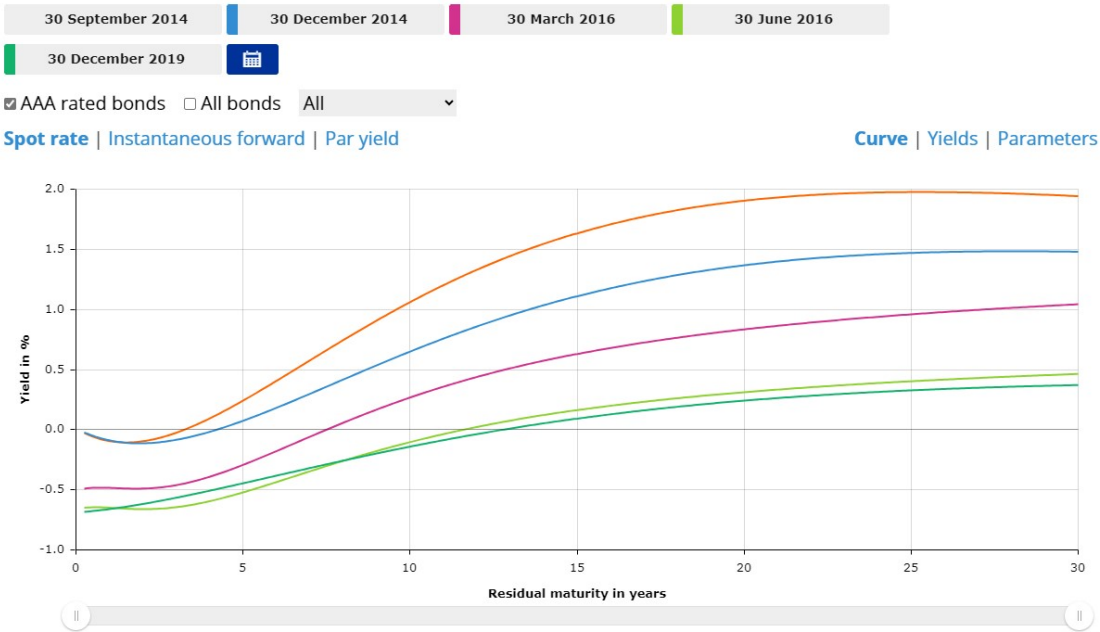
The Boucinha and Burlon (2020) study underscores these points by showing that banks that rely heavily on deposits show a weaker response to rate cuts. This dependence not only affects banks' ability to lend but also their overall profitability, which in turn can lead to more restrictive lending policies. In addition, it is found that communication and expectations about future monetary policy also play a crucial role in transmitting interest rate changes.

Figure 1: Yield curves at the moment ECB lowers deposit facility rate



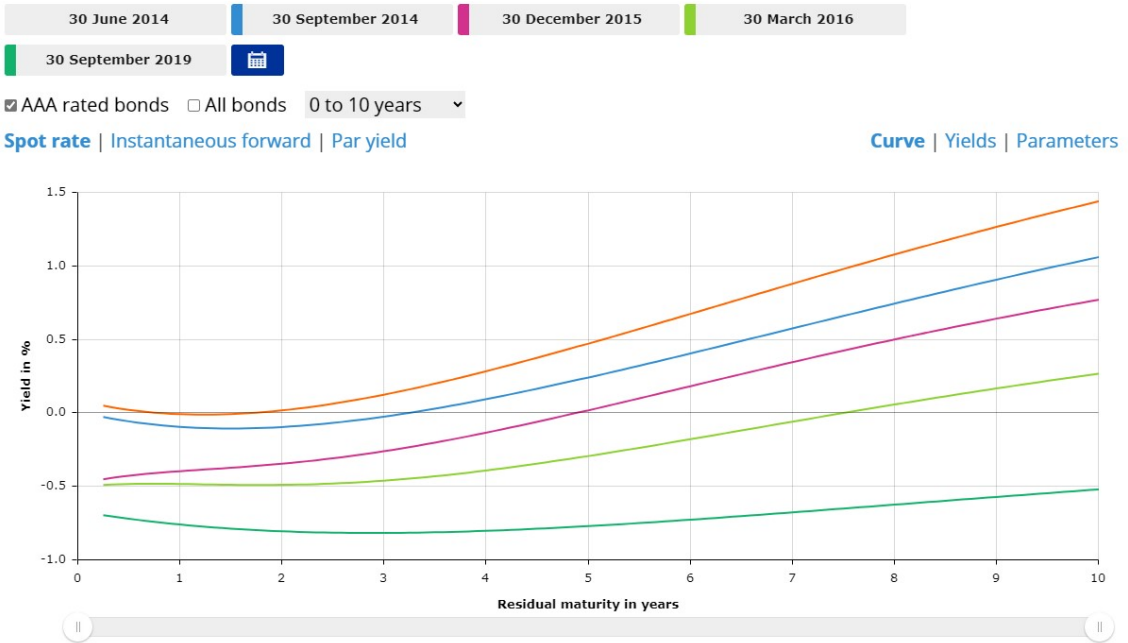
Dashed lines indicate the spot rate based on all government bonds; solid lines on AAA-rated bonds only.

Figure 2: Yield curves 3 months after ECB lowers deposit facility rate



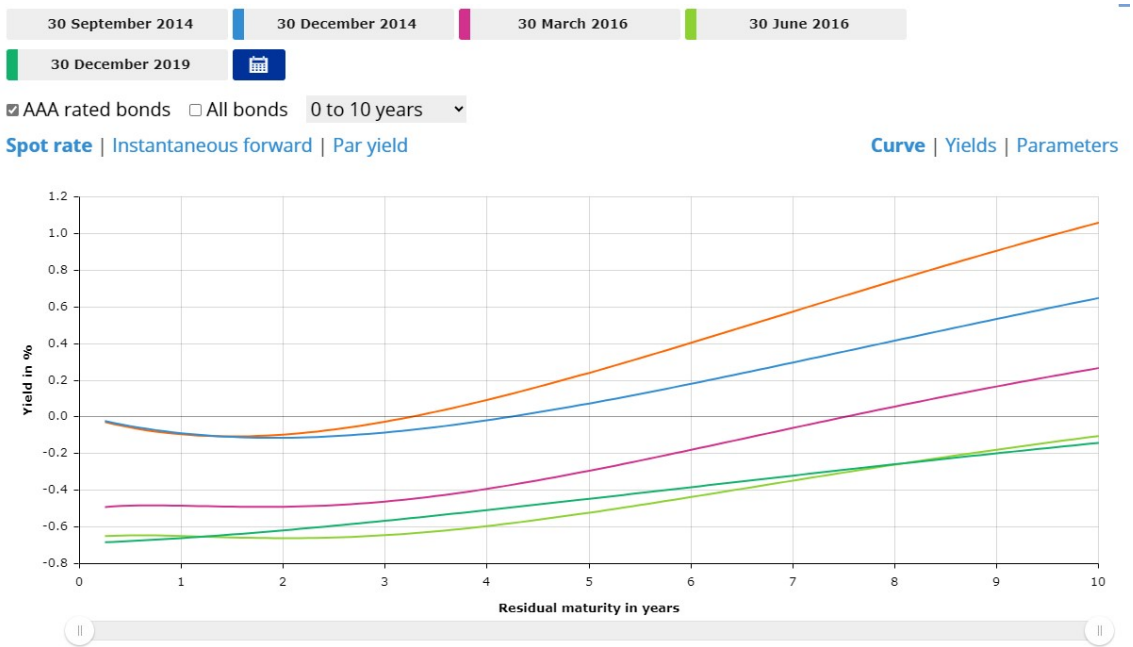
Dashed lines indicate the spot rate based on all government bonds; solid lines on AAA-rated bonds only.

Figure 3: Yield curves at the moment ECB lowers deposit facility rate; Focus on short and medium term interest rates



Dashed lines indicate the spot rate based on all government bonds; solid lines on AAA-rated bonds only.

Figure 4: Yield curves 3 months after ECB lowers deposit facility rate; Focus on short and medium term interst rates



Dashed lines indicate the spot rate based on all government bonds; solid lines on AAA-rated bonds only.

Long-term impacts and the need for additional measures

In order to achieve a normal yield curve and effectively stimulate the economy, it is necessary to actively influence the long end of the interest rate structure as well. This is often achieved through quantitative easing (QE) measures. In recent years, the ECB has introduced several QE programs to lower long-term interest rates and support the economy. The literature suggests that such measures can have significant effects on the steepness of the yield curve.

The research of Bernanke (2020) provides valuable insights into the effectiveness of QE programs. He argues that QE not only lowers long-term interest rates directly, but also influences market participants' expectations via signals. If investors expect the central bank to keep interest rates low while QE programs are running, they are more willing to invest in riskier assets, which in turn stimulates economic activity.

In a detailed analysis, Vayanos and Vila (2021) show that the effectiveness of QE depends primarily on how bond purchases are structured. If purchases are concentrated on long-term bonds, they can influence long-term yields much more effectively than if purchases are evenly spread across different maturities. This targeted strategy helps not only to steepen the yield curve but also to stabilize it, which is crucial for long-term planning of companies and investors.

In summary, the literature shows that while negative interest rates as a monetary policy tool effectively influence short-term interest rates, the transmission to long-term interest rates and lending is severely limited. The dampening of the effect of negative interest rates is caused by the DLB and the structure of bank financing. To steepen the yield curve and achieve more comprehensive economic stimulation, additional measures such as quantitative easing and a clear communication strategy from central banks are needed. These measures are crucial to influence long-term interest rates and create an environment that promotes sustainable economic recovery.

2nd Lesson Learned: Need for yield curve steepening

The steepness of the yield curve plays a crucial role in monetary policy as it reflects market expectations regarding future interest rates and economic activity. A flat or inverted curve can indicate economic weakness, while a steeper curve indicates a healthy expansion of the economy. Steeperating the yield curve and thus achieving a normalized yield curve requires targeted action at the long end of the yield curve. A significant tool used by central banks, including the European Central Bank (ECB), is quantitative easing (QE). These central bank purchases of long-term bonds have proven to be effective in influencing the yield curve.

Quantitative easing as a tool to influence long-term interest rates

The ECB's introduction of QE was part of a broader program to lower long-term interest rates while supporting economic growth. The measures were aimed at increasing liquidity in the banking sector and stimulating lending. A study by Altavilla, Carboni and Motto (2015) shows that the ECB's bond purchases had a significant and sustained effect on asset prices, in particular by reducing long-term interest rates, which led to a flattening of short-term and an increase in long-term interest rates. This reduction in long-term interest rates was crucial for reducing borrowing costs and promoting investment in the Eurozone (Altavilla, Carboni and Motto, 2015).

In addition to the direct effects on interest rates, the QE policy also influenced the expectations of market participants. This reinforced the effect of the policy by making participants expect the ECB to maintain low interest rates in the long term. In this context, Ihrig et al. (2018) describes that the ECB's purchases caused a significant decline in long-term

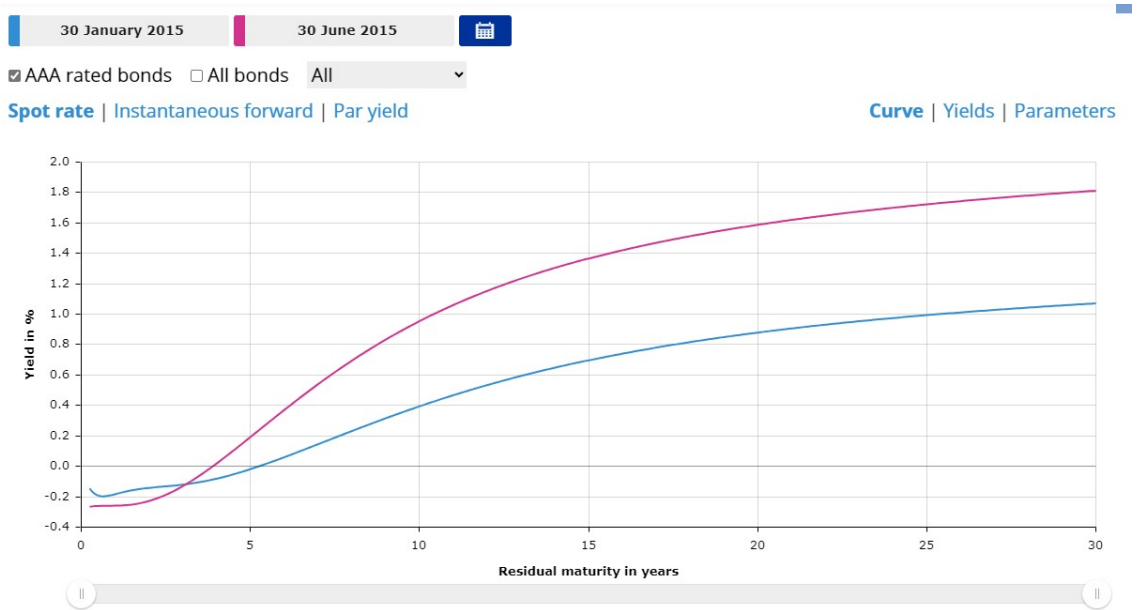
yields while stabilizing short-term interest rates. This led to a steepening of the yield curve and a normalization of the term structure (Ihrig et al., 2018).

Impact on the yield curve of long-term bond purchases

The ECB's targeted purchases of government bonds and other securities contributed significantly to the steepening of the yield curve. Bernanke (2020) highlights that these measures have a similar effect on the market environment as traditional interest rate cuts, but with the added benefit of stabilizing long-term asset prices. This stabilization is crucial because it provides investors with more security and thus generates greater demand for long-term assets. At the same time, the reduction in short-term interest rates allows for a higher spread between short- and long-term interest rates, resulting in a steeper yield curve (Bernanke, 2020).

The study by Eser et al. (2019) also shows that the ECB's various quantitative easing programs, in particular the purchase of long-term bonds, have significantly reduced long-term interest rates. These measures helped to provide investors with incentives to make long-term investments because expected future interest rates were more stable and lower. Through these effects, the ECB was able to successfully steepen the yield curve, which in turn boosted confidence in the economic recovery (Eser et al., 2019).

Figure 5: Yield curves, Focus on the period Jan 2015 – Dec 2016, when the largest volumes of OMT and APP were subscribed



Dashed lines indicate the spot rate based on all government bonds; solid lines on AAA-rated bonds only.

Figure 6: Yield curves, 6 months later: Prove that the impact of OMT and APP Programs have worked

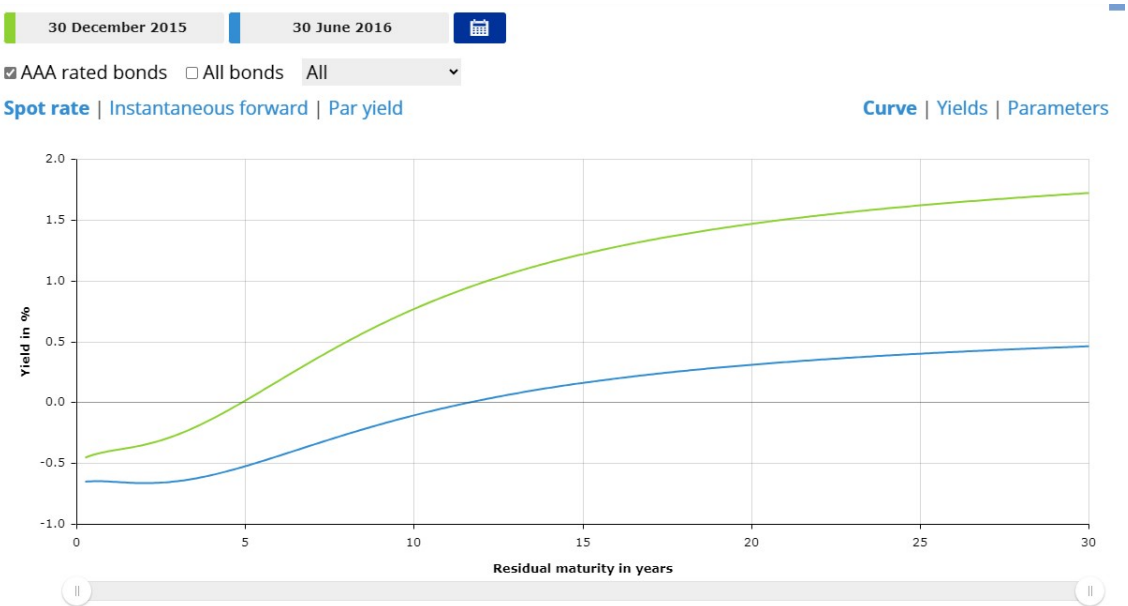
Dashed lines indicate the spot rate based on all government bonds; solid lines on AAA-rated bonds only.

Yield Curve Control (YCC) and other instruments

In addition to quantitative easing, the ECB has also explored strategies to directly control the yield curve (Yield Curve Control, YCC). This strategy, first introduced by the Bank of Japan, involves the targeted purchase of long-term bonds to achieve certain yield levels. Ihrig et al. (2018) argue that this method affects the entire interest rate structure, especially in a low interest rate environment where traditional monetary policy measures are less effective. The YCC policy has shown in Japan to provide an effective way to control long-term interest rates and thus boost confidence in future economic developments (Ihrig et al., 2018).

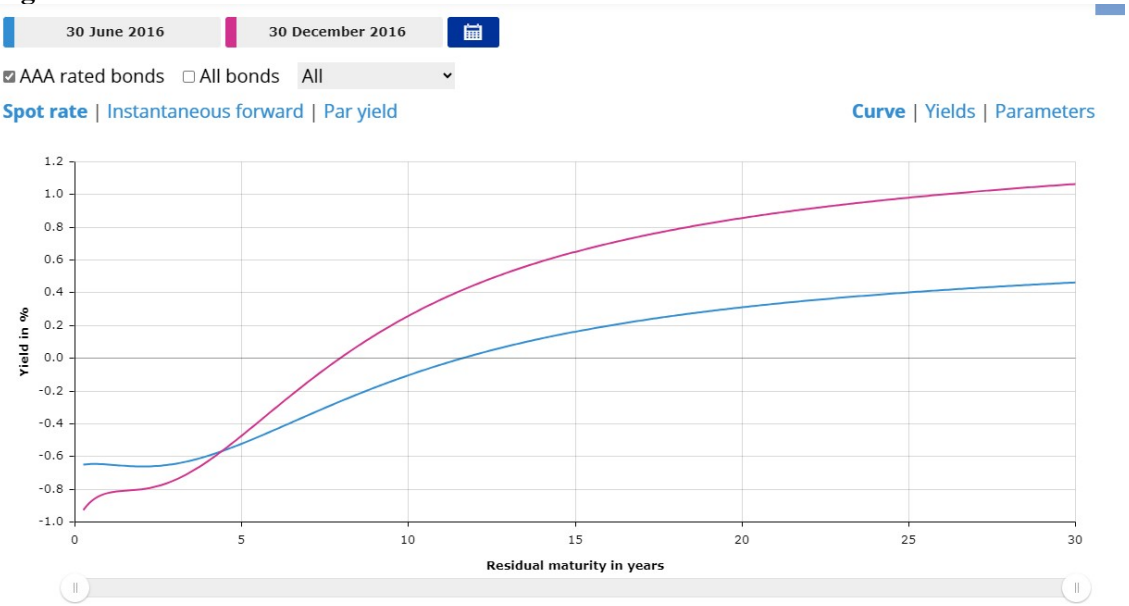
In summary, the ECB's quantitative easing measures and similar instruments, such as yield curve control, have a significant impact on the steepness of the yield curve. The ECB's targeted purchases of long-term bonds lowered long-term interest rates, which in turn led to a steepening of the curve. These measures have proven effective in stabilising the economy and bolstering investor confidence in the long-term outlook. Without these measures, the eurozone would have faced a persistently flat or inverted euro area economy.

Figure 7: Times of extreme flattening of yield curve: DFR lowered and APP + OMT are restricted as well



Dashed lines indicate the spot rate based on all government bonds; solid lines on AAA-rated bonds only.

Figure 8: Point of Time of countermeasures



Dashed lines indicate the spot rate based on all government bonds; solid lines on AAA-rated bonds only.

Figure 9: Result: Yield curve becomes steeper again

Dashed lines indicate the spot rate based on all government bonds; solid lines on AAA-rated bonds only.

The ECB's Outright Monetary Transactions (OMT) and Asset Purchase Programme (APP) measures have proven effective in influencing the yield curve in the euro area. Both programmes aim to lower long-term interest rates and thus ease credit conditions. The charts clearly demonstrate this. OMT works primarily by announcing unlimited bond purchases, which signals to market participants that the ECB is determined to stabilise bond yields in crisis-hit countries. This reduces risk and flattens the curve, especially for longer-term bonds. APP focuses on large-scale bond purchases that increase demand for government and corporate bonds and thereby lower long-term interest rates. This has a direct effect on the steepness of the yield curve, especially in the longer-term area, by pushing down bond yields. Both programmes therefore contribute to flattening the yield curve, especially in the longer-term maturities.

3rd Lesson Learned: Limited effectiveness of forward guidance

Forward guidance, i.e. the communication of future monetary policy intentions by central banks, is often seen as a tool to manage the expectations of markets and economic participants. This policy aims to reduce uncertainty and provide monetary stimulus by influencing long-term interest rates without having to immediately change short-term policy rates. However, there is growing evidence to suggest that the effectiveness of forward guidance cannot be clearly demonstrated, especially in the context of the European Central Bank (ECB).

Temporal analysis of ECB communication

Eisenschmidt and Smets (2018) emphasize that the ECB has regularly used forward guidance to influence the expectations of market participants since the financial crisis. However, they show that the effects of this communication are difficult to measure because forward guidance was often used in conjunction with other monetary policy measures such as bond purchases or

interest rate cuts. It is therefore difficult to isolate what contribution forward guidance actually makes to monetary easing (Eisenschmidt and Smets, 2018).

De Fiore and Tristani (2018) also examine the combination of forward guidance and unconventional measures such as asset purchases and conclude that the ECB's forward guidance did not have the expected effects in some phases. They argue that market participants did not always fully trust the ECB's announcements and forward guidance is often only perceived as credible when it is supported by tangible measures such as interest rate cuts or quantitative easing programs (De Fiore and Tristani, 2018).

Limitations and challenges of forward guidance

Johnson et al. (2020) of the Bank of Canada show in their comprehensive analysis that forward guidance is less effective in small open economies such as Canada and the Eurozone when markets are already heavily focused on interest rate cuts and other monetary measures. In a low interest rate environment, forward guidance is often unable to provide additional stimulus, as market participants already expect interest rates to remain low for a longer period of time (Johnson et al., 2020).

In addition, the literature by Eggertsson et al. (2019) and Williams (2011) raises the question of whether forward guidance can still play a relevant role in an environment where interest rates are already very low or the effective zero lower bound has been reached. They note that forward guidance is often fraught with uncertainty, as central banks find it difficult to predict future economic developments. In the euro area in particular, where several countries are facing different economic conditions, the effectiveness of forward guidance may be limited (Eggertsson et al., 2019; Williams, 2011).

Empirical evidence

An empirical study of the effects of forward guidance shows that markets reacted only marginally to certain ECB announcements. Leong and Howlett (2021) argue that many economic policy decisions, including forward guidance, are strongly influenced by political and institutional factors. They point out that the credibility and effectiveness of forward guidance often depends on the political stability and macroeconomic conditions in the respective countries (Leong and Howlett, 2021).

The effectiveness of the Forward Guidance (FG) instrument of the European Central Bank (ECB) has been analyzed from different perspectives in various studies. Based on the documents searched, the following conclusions can be drawn:

A key prerequisite for the effectiveness of forward guidance is the credibility of the central bank. If the public considers the central bank's announcements about the future interest rate to be credible, these statements can effectively influence market participants' expectations regarding inflation and interest rate developments. The analysis by Stephen Cole et al. (2023) shows that the credibility of the central bank plays a crucial role. If credibility is lacking, the effectiveness of forward guidance decreases significantly and the hoped-for control of expectations and macroeconomic variables remains largely ineffective. The credibility of many central banks, including the ECB, was a challenge, especially in the aftermath of the global financial crisis and during the COVID-19 crisis.

Tanja Linta (2024) highlights that internal disagreements within the ECB Governing Council can further weaken the credibility of forward guidance. Markets interpret such disagreements as a sign of a possible change in the direction of monetary policy, even if the ECB communicates the opposite. This leads to the hoped-for effects of forward guidance being reduced, especially during expansionary monetary policy phases. Unanimity in the

Council, on the other hand, does not significantly increase credibility, but disagreement has been shown to reduce it.

The work of Massimo Rostagno et al. (2021) shows that the effectiveness of forward guidance in combination with other unconventional measures such as the negative interest rate and the ECB's bond purchases (QE) is more difficult to assess. While forward guidance had some impact on the yield curve, the impact was more muted compared to the other tools (especially QE). Forward guidance mainly affected the medium-term part of the yield curve, whereas long-term interest rates were more strongly influenced by the bond purchases.

According to an analysis of the ECB report on monetary communication (2021), there is a close link between the clarity and consistency of communication and the effectiveness of forward guidance. It shows that clear communication that precisely manages market participants' expectations is crucial for the successful implementation of forward guidance. If the ECB's message is unclear or contradictory, this can affect the intended impact on market participants' inflation expectations and interest rate decisions.

Forward guidance can be an effective monetary policy tool to manage market and household expectations. However, its effectiveness depends heavily on the credibility of the central bank and the clarity of its communication. In combination with other unconventional measures, forward guidance can influence medium-term interest rates in particular. The actual effect has been weakened by internal disagreements in the ECB Governing Council, so the instrument has so far been ineffective.

In summary, forward guidance in the eurozone has not yet been proven to be a clearly effective instrument for influencing the interest rate structure and managing economic expectations. This is partly due to the complex economic situation in the eurozone and the frequent combinations with other monetary policy measures, which make it difficult to assess forward guidance in isolation. The analyses by Eisenschmidt and Smets (2018) and De Fiore and Tristani (2018) show that forward guidance without accompanying measures has often not achieved the expected effects.

4th Lesson Learned: Fast exit from NIRP

The experience with negative interest rate policies (NIRP) shows that the exit from such a monetary policy measure must be rapid to avoid the risk of a liquidity trap. A liquidity trap occurs when, despite extremely low or negative interest rates, aggregate demand is not stimulated because firms and consumers either stop borrowing or stop investing. Such a scenario can push the economy into long-term stagnation, as was the case in Japan for several decades. Japan has been in a low interest rate environment since the 1990s and has failed to achieve sustainable economic growth and stable inflation despite extensive monetary easing measures, including negative interest rates. This situation, also known as "Japanization," offers important lessons for the European Central Bank (ECB) and other central banks facing a similar monetary policy environment (Eggertsson et al., 2019).

The role of inflation in the euro area before the Russia-Ukraine crisis

Clear inflationary tendencies were already evident in the euro area before the Russia-Ukraine crisis. Inflation in the euro area rose to 5% as early as early 2022, due to structural problems and the influence of external factors such as the COVID-19 pandemic. Supply chain disruptions and an imbalance between supply and demand led to significant price pressures. This development clearly demonstrated that the ECB was operating in an inflationary environment before geopolitical tensions further fueled inflation (ECB Monetary Policy, 2023). The price shocks caused by rising energy and commodity prices exacerbated already

existing inflation and made it clear that the NIRP policy had reached its limits under these conditions. In such an environment, the continuation of NIRP poses a significant risk, as the low interest rate policy was intended to generate additional demand, but this is counterproductive in an environment of already rising prices.

External shocks and their amplifying effect

The Russia-Ukraine crisis further accelerated inflation in the euro area, in particular through sharp increases in energy prices. These shocks reinforced the structural inflationary tendencies that were already visible before the crisis. The ECB was faced with a new situation in which inflationary pressures were not only driven by demand stimulation, but also by supply-side shocks that are harder to control. Eisenschmidt and Smets (2018) argue that such shocks can further fuel inflation if the central bank does not act in time. In the euro area, rising energy costs led to an amplification of inflation, which was already above 5% (Eisenschmidt & Smets, 2018). In this situation, it is important that the ECB react quickly to the inflationary factors and end negative interest rates to prevent the economy from overheating.

The danger of a liquidity trap in the event of persistent inflation

The main danger of continuing NIRP in an inflationary environment is the risk of worsening inflation, which can lead to a liquidity trap. A liquidity trap occurs when interest rates are so low that they do not provide further incentives for investment or consumption because market participants have no expectations of a future rate hike and prefer to save instead. This was the case in Japan, where long-term low interest rates and deflation expectations meant that the central bank's monetary policy impulses were ineffective. Although the Bank of Japan had introduced extensive quantitative easing programs and negative interest rates, it failed to stimulate growth in a sustainable manner (Eggertsson et al., 2019).

In the euro area, the risk is that a persistent NIRP in an environment of inflation above 3% for a period of six months or more could threaten economic stability. The scenario in which inflation and negative interest rates coexist could further depress real interest rates and push inflation expectations up uncontrollably. This would not only reduce consumer purchasing power but also devalue savings, which could lead to a further decline in confidence in the ECB's monetary policy management (De Fiore & Tristani, 2018). In addition, there is a risk that the eurozone could fall into a liquidity trap like Japan, where low interest rates and high inflation coexist and the central bank's monetary policy tools are no longer effective in controlling inflation.

Rapid exit from NIRP as a preventive measure

Given the significant risks associated with a sustained NIRP policy in an inflationary environment, the exit from negative interest rates must be rapid. The rise in inflation in the Eurozone before the Russia-Ukraine crisis and the amplification by external shocks show that central bank hesitation could cause inflation to spiral out of control and put the central bank in a situation similar to Japan. Johnson et al. (2020) argue that a rapid exit from negative interest rates in an inflationary environment is necessary to maintain the credibility of monetary policy and achieve long-term inflation objectives (Johnson et al., 2020).

The lessons from the Japanese experience and current developments in the Eurozone show that a rapid exit from NIRP is essential in an environment of rising inflation. The rise in inflation before and after the Russia-Ukraine crisis and the risk of amplifying inflation from external shocks highlight the need to end negative interest rates quickly. Otherwise, there is a

risk of a liquidity trap that could further hamper economic growth and allow inflation to rise uncontrollably.

4. Summary and Conclusion

The European Central Bank's (ECB) negative interest rate policy (NIRP), introduced in 2014 as a response to the financial crisis and subsequent eurozone stagnation, was a highly unconventional monetary tool aimed at stimulating lending and returning inflation to target levels. Although the policy provided some initial benefits, several lessons have emerged that are crucial for future monetary policymaking. This summary highlights four key lessons learned from the ECB's experience with NIRP.

1. Effectiveness of Negative Interest Rates

Negative interest rates proved to be an effective tool, but primarily in influencing short-term interest rates. As shown in various studies, including Eggertsson et al. (2020), NIRP effectively reduced short-term rates and spurred lending. However, its impact on long-term interest rates was limited. The transmission of negative rates to long-term markets faced constraints due to the deposit rate lower bound (DLB), beyond which banks were unable to further reduce deposit rates without losing customer deposits. This limited the broader effectiveness of NIRP in stimulating the economy over longer horizons (Eggertsson et al., 2020).

2. Need for Yield Curve Steepening Measures

A key lesson is that negative interest rates alone are insufficient to normalize the yield curve. To achieve a steeper yield curve, central banks need to implement additional measures targeting the long end of the interest rate structure. Quantitative easing (QE) programs were critical in influencing long-term rates by increasing liquidity and reducing borrowing costs across the eurozone. Studies, such as those by Altavilla et al. (2015) and Bernanke (2020), emphasize that QE significantly lowered long-term rates, helping to steepen the yield curve and improve market stability. This highlights the necessity of combining NIRP with asset purchase programs to achieve broader monetary objectives (Bernanke, 2020).

3. Limited Effectiveness of Forward Guidance

Forward guidance, intended to manage market expectations about future monetary policy, did not deliver the desired effects in the context of NIRP. Research by Eisenschmidt and Smets (2018) and De Fiore and Tristani (2018) showed that markets often reacted weakly to communication alone unless it was supported by concrete measures like QE or rate cuts. Forward guidance, without accompanying action, lacked credibility, especially when economic conditions in different eurozone countries varied significantly. This limited its ability to influence long-term interest rates and guide market expectations effectively (Eisenschmidt & Smets, 2018).

4. Urgency of a Fast Exit from NIRP

A rapid exit from NIRP is essential, particularly when inflation begins to rise. Delaying the exit risks trapping the economy in a liquidity trap, where low interest rates fail to stimulate demand and instead lead to stagnation. Japan’s experience with prolonged negative rates serves as a cautionary example of the dangers of a liquidity trap. The eurozone’s inflation, which had reached 5% even before the Russia-Ukraine crisis, demonstrated that negative rates became increasingly risky as inflationary pressures built up. Studies by Johnson et al. (2020) and Eggertsson et al. (2019) underscore the importance of

quickly normalizing rates to prevent uncontrolled inflation and maintain monetary policy effectiveness (Johnson et al., 2020).

The ECB's experience with NIRP offers valuable lessons for the future use of negative interest rates in monetary policy. While effective in influencing short-term rates, NIRP must be paired with long-term measures like QE to achieve broader economic stability. Additionally, forward guidance alone has limited power without supporting actions, and a timely exit from NIRP is crucial in preventing the economy from falling into a liquidity trap, especially in the context of rising inflation. These lessons should inform the ECB and other central banks when considering future applications of negative interest rate policies.

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CLASSIFICATION OF SOCIOECONOMIC SUPPORT MODELS FOR CHILDREN IN DIFFICULTY

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Abstract: *Children in difficulty represent a vulnerable group of population whose welfare relies heavily on the effective integration of economic, social, and educational support systems. Prior to modern welfare systems, the community traditionally assumed responsibility for vulnerable children's needs. Contemporary support systems have evolved along three main paradigms: child protection, family support, and community care, each emphasizing different balances of state involvement, community responsibility, and family autonomy. This paper analyzes various international models - Anglo-Saxon, Communitarian, Continental, Emergent, Mediterranean, Scandinavian, and Transitional - highlighting their distinctive characteristics, strengths, and limitations. It further explores how these models reflect specific economic structures, financing mechanisms, and social priorities, ranging from highly institutionalized and tax-funded frameworks in Scandinavian and Continental countries to decentralized, community-based approaches in developing and emerging economies. While Scandinavian and Continental models stand out for their universality and strong state involvement, they require substantial financial commitments. In contrast, the Anglo-Saxon, Communitarian, and Mediterranean models offer much more flexibility, but they often struggle with the equity and the consistent access. The Emergent and Transitional models, including Moldova's, highlight the importance of reform, innovation, and international cooperation in building resilient, inclusive child support systems. The study concludes by emphasizing the necessity for balanced support models combining efficiency, accessibility, and sustainability to ensure optimal outcomes for vulnerable children. The work 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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JEL Classification: *I31, I38, J13, H53.*

1. Introduction

The development of social and economic support systems for children in difficulty has evolved significantly over time. In the past, the care and protection of vulnerable children were primarily the responsibility of the community and extended family. Today, this role has expanded into structured systems that combine public and private services, aiming to provide all children with safe, stable, and nurturing environments that support their well-being and development. Modern child welfare systems operate under several paradigms, including child protection, family support, and community care. These approaches reflect different cultural, social, and political contexts, influencing how responsibilities are shared between the state, families, and communities. Support systems can also be categorized by their level of institutionalization—from institutional and semi-institutional care to non-institutional, community- and family-based alternatives. Globally, a variety of models have emerged, shaped by each country's economic structure, policy priorities, and available resources. These include liberal, community-oriented, continental, nordic, mediterranean, transitional, and emergent models, each with distinct characteristics, advantages, and challenges. The way these models are implemented reflects broader national strategies in social policy, particularly regarding equity, inclusion, and sustainability. This paper provides an overview of the main models of support for children in difficulty, examining their structural differences and policy orientations. By comparing these systems, the paper aims to highlight the importance of

adapting support mechanisms to specific national and local contexts, with the ultimate goal of promoting the rights and well-being of all children.

2. Paradigms of socioeconomic support of children in difficulty

Before the development of social and economic support systems for children in difficulty, the community in which they lived played this role. In order to implement the provisions of a modern support framework, it is necessary to have a child welfare system, which can be considered as a group of public and private services that are focused on providing all children with safe, permanent and stable environments that support their well-being.

There are three major paradigms according to which child support systems operate: child protection; family support; community care (Cameron & Freymond, 2006:5-6) These paradigms coexist in varying proportions within these systems. In the case of child protection systems, the state is the one that regulates social and moral arrangements, with an emphasis on individual rights and responsibilities. There is a clear division between the private and public domains that protect the confidentiality of the family. Intrusion into families by child protection authorities is allowed only when parents violate minimum standards for child care. The primary objective of child protection is to protect children from abuse in the home.

In family-oriented models of support, the state supports child and family welfare systems that reflect shared ideals about children, family and community. The principles of civil solidarity and, in some contexts, subsidiarity (local responsibility) are emphasized. Supporting the appropriate care of children is seen as a shared responsibility. Providing support for the development of parent-child relationships and caring for children are the primary objectives. Ideally, the emphasis is on reaching consensual agreements with families.

Community-based care models are practiced in many Aboriginal communities in different regions of the world. Connections to extended family, community, place and history are seen as integral to healthy individual identities. Ideally, community-based care is based on consultation with parents, extended family and the local community for the protection and care of children. An important role is given to keeping children in their families and communities. Respect for traditional indigenous values and procedures is an integral part of community-based care processes.

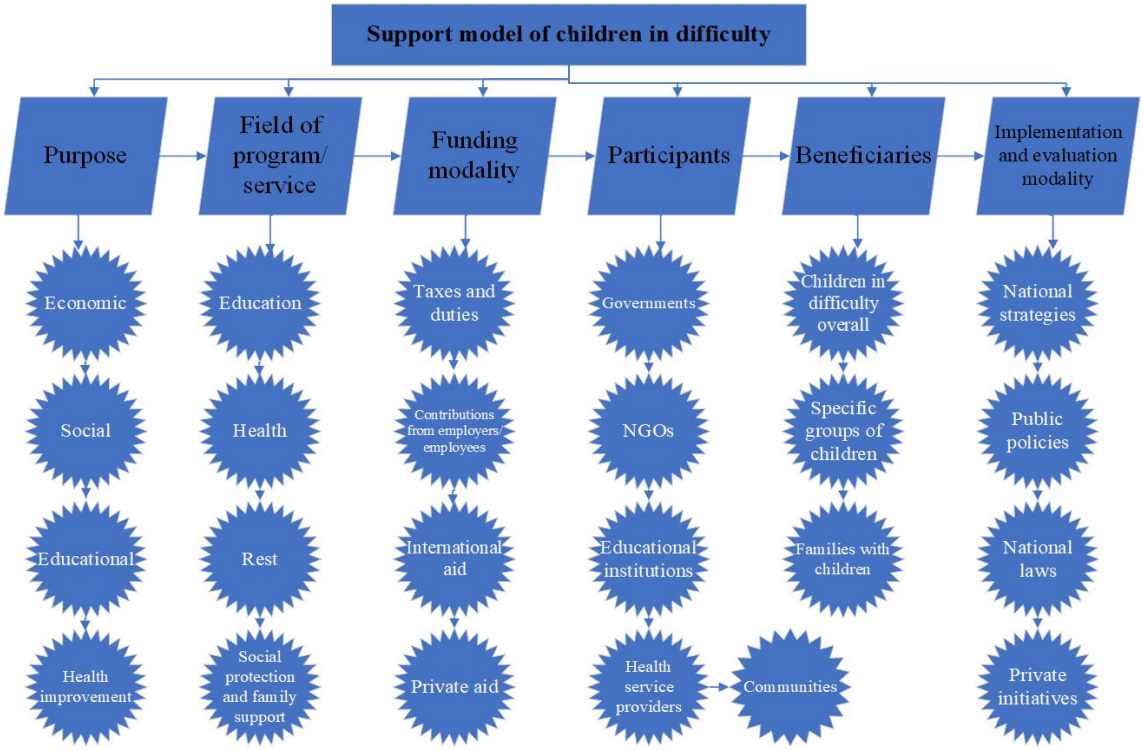

Figure 1. **Structure of a model for supporting children in difficulty**

Source: Developed by the author

A model for supporting children in need is a structured conceptual and operational framework that integrates economic, social, and educational objectives, with the aim of providing assistance, resources, and guidance to vulnerable children. This model is based on essential areas such as education, health, recreation, and social protection, using diverse financing mechanisms, including taxes and duties, employer and employee contributions, international aid, and private support. The implementation and evaluation of the model involves a network of institutional and community actors, including governments, nongovernmental organizations, educational institutions, health service providers, and local communities (***Figure 1***).

3. Support models of for children in difficulty

The models of support for children in difficulty are determined by the structure of the types of support systems implemented. The types of support systems can be classified according to the degree of institutionalization (the practice of placing children in institutional settings rather than in family or community settings): institutional, semi-institutional, non-institutional. Institutional types provide children with permanent support and supervision in specialized state or private facilities: placement centers, rehabilitation centers for minors. orphanages, boarding schools for children with special needs. Semi-institutional types are designed to provide a balance between institutional support and an environment that imitates the family atmosphere as closely as possible: community homes for children with special needs, family-type homes (homes structured to provide an experience closer to a family

environment), day centers with temporary residential support, transitional programs (to prepare adolescents for leaving the residential care system). Non-institutional types concern the integration of children into families or the community, avoiding institutionalization, providing an environment that favors the natural and healthy development of the child: adoption, foster care, guardianship, mentoring, sponsorship programs, community support programs, curatorship. The general trend in most countries is towards the deinstitutionalization of support for children in difficulty.

In relation to the structure of use of these types of support applied and the political, economic and social approaches within the countries, the following models of support for children in difficulty can be delimited: the Anglo-Saxon (liberal) model, the communitarian model, the continental model, the emergent model, the Mediterranean model, the Scandinavian (Nordic) model and the transitional model (***Table 1, Table 2***), which can be compared by their characteristics, advantages and disadvantages and according to a series of criteria: the level of state involvement, sources of funding, accessibility and coverage, efficiency of resource allocation, child-centred approach, community and family involvement, flexibility and adaptability, long-term impact on child development, integration with other social policies, equity and inclusion.

Table 1. Classification of models of support for children in difficulty, their characteristics, advantages and disadvantages

Model	Representative countries	Characteristics	Advantages	Disadvantages
Anglo-saxon (liberal)	Australia, Canada, Ireland, New Zealand, United Kingdom, United States	Orientation towards targeted rather than universal support; combination of public and private support; emphasis on individual responsibility and self-sufficiency.	Flexibilitate în politicile sociale, ce permite adaptarea rapidă la schimbări sociale și economice; promovarea inițiativei individuale și a responsabilității personale; costuri mai reduse pentru stat prin implicarea sectorului privat și a comunității.	Higher risk of social inequality and more limited access to services for low-income families; reliance on eligibility conditions that may exclude vulnerable people who do not meet strict criteria; high variability in quality and access to services between different regions or communities.
Communitarian	Brazil, Colombia, Ecuador, Bolivia, Peru, India, Indonesia, Philippines, Pakistan, Kenya, Nigeria, Uganda, Tanzania	High dependence on the community and traditional family structures; active participation of NGOs and local and international initiatives in providing services; flexibility and adaptability to local conditions.	Personalized approaches that take into account the specific needs of communities; encouraging community involvement and strengthening social ties; relatively low costs for the state.	High variability in the quality and availability of services between different communities; dependence on local and international resources may limit effectiveness in poor areas; lack of strict regulation which may lead to inequities and abuses.
Continental	Belgium, France, Japan, Germany, Netherlands, Austria, Luxembourg, Switzerland	Mix of universal and targeted benefits; social insurance system financed by contributions from employers and employees; active role of the state in regulating and financing social services.	Stability and predictability in service delivery; solid social protection, providing a level of security for citizens; relatively equal access to basic services, such as education and health.	Systems can be bureaucratic and rigid, with inefficiencies in administration; high costs for employers, possibly limiting job creation; frequent reforms may be necessary to respond to economic and demographic dynamics.
Emergent	South Africa,	Rapidly growing economies	High potential for	Inequalities in access to

	Argentina, Chile, China, Ghana, Malaysia, Thailand, Vietnam, Ethiopia, Egypt, Morocco, Mexico	developing new infrastructure and social services; mix of private and government initiatives in providing social services; focus on modernizing social services and economic growth, often with international support.	innovation and adoption of new technologies applied in social services; investment and economic growth opportunities that can improve access to social services; ability to attract external funding for the development of infrastructure and social services.	services, between developed urban and rural areas; risk of prioritizing economic growth to the detriment of social protection; dependence on global economic cycles which can make social services vulnerable to economic fluctuations.
Mediterranean	Albania, Bosnia and Herzegovina, Greece, Italy, Portugal, Spain	Focus on reactive rather than proactive/preventive measures; limited funding and insufficient resources; high dependence on family networks (extended family)	Flexibility in managing local crises; strengthening family ties.	Inequality and limited access to services; overburdened systems during economic crises; lack of long-term investment in social infrastructure.
Scandinavian (Nordic)	Denmark, Finland, Iceland, Norway, Sweden	Universal and free or subsidized social and health services; inclusive and high-quality education system; system of progressive, relatively high taxes to finance social services.	High social equality and reduced economic disparities; high quality of life and general well-being; consistent investments in children and families, guaranteeing a good start in life for all citizens.	High taxes can be inhibitory to personal economic growth and private initiative; high costs can put pressure on the country's economy in times of economic crisis; potential to discourage competition and innovation in certain sectors.
Transitional	Bulgaria, Republic of Moldova, Poland, Romania, Baltic States, Hungary, Czech Republic, Slovakia, former Yugoslav countries	Reform from centralized systems to more decentralized services; focus on partial privatization and diversification of service providers; fight against the legacy of inefficiencies and systemic corruption.	Opportunities for modernization and efficiency; potential for diversification and improvement of services offered; openness to more democratic and transparent practices.	Periods of instability and uncertainty in transition; risks of fragmentation of services and inequality in access to resources; difficulties in overcoming bureaucratic inertia and resistance to change.

Source: Systematized by the author

Table 2. **Comparing the models of support for children in difficulty**

	Anglo-saxon (liberal)	**Communitarian**	**Continental**	**Emergent**	**Mediterranean**	**Scandinavian (Nordic)**	**Transitional**
Level of state involvement	Minimal; relies on private sector and NGOs	Moderate; strong community and NGO involvement	High; combination of universal and targeted benefits	Evolving; mix of private and state initiatives	Low; family networks play a crucial role	Very high; fully state-funded and universal	In transition; moving from a centralized to a mixed system
Sources of funding	Private funding with some public support	Funding from local community and NGOs, state support varies	Social insurance and government funding	Mix of funding from state, private sector and international donors	Limited state support, largely family-based	High taxation finances universal services	Mix of public funding and foreign aid
Accessibility and coverage	Selective, based on eligibility criteria	Community-based, varies by location	Broad coverage through social insurance	Urban areas are better served than rural areas	Limited access, often fragmented	Universal, equal access for all citizens	Varies significantly, still in the process of developing inclusive policies

Efficiency of resource allocation	Efficient, but with unequal access	Flexible, but with inconsistent service quality	Predictable, but bureaucratic	Growing, but faces structural inefficiencies	Weak, often reactive rather than proactive	Highly efficient due to strong governance	Inefficient due to transition challenges
Child-centered approach	Moderate; encourages self-reliance	High; adapted to community needs	Strong; focuses on safety and development	Developing; varies depending on policy	Weak; children often rely on extended family	Very strong; prioritizes child well-being	Improving; adapts to international standards
Community and family involvement	Low; emphasis on individual responsibility	Very high; community-based support	Moderate; combination of state and community efforts	Moderate; public-private partnerships	High; predominantly family-based support	Moderate; strong state intervention limits the role of the family	Variable; in transition to mixed involvement
Flexibility and adaptability	High; market-oriented and adaptable	High; community-based flexibility	Low; slow reforms due to bureaucracy	Moderate; still developing to implement effective reforms	Low; reactive rather than proactive	Low; stable but slow to change	Moderate; varies depending on the pace of transition
Long-term impact on child development	Varies; higher for wealthier families	Strong where community support is active	High; provides long-term stability	Uncertain; potential for significant improvements	Weak; instability limits long-term benefits	Very high; consistent investment in children	Evolving; results vary by region
Integration with other social policies	Limited; fragmented policies	Moderate; linked to local development efforts	Strong; coordinated social assistance policies	Developing; improving integration	Weak; minimal state involvement	Very strong; holistic social policies	Variable; efforts to align with EU and international standards
Equity and inclusion	Low; income-based disparities	Variable; depends on community resources	Moderate; social security provides a balance	Growing, but still faces inequalities	Low; limited access for disadvantaged groups	Very high; strong focus on equality	Developing; disparities still persist

Source: Systematized by the author

The main differences between these models are significant. The Anglo-Saxon model is based on the private sector and NGOs, with selective access and predominantly private funding, but generates high social inequalities. The community model emphasizes community and NGO support, with moderate state involvement and high flexibility, but the services offered vary greatly in quality. The continental model is a balanced one, characterized by a mix of universal and targeted benefits, social security financing, but also excessive bureaucracy that affects efficiency. The emergent model is evolving and combines private and state initiatives, but faces significant territorial inequalities, especially between urban and rural areas. The Mediterranean model is based on family networks, with low state intervention and limited accessibility to social services, which makes it more vulnerable in times of crisis. The Scandinavian model offers universal services with high efficiency, being financed by high taxes and having a strong focus on equality and child well-being, but high costs can be an obstacle. The transitional model, present in countries such as Moldova, is trying to modernize, but faces challenges related to efficiency and inclusion. In terms of the advantages and disadvantages of these models, the Scandinavian and continental ones offer the most inclusive and efficient services, but involve high costs and a high degree of bureaucracy. The Anglo-Saxon and Communitarian models are more flexible, but unequal access and social risks can create long-term problems. The Mediterranean and emergent models feature fragmented services, limited state involvement, and social policies that are reactive rather than

preventive. The transitional model faces administrative inefficiency and significant regional disparities. Developed countries tend to apply more universal and efficient models, but which involve high costs, while countries in transition or emergent need to improve the integration of social policies and increase the efficiency of resource allocation. The ideal model should be balanced, combining accessibility, sustainability and efficiency to ensure real support for children in difficulty.

In countries that have adopted the Anglo-Saxon model, state support for the social sector covers the minimum necessary (Tuzubekova, Kazizova, Sarybaeva & Zhunussova, 2022). Although the provision of residential care is substantially more expensive than family placements, in countries that base support for children in difficulty on this model, such as the United Kingdom, the prevalence of for-profit residential care for children is increasing, especially in regions where fewer children are placed, with more negative than positive impacts (excessive profit-making, poorer quality of care, greater placement instability, placement further from home (Sen, Ulybina & Holmes, 2024), but without the support of these providers, institutions would be underfunded. In countries such as the United States and the United Kingdom, social policies are focused on minimal state intervention, promoting private sector involvement and individual responsibility. The state provides targeted support through social assistance programs such as Temporary Assistance for Needy Families (TANF) in the United States, but private charities and community-based organizations also play a significant role. The implementation of this model in policy often results in decentralized services with varying quality and access, depending on local resources. In countries where a strong support system for children in need has not been formed, such as African countries, this primary support role is played by the collective responsibility of the community through local initiatives (educational, health), NGOs and local partnerships, and faith-based communities. Community-based support measures are low-cost measures that have reasonable effectiveness on the Sustainable Development Goals related to health, economy, and equality in relation to adolescents with HIV/AIDS (Fatti et al., 2018). In countries such as Brazil and the Philippines, social policies integrate community-based approaches with the active participation of NGOs and international organizations. These policies are less formalized and rely largely on local initiatives. For example, in Brazil, the Bolsa Família program combines government and community efforts to provide conditional cash transfers aimed at reducing poverty while engaging local support systems. Implementing this model often means that services are flexible but can be unevenly distributed, depending on the strength of local networks. One country with an emerging model for supporting children in need is China. The COVID-19 pandemic has exposed systemic problems in the child protection system based on this model: the lack of a specialized child protection law, fragmented systems, and unclear responsibilities among authorities. There is also a major shortage of staff. With over 7 million orphaned children, it is “a real challenge for the 620,000 child protection directors and 48,000 child protection supervisors across the country” (Zhao, Zhu & Hämäläinen, 2021:13). Chinese local authorities have established a three-tiered prevention and protection system, called the Child Guidance Model, and have collaborated with social organizations to deliver services, but there is a need for better legislation, better institutional frameworks, and increased professional training in child welfare to ensure effective long-term protection and the sustainability of the system. There is a need to improve online services during crises and better integrate children’s perspectives into service development. In emerging economies such as China and South Africa, social policies are

evolving rapidly, often with a combination of government-led initiatives and international support. In China, social policy implementation includes efforts to strengthen the child welfare system through pilot programs and partnerships with NGOs. Implementing this model in policy often involves balancing modernization with addressing systemic gaps.

Countries with a Mediterranean support model have a low level of social protection, with most social support provided through family means and private charity, and support for family, maternity, education receiving limited funding (e.g. 1% of GDP in Italy) (Tuzubekova, Kazizova, Sarybaeva & Zhunussova, 2022), however, there is a diversity of support instruments. In Italy, support for children in difficulty comprises a range of services and programmes: Servizi Sociali (Social Services) - local social service departments that provide assistance and support to families and children in difficulty, including those at risk of abuse or neglect; Centri per le Famiglie (Centres for Families) that provide resources, advice and activities to support families and promote child well-being. Among the financial assistance instruments applied, we can mention: Assegno di Natalità (Baby Bonus) - financial benefit for low- and middle-income families upon the birth or adoption of a child; Assegno di Sostegno (Family Allowance) - benefit for families with dependent children who meet certain income criteria. For educational support there is Sostegno Scolastico (Educational Support for Children with Disabilities) - specialized support in schools to accommodate children with disabilities, ensuring their right to education; programs for early childhood education - nurseries and kindergartens (asili nido and scuole dell'infanzia) often subsidized for families in difficulty. Among the early intervention programs there are services for young children with developmental delays or disabilities, focusing on early diagnosis and intervention. Mensa Scolastica is nutritional support through subsidized or free school meals to ensure that children receive adequate nutrition, especially in low-income families. Families facing legal issues affecting children, including disputes over custody and protection of rights, can obtain legal aid. Italy also offers support for immigrant and refugee children - integration programs: language courses and cultural integration programs to help immigrant and refugee children adapt to their new environment. Specific educational support - personalized educational programs to help with language barriers and integration into the Italian school system. Tutela Minori (Child Protection) encompasses programs and interventions designed to protect children from abuse and neglect, including emergency removal from homes if necessary. In countries such as Italy and Greece, social policies are reactive, with limited state intervention and a strong reliance on family support and private charity. For example, social services in Italy often focus on immediate needs through local agencies, but these services are underfunded and vary greatly from region to region. The implementation of this policy model is marked by minimal state involvement and significant disparities in service provision.

In countries with a continental model, the system of support for children in difficulty is comprehensive and multifaceted. A good example of a country in this regard is Germany. A peculiarity of its system is that for the early detection of stress in the family, potential risks to the well-being of children in their first years of life, the concept of “Early Help” (Ni & Klammer, 2023) is applied, which involves the provision of personalized preventive assistance at local and regional levels, determined by needs, to parents from the beginning of pregnancy and throughout the child’s first years, up to the age of three. Networks of early care centers cover 99.5% of German municipalities. Early intervention centers (Frühförderstellen) provide support for both infants and young children with developmental delays or disabilities. The German Youth Welfare Office (Jugendamt) plays a key role in protecting and ensuring

the well-being of children. It offers a wide range of services, from advice and support for families in need to interventions in cases of child safety risks. Financial assistance includes: child benefit (Kindergeld) - a monthly payment provided to all families with children, regardless of income, to help cover the basic costs of raising children; child supplement (Kinderzuschlag) - additional financial support for low-income families already receiving child benefit, designed to prevent children from needing state social benefits; education and participation packages - financial support for children from low-income families to participate in school trips, lunch programs, music lessons, sports clubs and tutoring. Children can benefit from all-day schools and programs (Ganztagsschulen) that offer additional educational opportunities, meals and supervision beyond regular school hours, especially beneficial for children from disadvantaged backgrounds. All German children have universal health insurance. Children in difficulty may be placed in legal guardianship, parental care, or in a family or residential setting. Integration and support for migrant children takes place through specific programmes designed to help migrant and refugee children integrate into the school system and receive language support and other integration aids. Psychological counselling and therapeutic services are available for children who have suffered trauma or have behavioural problems, helping to address psychological needs and supporting children's mental health. In Germany and France, social policies are characterised by a combination of universal benefits and targeted interventions, supported by a strong social security system. These countries implement comprehensive welfare programmes that are highly regulated by the state. The implementation of this model in policy ensures a high level of social security, but can also lead to bureaucratic inefficiencies.

A prominent representative of the Scandinavian model of support for children in need is Norway, which offers them a comprehensive and robust support system, reflecting its commitment to child welfare and social equity. Barnevernet, the main government agency responsible for child welfare in Norway, offers a wide range of services, such as monitoring children's living conditions, providing family counselling and, if necessary, placing children in foster care or residential care. In Norway, additional educational support is provided for children with disabilities or learning difficulties and free access to primary and secondary education. Mental health services are available to support children experiencing emotional or psychological problems. Families in need receive additional support through various social benefits, such as child benefit (barnetrygd), paid to all families with children up to a certain age to help cover basic expenses. There are also additional benefits for families with children on low incomes. Schools in Norway typically provide a healthy lunch for all students, ensuring that nutritional needs are met during the school day. There are also programs to support families who struggle to provide adequate nutrition at home. Norwegian law includes strong protections for children's rights, guided by the principles of the UN Convention on the Rights of the Child. This includes ensuring that children's voices are heard in legal matters affecting them, especially in cases involving custody or family disputes. About 35% of services for children in need were provided in the child's home, including services such as guidance, home treatment, home counseling, supervision and training in parent management, 25% of children were in out-of-home care, most of them in foster care, and about 7% of children were in residential care (Kojan, 2011). In Norway and Sweden, social policies are highly developed, with a strong emphasis on universal welfare and equity. These countries implement extensive social safety nets, including universal child benefits and comprehensive

health care and education services. The realization of this policy model is seen in the integration of services, with a strong emphasis on preventive care and early intervention.

One of the countries where the transitional model is applied is Bulgaria, where various governmental and non-governmental organizations provide targeted support to children in difficulty. Financial assistance includes the monthly child allowance - a benefit available to families on an income basis, aimed at supporting the basic needs of children. The amount varies, with additional supplements for children with disabilities. Programs for children with disabilities include specialized educational staff and resource support in mainstream schools, ensuring that children with special educational needs receive appropriate education and support. Early intervention programs are addressed to children from birth to 7 years of age and provide therapeutic services to those with developmental risks, delays or disabilities. There are also specific programs for the integration of Roma children into society, providing access to quality education, healthcare and social services to overcome systemic barriers. Family support services are essential for integrating vulnerable families, especially from the Roma community, into the education, health and social systems, while safeguarding the best interests of children. Professionals providing these services play a crucial role in addressing issues such as child abandonment and neglect and in implementing child protection policies at the local level. Challenges include insufficient resources, unequal access to services for Roma children, and the need for integrated services and active parental involvement. A study (Kotzeva & Mineva, 2023) shows that service providers often struggle to convince families to use available services and overcome parental reluctance. Effective communication and engagement with marginalized families can be improved by forming partnerships based on respect and understanding, avoiding patronizing attitudes, and employing community mediators familiar with the cultural and linguistic contexts of the families they serve. In transition economies such as Moldova, social policies are evolving as these countries move from centralized systems to more decentralized and diversified models. In Moldova, for example, the focus is on reforming the child protection system by integrating community-based services and reducing reliance on institutional care. Achieving this model in policy involves balancing new approaches with overcoming the legacy of past systemic inefficiencies and challenges. This approach aims to provide more appropriate and personalized support for vulnerable children, tailored to the specific needs of each child and the community to which they belong. Particular emphasis was placed on the creation and expansion of social services at the local level, responding to the needs of children in difficulty. These services include day care centers, foster care, and other forms of support. A major objective was to reduce the number of children placed in large residential institutions, promoting instead foster care and other forms of alternative care that provide a more family-like environment. The adoption of the National Program for Child Protection for 2022-2026 highlights the commitment of the authorities to align national policies with international standards on children's rights and to implement concrete measures for their protection. Collaboration with NGOs and international organizations has been essential in providing services, training staff, and developing pilot programs aimed at improving the child protection system. Training and professional development programs have been carried out for social workers and other specialists involved in child protection, to ensure effective intervention based on best practices. These efforts reflect the commitment of the Republic of Moldova to create a more efficient child protection system, focused on the individual needs of children and oriented towards their integration into the community.

5. Conclusions

The classification of socioeconomic support models for children in difficulty reveals a wide spectrum of paradigms, ranging from highly institutionalized and state-driven systems to decentralized, community-based approaches. Each model reflects distinct economic realities, cultural values, and governance structures, influencing not only the delivery of services but also the well-being and future development of vulnerable children. While Scandinavian and Continental models stand out for their universality and strong state involvement, they require substantial financial commitments. In contrast, Anglo-Saxon, Communitarian, and Mediterranean models offer more flexibility but often struggle with equity and consistent access. Emergent and Transitional models, including Moldova's, highlight the importance of reform, innovation, and international cooperation in building resilient, inclusive child support systems. No single model is universally optimal; rather, effective support for children in difficulty must be contextually tailored, integrating principles of accessibility, sustainability, and child-centeredness. A balanced, adaptive approach, combining state responsibility with community participation, remains essential for securing every child's right to a safe, nurturing, and empowering environment.

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ASSESSING THE EFFICIENCY OF PUBLIC INSTITUTIONS IN THE EU THROUGH DEA: EFFECTS OF STRATEGIC PLANNING AND THE COVID-19 PANDEMIC

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Abstract: *In light of economic and social challenges intensified by the COVID-19 pandemic, which has strained the capacity of public institutions to effectively meet citizens' needs, this paper presents a comprehensive examination of the efficiency of public institutions across the 27 member states of the European Union (EU) for the years 2019 and 2020, utilizing Data Envelopment Analysis methodology. The study investigates the relationship between resource allocation for strategic planning initiatives and the corresponding measurable outcomes, aiming to clarify how effectively public institutions convert investments in planning into significant achievements that provide tangible benefits for citizens and enhance public service delivery efficiency. Conducting a robust analysis requires careful assessment of both input and output variables, allowing for precise characterization of institutional performance. The selected input indicators—including governmental expenditures explicitly designated for strategic planning and the Corruption Perception Index—provide insight into resources directed toward strategic efforts and the effectiveness of systemic safeguards against corruption while fostering ethical responsibility. The analysis reveals complex interactions among these variables, underscoring the importance of thorough evaluation in shaping public policy. Additionally, the paper advocates for the integration of adaptive strategic planning and increased citizen participation to improve institutional effectiveness.*

Key words: *efficiency, public institutions, strategic planning, data envelopment analysis (DEA).*
JEL classification: *C61, H50.*

1. Introduction

In the wake of the unprecedented challenges presented by the COVID-19 pandemic, the efficiency of public institutions has emerged as a critical area of focus for policymakers and researchers alike. The pandemic has highlighted the critical need for effective governance and resource management, as countries navigated through unprecedented public health crises and their economic ramifications. This research seeks to investigate the influence of strategic planning practices on the performance of public institutions in Romania and the other 26 member states of the European Union, which together exemplify a diverse array of governance frameworks and resource allocation strategies.

The study employs Data Envelopment Analysis (DEA) as its primary methodological framework. By applying the Bunker, Charnes, and Cooper (BCC) Variable Returns to Scale (VRS) model within DEA, the research aims to accurately assess how public institutions operate under conditions of variable returns to scale, facilitating a comprehensive evaluation of their efficiency and effectiveness in resource utilization. This methodological approach allows for an exploration of the unique performance dynamics present within the public sector, yielding valuable insights for potential reforms and improvements in governance.

The efficiency scores for these countries are informed by several pertinent input indicators: government expenditures related to strategic planning, the Corruption Perception Index, and the number of personnel in public administration. These factors are crucial for assessing governmental capacity during crises, particularly in challenging situations like a global pandemic.

On the output side, this analysis will evaluate indicators of government effectiveness, the Voice and Accountability Index, and citizen satisfaction with public services. These metrics provide insights into the responsiveness of public institutions to citizen needs during emergencies.

Data for this study have been meticulously gathered for the years 2019 and 2020, providing a comparative framework for assessing the impact of the pandemic on efficiency scores. The primary sources of data include Eurostat, the Organisation for Economic Co-operation and Development (OECD), the World Bank, Transparency International, and Eurobarometer. The analysis is conducted utilizing RStudio, with visual representations of the findings generated in Excel.

The innovative aspect of this research lies in its methodological approach to examining public sector efficiency across EU member states, particularly in relation to strategic expenditures and governance outcomes that have been shaped by the COVID-19 pandemic. This analysis provides valuable insights into how governmental efficiency can fluctuate in response to external circumstances, such as the COVID-19 pandemic, and underscores the importance of adaptability and proactivity in state leadership.

2. Literature review

Strategic planning is an essential activity in organizations, aligning their objectives with future environments, and has undergone significant evolution in definitions and approaches over the past three decades. Defined variably in the literature, strategic planning can be viewed as a systematic process aimed at envisioning a desired future and transforming that vision into defined objectives, as noted by Drucker (1974) and Porter (1985). Mintzberg et al. (1998) highlight that traditional strategic planning processes, which struggle in uncertain environments like the COVID-19 pandemic, similarly pose challenges in the public sector, revealing the need for more adaptive and flexible approaches to effectively address rapidly changing circumstances and enhance service delivery. Such uncertainty necessitates the adoption of flexible strategies, as emphasized by Ringland (1998), to effectively navigate challenges and achieve organizational goals. Schoemaker et al. (2018) reinforces the idea that a systematic approach to strategic planning, which incorporates scenario planning and real-time strategy adjustments based on emerging information, is crucial for organizations to respond adeptly to environmental changes.

Strategic planning and efficiency analysis within the public sector are fundamental components of effective public institution management, with Data Envelopment Analysis serving a pivotal role in the evaluation of performance and enhancement of services delivered to citizens. DEA facilitates the comparison of inputs with outputs, enabling the identification of efficient units and fostering the adoption of best practices (Afonso and Fernandes, 2008; Asghar et al. 2009). Gordon (2005) assert that establishing a synergistic relationship between strategic planning and performance control is vital for ongoing adaptation to the challenges faced in the public sector. Furthermore, Cooper et al. (2011) provide an in-depth examination of DEA and associated software tools for assessing efficiency, while Kalb (2010) underscores the obstacles encountered in performance evaluation and the critical need for resource optimization. Consequently, a systematic approach to strategic planning not only advances the long-term viability of public institutions but also promotes the responsible stewardship of public resources (Bryson, 2024).

The DEA method ranks essential management approaches, allowing for the evaluation of efficiency based on selected inputs and outputs, with its initial implementation occurring in 1978 as a CCR model by Charnes, Cooper, and Rhodes (Charnes et al., 1978). Subsequently, in 1984, Bunker, Charnes, and Cooper introduced the BCC variant, which assesses the efficiency of decision-making units under the assumption of variable returns to scale, emphasizing the importance of incorporating decision makers' preferences into DEA models (Omrani et al., 2020).

The foundational DEA models include the CRR input and output-oriented model, the BCC input and output-oriented model, and the SBM model, alongside modified-variate models such as the Malmquist index and the super-efficiency model. The super-efficiency model functions on the principle of treating efficient units as zero, effectively excluding them from the ensemble to establish a new efficiency frontier from which performance is assessed, enabling robust comparisons among organizational units, or decision-making units (DMUs), each utilizing a specific number of inputs to produce defined outputs (Charnes et al., 1978; Cova-Alonso et al., 2021).

In terms of model orientation, three distinct variants are recognized: input-oriented, output-oriented, and non-oriented models. Each orientation serves a specific analytical purpose, allowing for a tailored evaluation of efficiency based on the unique characteristics of decision-making units. For instance, input-oriented models focus on minimizing inputs while maintaining output levels, whereas output-oriented models aim to maximize outputs given a certain level of inputs (Po et al., 2009). The non-oriented approach, on the other hand, offers a balanced perspective, providing insights into efficiency without a specific directional bias (Krejnus et al., 2023).

The significance and objectives of the analysis are contingent upon the selected inputs and outputs within the model, which must be logically interconnected, reflecting the essence of a production process. To guarantee the appropriate selection of these inputs and outputs, correlation analysis is employed, serving as a critical tool for establishing valid relationships between them (Data Envelopment Analysis, 2024; Laerd Statistics, 2024).

In addition to ensuring the appropriate correlation coefficient among the right-hand side variables, it is essential to align the inputs and outputs with the number of decision-making units (DMUs). A common guideline stipulates that the sum of inputs and outputs should not exceed one-third to one-fifth of the total number of DMUs. The correlation coefficient, which ranges from -1 to 1: a value of -1 signifies absolute inverse dependence, 0 denotes no linear dependence, and 1 indicates absolute direct dependence. In the context of DEA analysis, it is crucial that the correlation coefficient does not surpass 0.8 to avoid potential bias in efficiency results, with an ideal correlation coefficient falling between 0.3 and 0.8, validated at a significance level of 0.05 depending on the number of units analyzed (Šoltés, 2008).

The DEA analysis often entails complexity due to the extensive number of input and output variables involved; thus, utilizing a singular index for both inputs and outputs theoretically streamlines the model by reducing dimensionality and enhancing result interpretation, while the assignment of equal weights to each variable ensures fairness and transparency, ultimately facilitating a holistic assessment of overall efficiency without undue emphasis on individual variable performance.

The selection of the output-oriented BCC (Banker, Charnes, Cooper) VRS (Variable Returns to Scale) methodology is theoretically grounded in its capacity to accommodate variable scalability, recognizing that the relationship between inputs and outputs can differ

significantly based on the size and characteristics of the unit being analyzed; this flexibility is essential for accurately capturing the operational dynamics of diverse decision-making units (DMUs) within the public sector.

By employing standardized input and output indices, the BCC methodology not only simplifies the DEA analysis but also enhances the comprehensibility and interpretability of the results. Efficiency scores will range from 0 to 1, where values approaching 1 indicate optimal efficiency, thereby reflecting the unit's capacity to utilize its resources effectively in relation to its counterparts. This theoretical framework paves the way for identifying best practices and benchmarking performance across various public institutions, ultimately guiding policy decisions that aim to enhance overall effectiveness and responsiveness in public service delivery.

3. Data and methodology

The objective of this research is to assess the performance of public institutions in the 27 member states of the European Union during the years 2019 and 2020, utilizing the Data Envelopment Analysis methodology. This study aims to analyze the relationship between the resources allocated for strategic planning initiatives (input indicators) and the resulting performance outcomes of these institutions (output indicators). The findings will enhance our understanding of how public resources are utilized and their impact on institutional effectiveness, especially in the context of the challenges faced by EU member states following the COVID-19 pandemic.

The research is guided by the following questions:

1. *What role does strategic planning play in determining the performance of public institutions in relation to citizen satisfaction?*
2. *How has the COVID-19 pandemic impacted the performance scores of EU member states?*

The years 2019 and 2020 were selected for this analysis because they provide the most recent data published by reputable international organizations such as Eurostat, the World Bank, and Transparency International. The year 2019 was characterized by stability in both economic and political domains, allowing for a performance assessment of public institutions unmarred by external disruptions. In contrast, the year 2020 is critical for examining how these institutions responded to significant challenges presented by the COVID-19 pandemic. Data from 2020 sheds light on governmental measures, resource management efficiency, and institutional adaptability in crisis situations. By comparing the performance outcomes of 2019 and 2020, the study will illuminate trends in institutional effectiveness, identifying both achievements and areas that require enhancement.

To provide clarity and structure regarding the variables used in assessing public institution performance, these will be detailed in Table 1. This table will include descriptions for each variable, specifying their type (input or output), the data sources, the units of measurement, and their relevance to the research context.

Table 1. Variables used in the analysis.

Indicator	Unit of measurement	Abbreviation	Type of indicator	Data source	Relevance
Government expenditures	% of Gross Domestic Product	GEX	Input	Eurostat	Reflects investments in public services.
Expenditures on strategic planning	% of Government expenditures	ESP	Input	World Bank	Indicates the level of resource allocation for consultancy.
Number of employees in the public sector	Per 1,000 inhabitants	NE	Input	OECD	Measures human resource capacity in the public sector.
Corruption perception index (rescaled)	Score (1-10)	CPI	Input	Transparency International	Reflects the perceived level of corruption in public administration.
Government Effectiveness	Score (-2.5; 2.5)	GE	Output	World Bank	Evaluates the quality and efficiency of public services.
Control of corruption	Score (-2.5; 2.5)	CC	Output	World Governance Indicators	Reflects the capacity to control corruption.
Voice and accountability index	Score (-2.5; 2.5)	VAI	Output	World Governance Indicators	Indicates citizens' ability to influence political decisions.
Citizen satisfaction with public services	%	CS	Output	Eurobarometer	Reflects citizens' perceptions of public services.

Source: Author's proceedings.

Unlike parametric methods, DEA is non-parametric and does not impose restrictive assumptions on the relationships between inputs and outputs, allowing for flexibility given the multiple interdependencies influencing public sector efficiency. DEA supports a multidimensional analysis that integrates various inputs—such as government expenditures, employee numbers, and corruption perception—with outputs like governance quality and citizen satisfaction. Traditional statistical methods often fail to capture the complexity of these interactions. The BCC VRS model (Banker, Charnes, Cooper – Variable Returns to Scale) is utilized to account for efficiency variations according to the size and characteristics of the public sector in each member state. An output-oriented approach is chosen to evaluate how effectively member states maximize results from available resources since improving governance and other key inputs enhances public sector performance. The DEA analysis, involving 27 decision-making units (DMUs) and 8 variables (DMUs/variables ratio = 3.375),

yields robust and generalizable results, exceeding the recommended 3:1 threshold and minimizing the risk of overfitting. While current findings are satisfactory, a larger number of DMUs would improve precision and robustness. Correlation analysis between input and output variables is vital for clarifying relationships and optimizing the model structure, supported by heat maps for clear visual representation of interactions (Krejnus et al., 2023).

Table 2. Correlation coefficients for the years 2019 and 2020.

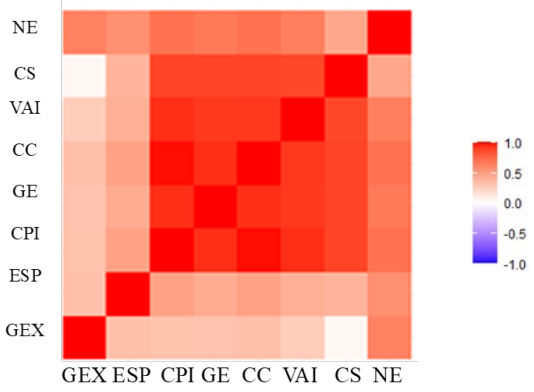
	2019							
	GEX	**ESP**	**NE**	**CPI**	**GE**	**CC**	**VAI**	**CS**
GEX	1	0.33	0.63	0.32	0.32	0.33	0.26	0.04
ESP	0.33	1	0.57	0.48	0.43	0.48	0.41	0.38
NE	0.63	0.57	1	0.70	0.67	0.70	0.65	0.46
CPI	0.32	0.48	0.70	1	0.94	0.99	0.94	0.88
GE	0.32	0.43	0.67	0.94	1	0.94	0.91	0.88
CC	0.33	0.48	0.70	0.99	0.94	1	0.91	0.88
VAI	0.26	0.41	0.65	0.94	0.91	0.91	1	0.87
CS	0.04	0.38	0.46	0.88	0.88	0.88	0.87	1
	2020							
	GEX	**ESP**	**NE**	**CPI**	**GE**	**CC**	**VAI**	**CS**
GEX	1	0.22	0.56	0.17	0.15	0.16	0.17	-0.10
ESP	0.22	1	0.56	0.45	0.42	0.49	0.43	0.34
NE	0.56	0.56	1	0.70	0.65	0.70	0.66	0.48
CPI	0.17	0.45	0.70	1	0.93	0.98	0.91	0.88
GE	0.15	0.42	0.65	0.93	1	0.92	0.90	0.90
CC	0.16	0.49	0.70	0.98	0.92	1	0.90	0.88
VAI	0.17	0.43	0.66	0.91	0.90	0.90	1	0.84
CS	-0.10	0.34	0.48	0.88	0.90	0.88	0.84	1

Source: Author's proceedings in RStudio.

Through the application of heat maps derived from the data presented in Table 2, this analysis enables the swift identification of significant correlations, which are crucial for clarifying the interpretation of direct or inverse relationships. Furthermore, by addressing complexity and alleviating multicollinearity issues, this method assists in prioritizing variables based on their impact on outputs, as elucidated by Wilks (2011) and Xu et al. (2018).

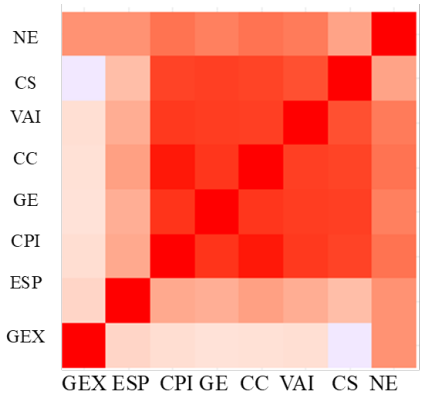
The use of heat maps for the correlation coefficient matrix—covering both 2019 (Figure 1) and 2020 (Figure 2)—elucidates the intricate relationships among the variables incorporated in the model, thereby facilitating informed, data-driven decision-making and enhancing both the effectiveness and interpretability of the model.

Figure 1. Heat map of the correlation coefficients for data collected in 2019.



Source: Author's proceedings in RStudio.

Figure 2. Heat map of the correlation coefficients for data collected in 2020.



Source: Author's proceedings in RStudio.

This correlation analysis provides robust justification for the selection of key indicators, including government expenditures (GEX and ESP), administrative size (NE), corruption perception (CPI), government efficiency (GE), control of corruption (CC), accountability of government (VAI), and citizen satisfaction with public services (CS), collectively yielding a comprehensive understanding of governmental performance and citizen engagement.

The strong positive correlations observed in 2019 between the Corruption Perception Index (CPI), government efficiency (GE), control of corruption (CC), and accountability of government (VAI) suggest an ideal scenario where a low perception of corruption is closely linked to effective governance and greater citizen engagement. This positive association reinforces the hypothesis that good governance contributes to reducing corruption and increasing civic satisfaction. In contrast, the weaker positive correlation noted between government expenditures (GEX) and the number of employees in the public sector (NE) indicates a potential connection between rising expenditures and an expanding civil service, warranting further analysis to determine whether it reflects efficient spending or merely budget expansion.

The weakening of positive correlations in 2020 indicates a possible deterioration of the situation, potentially implying a rise in perceived corruption or a decline in governmental efficiency and accountability. This shift requires examination to ascertain whether it reflects a changing reality or a statistical fluctuation. The slight negative correlation between government expenditures and citizen satisfaction (CS) is surprising and suggests inefficient resource allocation or a disconnect between governmental spending and citizen perceptions. The strong positive correlations between good governance and low corruption perception noted in 2019 diminished in 2020, likely due to the impacts of the COVID-19 pandemic.

Overall, the correlation analysis emphasizes the importance of variable selection in the model, providing a multidimensional perspective on the relationship between government expenditures, good governance, and citizen satisfaction. Although correlation does not imply causation, the analysis indicates that the selected variables are well-chosen to explain variations in governmental performance and public satisfaction.

The DEA analysis can become complex when utilizing a large number of input and output variables; therefore, employing a single index for both inputs and outputs significantly

simplifies the DEA model, reducing dimensionality and facilitating result interpretation. This approach, which assigns equal weights to each variable in calculating aggregate indexes, ensures fairness and transparency while avoiding subjectivity, allowing for a comprehensive assessment of overall efficiency without focusing on individual variable performance.

The choice of the output-oriented BCC (Banker, Charnes, Cooper) VRS (Variable Returns to Scale) methodology is theoretically justified, as it allows for variable scalability, recognizing that the relationship between inputs and outputs can vary based on the size of the unit being analyzed. Recognizing that the public system cannot be considered to be functioning at an optimal scale (Debnath and Shankar, 2014), this research paper employs the BCC VRS (Banker, Charnes, Cooper - Variable Returns to Scale) model to provide a nuanced analysis of efficiency. This choice is predicated on the understanding that public institutions often face inherent challenges that inhibit optimal performance, such as resource constraints, varying operational capacities, and external pressures.

By employing a standardized input and output index, this approach simplifies the DEA analysis, enabling a comprehensive assessment of public institutions' performance, with efficiency scores ranging from 0 to 1, where values closer to 1 indicate greater efficiency. In other words, this research effectively combines the standardized values of the identified variables into one input variable and one output variable, ensuring that each variable is given equal importance in their respective indices to provide a balanced representation within the analysis.

4. Results and discussions

Table 3 presents the relative efficiency scores calculated using the output-oriented BCC model for the years 2019 and 2020, reflecting the comparative performance of the analyzed countries in utilizing available resources and allowing for the identification of both top performers and trends in operational efficiency across the two periods.

Each unit with an efficiency score of 1 is considered 100% efficient, while countries with scores below 1 are classified as inefficient. The analysis identified five countries that achieved 100% efficiency in terms of citizen satisfaction as well as governmental quality for both years assessed, taking into account the resources utilized. These resources include strategic planning expenditures embedded in government budgets, as well as the size of administrative agencies.

Table 3. Efficiency scores obtained using the BCC VRS model.

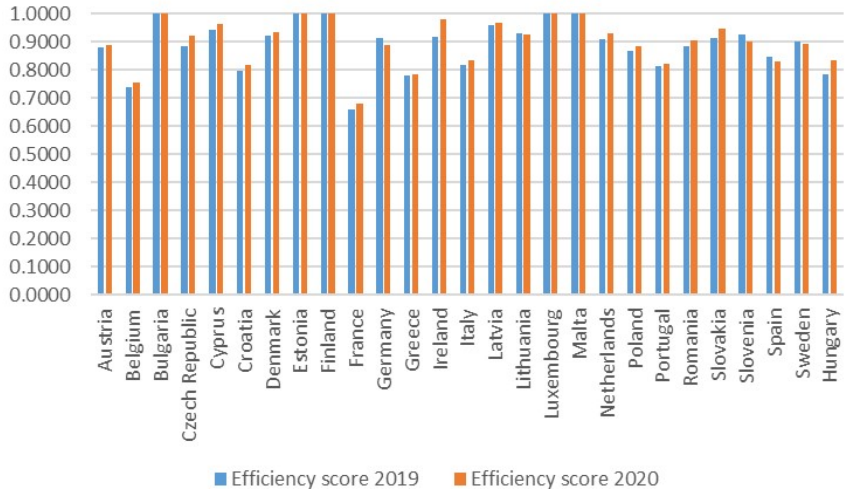
Country	2019		2020	
	Efficiency scores 2019	Ranking 2019	Efficiency scores 2020	Ranking 2020
Austria	0.8795	18	0.8896	17
Belgium	0.7394	26	0.7540	26
Bulgaria	1.0000	1	1.0000	1
Czech Republic	0.8851	16	0.9206	13
Cyprus	0.9445	7	0.9651	8
Croatia	0.7957	23	0.8177	24
Denmark	0.9209	10	0.9328	10
Estonia	1.0000	1	1.0000	1

Finland	1.0000	1	1.0000	1
France	0.6597	27	0.6788	27
Germany	0.9152	12	0.8877	18
Greece	0.7817	25	0.7855	25
Ireland	0.9181	11	0.9822	6
Italy	0.8187	21	0.8352	21
Latvia	0.9598	6	0.9673	7
Lithuania	0.9296	8	0.9267	12
Luxembourg	1.0000	1	1.0000	1
Malta	1.0000	1	1.0000	1
Netherlands	0.9116	14	0.9306	11
Poland	0.8667	19	0.8858	19
Portugal	0.8139	22	0.8216	23
Romania	0.8835	17	0.9058	14
Slovakia	0.9145	13	0.9484	9
Slovenia	0.9247	9	0.9014	15
Spain	0.8487	20	0.8324	22
Sweden	0.9006	15	0.8935	16
Hungary	0.7824	24	0.8356	20
Minimum	0.6597		0.6788	
Average	0.8887		0.8999	
Std. dev.	0.0868		0.0834	

Source: Author's proceedings in RStudio.

The countries that demonstrated efficiency in both analyzed years (Bulgaria, Estonia, Finland, Luxembourg, and Malta, each consistently achieving a score of 1) exemplify how effective governance and administrative efficiency are rooted in strategic public expenditures and a low corruption perception index. These factors have significantly contributed to high levels of citizen satisfaction with public services, positioning these states as exemplary models for others in the region (Mitu and Stanciu, 2023; Briguglio, 2024). The average efficiency of the 27 member states of the European Union in 2019 was approximately 89%, with a minimum of 66%, a score obtained by France. This variability in efficiency scores suggests a diversity in how each country manages its resources and prioritizes the needs of its citizens. In the following year, a slight increase in average efficiency was observed, reaching approximately 90%. However, France recorded a modest improvement in 2020, attaining a score of approximately 68%, as can be seen in Figure 3. This indicates challenges in governance and administrative efficiency in France that continue to affect citizen satisfaction with public services.

Figure 3. Histogram of efficiency scores for the years 2019 and 2020 for EU countries.



Source: Author's proceedings in Excel

This evolution can be partially explained by the influences generated by the COVID-19 pandemic, which had a significant impact on all countries. The health crisis forced governments to redirect resources and adopt swift measures in response to unprecedented challenges (Mathonsi, 2023). While some countries were able to adapt rapidly, maintaining high governance standards and ensuring citizen satisfaction, others, such as Germany, Slovenia, Spain, and Sweden, encountered difficulties in managing the crisis, which was reflected in a decline in their efficiency scores.

Additionally, the management of financial and human resources during the pandemic was crucial. Countries that implemented effective communication strategies and were able to quickly mobilize their resources succeeded in maintaining citizen satisfaction. In contrast, nations that faced challenges in organizing healthcare systems or adopting administrative responsibilities suffered setbacks.

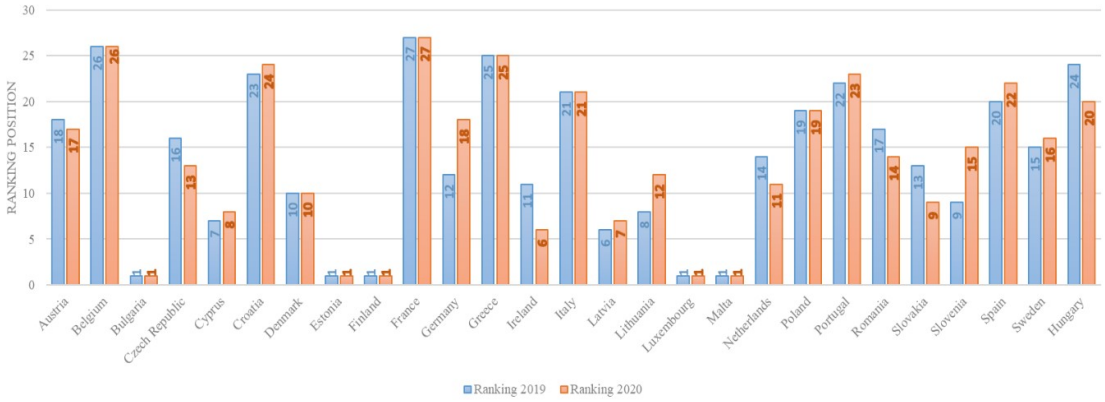
The observed decrease in standard deviation (see Table 3) may imply that, on the whole, nations across the EU have experienced similar enhancements in efficiency, resulting in diminished extreme variations. This trend could signify a positive shift in the adoption of governance policies throughout the region (Xanthopoulou and Plimakis, 2021). Furthermore, this decline may reflect the impact of collective interventions or policies implemented at the European level, which have contributed to enhancements in governmental efficiency. For example, initiatives enacted in response to the COVID-19 pandemic may have significantly shaped the manner in which governments allocated and managed their resources.

The results of the DEA analysis for the years 2019 and 2020 offer a perspective on changes in economic efficiency and resource allocation among the 27 European countries studied. The observed changes in rankings reflect the interaction of multiple factors: economic structure, public policies, dynamics of international markets, as well as global events like the COVID-19 pandemic, as illustrated in Figure 4.

The performance of Bulgaria, Estonia, Finland, Luxembourg, and Malta, which achieved perfect scores, underscores exemplary resource management and reinforces the potential for effective governance in optimizing funding and implementing sound economic policies. Recent research highlights that smaller nations with well-structured policies often

exhibit superior performance both economically and environmentally, suggesting a model for larger countries to emulate (Paliova and Nova-De Lisivkova, 2022).

Figure 4. Histogram of rankings for the years 2019 and 2020 for EU countries.



Source: Author's proceedings in Excel

Ireland's ascension from 11th to 6th place reflects significant adaptability and progress in its economic strategies, with improvements in efficiency closely tied to strategic investments in technology and infrastructure (Egan et al., 2024). The Czech Republic, similarly, has made notable strides, moving from 16th to 13th position, largely due to structural reforms and effective utilization of European funds (Kocsis, 2023).

In contrast, Germany's drop from 12th to 18th in the DEA efficiency rankings between 2019 and 2020 highlights the considerable challenges faced in maintaining optimal efficiency amidst global economic disruptions. Structural issues—including bureaucratic processes and sluggish decision-making—appear to hinder performance. As noted by Carlin and Soskice (2008), these rigidities are prevalent in larger economies, constraining their ability to swiftly adapt to market changes and impeding long-term competitiveness. KPMG's analysis (2022) further indicates that countries burdened by complex administrative structures and stringent regulations may face delays in innovation and crucial reforms required to enhance operational efficiency.

Belgium and Greece exhibit similar stagnation in efficiency, underscoring an urgent need for structural reforms. France faces comparable challenges, where its bureaucratic system may stifle innovation and efficiency. It is imperative for France to implement policies aimed at simplifying administrative processes to facilitate economic growth.

The stagnation in economic performance calls for urgent structural reforms to eliminate rigidities and foster adaptability, particularly through simplifying bureaucratic processes to enhance innovation. Additionally, prioritizing investments in technology and infrastructure is vital for maintaining competitiveness, as demonstrated by the Eurostat report (2023), which reveals that countries investing in digitalization see significant economic improvements, emphasizing the need for a unified strategy to address emerging challenges.

Romania’s advancement from 17th to 14th place in the DEA rankings between 2019 and 2020 illustrates significant progress in resource utilization and policy implementation. Analyses conducted by Mihai et al. (2021) and the Eurostat report (2023)

suggest that this improvement is largely attributable to strategic investments in infrastructure and digitalization, resulting in more efficient resource allocation. However, persistent internal challenges, such as institutional inefficiencies and corruption, continue to undermine the country's economic potential. Zaman and Georgescu (2014) and Lucian (2021) highlight how these obstacles can inhibit effective access to European funds and the essential reforms, ultimately leading to stagnation in efficiency growth.

Furthermore, concerns regarding sustainability remain paramount, accentuating the urgent need to address the transition to renewable energy sources. Research by Drăgoi et al. (2023) indicates that Romania must expedite this transition to reduce CO2 emissions and further a development model that not only enhances economic performance but also safeguards the environment, ensuring a sustainable future for upcoming generations.

In summary, the analysis of DEA ranking dynamics between 2019 and 2020 highlights significant challenges confronting economies, reinforcing the necessity for profound and well-structured structural reforms. These reforms must seek not only to improve economic efficiency but also to adapt to evolving market conditions and sustainability requirements. A more effective strategic planning approach is essential, as it could significantly enhance citizen satisfaction with public services. An integrated strategy must prioritize innovation and embrace green technologies, while public policies support research and development, fostering partnerships between public and private sectors, as indicated by Carbonara and Pellegrino (2019), which can lead to enhanced resource efficiency. Furthermore, it is crucial for development strategies to incorporate international collaboration, recognizing the complexity of global challenges such as climate change. Such collaboration can facilitate the transfer of sustainable technologies and the adoption of best practices, as suggested by Simionescu and Plopeanu (2023). Implementing policies that unify these diverse dimensions will not only support long-term economic stability but also contribute to establishing an ecologically sustainable future, crucial for the well-being of generations yet to come.

5. Conclusions, political implications and limitations of the research

This analysis delves into the intricate relationships among government expenditures, effective governance, and citizen satisfaction, underscoring the critical importance of meticulous variable selection within the research framework. It highlights the need for nuanced analytical approaches that consider contextual factors, particularly in light of the COVID-19 pandemic. The exceptional challenges encountered during this period emphasize the necessity for public institutions to implement adaptive strategic planning, informed by citizen feedback, to optimize resource utilization. The commendable performance of countries such as Bulgaria, Estonia, Finland, Luxembourg, and Malta can be attributed to strategic investments and a low perception of corruption, which together enhance citizen satisfaction.

The active involvement of citizens in decision-making processes, complemented by robust measures of transparency and accountability, is essential for improving governmental performance and fostering public trust. Romania’s advancement in DEA rankings, driven by investments in infrastructure and digitalization despite institutional challenges, exemplifies the significance of a participatory governance model for enhancing service delivery and addressing urgent issues of sustainability and economic resilience. This study reiterates the importance of integrating adaptive strategic planning that incorporates citizen feedback, thereby formulating dynamic policies that respond effectively to shifting societal needs.

The analysis acknowledges several limitations, primarily relating to the absence of a subnational approach; it does not incorporate a nuanced examination of public efficiency at the subnational and regional levels, particularly concerning the fulfillment of citizen needs amidst rising regional disparities within the European Union. The constrained sample size (2019-2020) may influence the relevance of the results, while the complexity introduced by numerous variables complicates the evaluative process, suggesting that a concentrated focus on key factors might significantly enhance clarity. Persistent internal challenges, such as inefficiencies and corruption, continue to impede nations' economic potential, and the study does not examine public efficiency from a subnational and regional perspective, particularly amidst increasing regional discrepancies within the EU.

This reality accentuates the imperative for diverse data sources and robust methodological frameworks to ensure accurate evaluations of efficiency. Addressing these limitations is crucial for cultivating a resilient public sector. By prioritizing such strategic approaches, public policies can become more effective and better aligned with the genuine needs of citizens, thereby substantially enhancing the overall quality of governance.

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EFFECTIVENESS OF GOVERNMENT PROGRAMS TO SUPPORT FINANCIALLY VULNERABLE GROUPS

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Abstract: *In the Republic of Moldova, financial vulnerability of the population is one of the key problems of socio-economic development. Economic crises, reduction of incomes and growth of poverty intensify this problem. To address this situation, the government has developed state programs to support low-income groups of the population, focused on financial inclusion. The article analyzes the effectiveness of these programs, evaluates the mechanisms of financial inclusion and identifies the main barriers to their successful implementation. International practices that can be adapted to improve the situation in Moldova are considered. Special attention is paid to administrative barriers, insufficient funding and low awareness of target groups. The study uses official statistical data, materials of state bodies and international organizations, as well as legislative acts regulating social assistance. The results of the study show that despite achievements, programs often fail to reach their goals due to various constraints. One of the most important findings is the role of digital financial tools in improving the accessibility and effectiveness of programs.*

Keywords*: financial vulnerability, state support, financial inclusion, social policy, administrative barriers, digital financial instruments.*
JEL Classification: *I32, H53, D63.*

1. Introduction

In the Republic of Moldova, as in most transition economies, one of the most urgent problems is the financial vulnerability of the population. This phenomenon is a consequence of various economic factors, such as economic crises, decrease in income, decrease in employment and increase in poverty. In conditions of economic instability, low social mobility and limited opportunities for quality education, a significant part of the population finds itself in the zone of social vulnerability. This has serious consequences for the stability and development of the country's economy, as the increase in the number of poor and vulnerable people contributes to further deepening of social inequality and instability.

In response to these challenges, the Government of the Republic of Moldova has developed and implemented a number of state programs aimed at supporting socially vulnerable groups in order to improve their living standards, access to financial services and inclusion of these groups in the economic life of the country. A key element of such programs is to ensure financial inclusion - a process whereby all citizens, including those from the poorest and most vulnerable groups, have access to financial services such as bank accounts, loans, insurance and other financial instruments.

However, despite the adoption of a number of measures, the effectiveness of these programs remains a matter of debate. One of the main problems is the low awareness of the target groups about the available opportunities, as well as administrative and financial barriers that hinder the full utilization of these programs. Therefore, it is an important task to evaluate their impact and effectiveness in order to identify weak links and suggest ways to improve them.

The purpose of this article is to analyze the effectiveness of state programs aimed at financial inclusion in the Republic of Moldova. The article discusses key aspects of the implementation of these programs, their impact on the living standards of vulnerable groups, as well as barriers that limit their success. Also, special attention is paid to the international experience in the field of financial inclusion and the possibility of its adaptation to improve the situation in the Republic of Moldova.

This work is based on official statistical data, materials of government agencies and international organizations, as well as on the results of scientific research in the field of social policy and financial inclusion. It is expected that the results of the study will allow to offer recommendations to improve the effectiveness of existing programs, which in turn will contribute to the improvement of the financial situation of low-income population and increase the overall level of financial inclusion in the country.

2. Financial inclusion

In the context of growing economic inequality, access to financial services plays a key role in poverty reduction, entrepreneurship development and household stability. Limited access to financial instruments significantly reduces opportunities for the poor, hindering their economic activity and social inclusion. One of the mechanisms to mitigate these problems is the social assistance system aimed at supporting the most vulnerable groups.

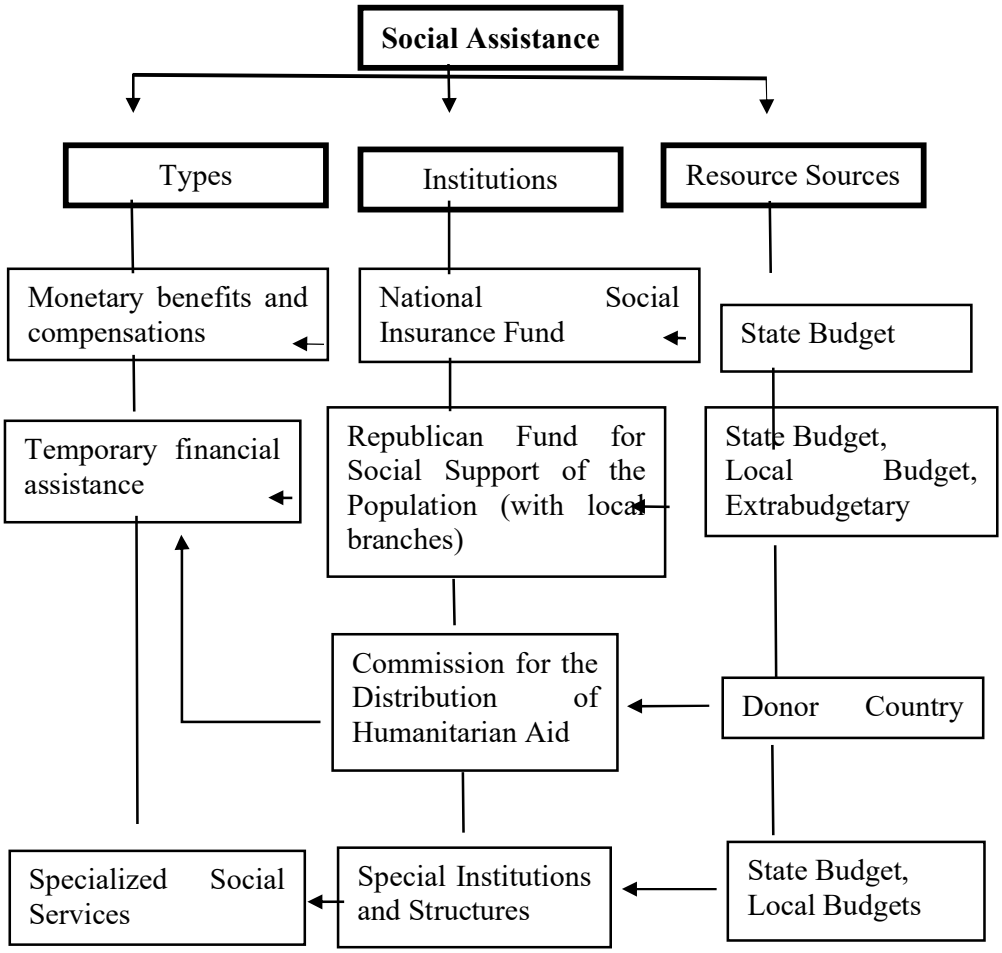
In the Republic of Moldova, social assistance is provided in several forms:

1. Cash benefits and compensations - payments aimed at supporting low-income families, pensioners and persons with disabilities.
2. Material assistance - temporary support in the form of food, clothing, medicines and other necessary resources.
3. Specialized social services - provision of assistance through special institutions and structures, including rehabilitation centers, social services and other organizations.

These measures are aimed at improving the living standards of vulnerable groups and facilitating their integration into the economic and social environment.

The Government of the Republic of Moldova has developed a number of programs aimed at supporting low-income and vulnerable segments of the population in order to increase their financial inclusion. The system of social assistance to the population of the Republic of Moldova consists of the following measures (Figure 1):

Figure No.1 Social assistance system of the Republic of Moldova.



Source: Scientific research «Assessment of the effectiveness of social assistance to some categories of population through the program of targeted compensations», Chisinau

The scheme reflects only those elements of social assistance that are managed and regulated by the state. Various foundations, charitable organizations, economic agents allocating funds for social assistance are also involved in this area, but the information on their activities is not generalized, so it is still difficult to assess their contribution to the formation of the national system of social assistance.

3. Evaluation of the effectiveness of state programs

The example of additional support measures presented by the Minister of Labor and Social Protection Alexei Buzu on December 6, 2023 demonstrates the practical implementation of state programs aimed at reducing the financial vulnerability of the population. Under this initiative, 67,711 beneficiaries from four vulnerable categories will

receive lump-sum payments of MDL 3,000 or 5,000, and the total budget of support measures will amount to MDL 226 million.

When analyzing the effectiveness of this program, it is important to assess several key aspects. First of all, it is necessary to determine whether the coverage of this initiative corresponds to the real number of people in need and whether the support actually reaches the target groups. There is also the question of the adequacy of the provided payments: whether the sums of 3,000-5,000 lei compensate for the additional expenses during the cold season, or whether additional measures are needed.

Equally important is the distribution of the allocated 226 million lei: how transparently and efficiently these funds are directed to those in need, and whether there are no administrative barriers that hinder access to assistance. In addition, the long-term impact of the program must be considered. One-off payments may temporarily alleviate the financial burden, but do not address systemic problems such as low income or limited access to financial services.

Program "Addressing the Impact of the Energy Crisis": Implemented by the United Nations Development Program (UNDP) with the support of the European Union, this program aims to support vulnerable households, including Ukrainian refugees, through the provision of financial compensation to mitigate the impact of the energy crisis, especially during the cold season. In 2023, the program's budget was increased by €3 million to expand beneficiary outreach and introduce energy saving initiatives.

Socio-Economic Development Program (2021-2025): This program plans to gradually increase the minimum pension to the level of the pensioner's subsistence minimum by 2025, improve pension indexation mechanisms, increase wages for public sector workers with priority for low-paid categories, and introduce the Law on Maternity Capital to strengthen support for families with children.

State programs to support vulnerable populations, such as lump-sum payments and energy crisis compensation, provide temporary relief, but their effectiveness depends on the coverage of real needs and the adequacy of the amounts provided. Payments of MDL 3,000-5,000 may not fully cover additional costs during the cold season, and one-off assistance does not address underlying problems such as low incomes and limited access to financial services. It is important to ensure transparency and efficiency in the distribution of funds, and to develop long-term measures to improve the economic situation of the population.

4. International experience and possibilities of adaptation for Moldova

Many countries successfully apply different approaches to support financially vulnerable groups of population, which can be adapted for the Republic of Moldova. For example, the UK has introduced social bonds that attract private investment to finance social programs. Kazakhstan implements measures to improve accessibility of financial services for persons with disabilities, including adaptation of banking services. The US and a number of African countries actively use direct cash transfers, which, thanks to digital technologies, reduce administrative costs and increase the targeting of support. Germany supports social entrepreneurship by creating favorable conditions for businesses that solve social problems. Special attention is paid to migrants and refugees: international organizations, such as UNHCR, develop special financial programs for the integration of these groups. Australia has a national strategy of financial inclusion, including educational initiatives and digital tools.

Adapting these practices in Moldova can help improve the effectiveness of state support, reduce poverty and increase access to financial resources for vulnerable groups.

5. Integration of support measures for vulnerable populations

In the cold period of 2025, the Minister of Labor and Social Protection Alexei Buzu presented a new package of support measures for vulnerable citizens. A total of 67,711 beneficiaries will receive lump-sum payments ranging from 3,000 to 5,000 lei, depending on the category, for a total amount of 226 million lei. These measures are aimed at helping those who are particularly in need of support during the winter period.

Launched in 2022, the cash assistance program for vulnerable citizens of the Republic of Moldova continues to operate with the support of the United Nations World Food Program (WFP), the United Nations Population Fund (UNFPA) and the International Organization for Migration (IOM), in cooperation with the Ministry of Labor and Social Protection. The program aims to reduce the impact of high energy and gas prices on the most vulnerable groups of the population and to provide for their basic needs.

The main beneficiaries of the program are pensioners, families with children with disabilities, and pregnant and breastfeeding women. Specifically 56,236 pensioners, 3,019 families with children with severe disabilities, 7,195 families with persons with disabilities and 1,261 pregnant or lactating women will receive lump sum payments. These measures significantly improve the living standards of vulnerable citizens in conditions of economic instability.

As part of its efforts to strengthen the social protection system, UNFPA is focused on supporting the Government of the Republic of Moldova, with particular attention to the needs of pregnant women who have given birth to children under 13 months of age, as well as older persons facing special challenges. IOM continues to support the reform of the national social protection system under the RESTART reform agenda, providing financial assistance to vulnerable Moldovan citizens, including families with children with special needs.

In March 2025, a workshop was held where representatives of public institutions, international development partners and social service providers discussed the implementation of an innovative social support model “Cash Plus”. This model, which includes both financial assistance and social inclusion services, aims to facilitate access to the labor market for vulnerable individuals and families seeking employment.

The Cash Plus model implemented under the Social Assistance Program includes case management, which helps social workers identify problems, propose solutions, and monitor the effectiveness of social assistance delivery. This model strengthens beneficiaries' ability to overcome difficulties and build a more stable future through sustainable solutions.

In addition, WFP conducts training workshops for trainers and representatives of national social protection institutions, and UNICEF, with financial support from the Governments of the United Kingdom and France, provides assistance to the Ministry of Labor and Social Protection to strengthen the capacity of social service providers. These measures will help improve the quality of social services and increase access to needed assistance.

The program continues to operate thanks to the support of a number of UN agencies in Moldova, such as UNICEF, IOM, WFP, UNHCR and other partners. These initiatives play a key role in improving access to quality social services and ensuring a better life for the most vulnerable groups.

6. Conclusions

Financial vulnerability remains an acute problem in the Republic of Moldova, significantly affecting the economic stability and social well-being of the population. Despite various government efforts and international support, challenges remain in ensuring effective financial inclusion of vulnerable groups.

The analysis of state programs aimed at financial inclusion in Moldova shows that although financial assistance measures provide necessary support to low-income citizens, pensioners and families with disabilities, their effectiveness is limited by administrative barriers, low awareness of beneficiaries and short-term nature of some initiatives. Programs such as lump-sum payments, targeted social assistance, and cooperation with international organizations help alleviate current financial difficulties, but do not yet address the systemic problems contributing to financial vulnerability.

International experience shows that sustainable financial inclusion requires an integrated approach that includes financial education, access to digital banking services and support for social entrepreneurship. Countries such as the UK, Germany and Australia have successfully implemented long-term strategies that integrate social and financial support mechanisms, which can serve as an example for Moldova.

The introduction of the Cash Plus model, which combines financial assistance with social services and employment support, represents a promising step towards a more integrated and sustainable approach. Improving social programs by introducing case management and capacity building initiatives will increase the efficiency of resource allocation and contribute to the long-term economic sustainability of vulnerable groups.

To increase the effectiveness of financial inclusion policies, it is necessary to improve information campaigns, simplify administrative processes and increase cooperation with international and private organizations. The development of digital financial tools and the promotion of financial literacy will also help to empower vulnerable populations, providing not only short-term support but also long-term economic stability.

Overall, while progress has been made in ensuring financial inclusion through various social assistance programs, Moldova needs to continue to work on removing existing barriers and implementing sustainable financial support mechanisms. Adapting successful international practices and strengthening the financial infrastructure will significantly improve the financial situation of the most vulnerable citizens, contributing to social stability and economic development of the country.

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DEVELOPMENT OF BRAILA MUNICIPALITY -SMART CITY

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Abstract: *In the article "Development of Braila Municipality - Smart City" I will try to present all the measures adopted so far by Braila Municipality in order to implement until 2030 the "Smart City" Program launched by the Ministry of Communications and Information Society. The "Smart City" program, launched by the Ministry of Communications and Information Society, implies the optimization of cities through technology. The use of new gadgets and the online environment aims to increase the quality of life of citizens by creating a healthier, more educated, less expensive city, open to new business investments and with citizens actively involved in the process of public administration. The ultimate goal of this project is the full integration of smart technologies in all spheres of activity of a city. The "Smart City" program launched by the Ministry of Communications and Information Society involves the optimization of cities through technology. The use of new gadgets and online environment aims to increase the quality of life of citizens by creating a healthier, more educated, less expensive city, open to new business investments and with citizens actively involved in the process of public administration. The ultimate goal of this project is the full integration in all spheres of activity of a city of smart technologies. Braila - the gateway to Europe, an important economic, medical, educational pole, supported by a modern infrastructure and in continuous modernization and a developed partnership environment, with a sustainable economy developed through innovation, tradition and resource development, attractive to investors, cultural and tourist center, modern and with a democratic multiethnic community has proposed and achieved a considerable proportion to develop services for its citizens. Thus by simply accessing its own online platform can be identified in the Smart City section of the following online services available.*

Keywords*: smart city, regional development, local development, quality of life.*
JEL Classification*: F63, F64.*

1. General coordinates on the smart city concept

In the elaborated framework of the 'Smart City' program, smart technologies are defined as programmable components or sensors with the ability to connect to the internet that aim to collect, transmit and process data.

In the area of services for citizens or business, the services that fall under the smart component are those provided to the public through the technologies described.

Based on these definitions, smart communities are defined as localities in which smart services are used to identify and meet the requirements and needs of the citizens and the business environment of the area.

2. Basic principles

In order to be labeled smart, a community must respect the following principles:

- respect for the environment and life in general;
- respect for the law, the community and its members;
- the judicious use of available resources and recycling where possible;
- reducing dependence on finite resources;
- increasing the active involvement of community members in solving community problems;
- ensuring sustainable, coordinated and rational development at individual and community level.

3. The current status of the implementation of the smart coordinators in Braila municipality

Referring to the coordinates defined above, the current status of the implementation of the smart city concept within the Municipality of Braila is made by referring to key areas in the city infrastructure including aspects of the public utility networks and their structure, particularities of the transportation network, elements of public administration and the relationship with the environment

A. Electricity network

Municipality of Braila has completed the modernization of public lighting:

- 12,736 LED luminaires have been installed
- Reduced electricity and maintenance costs for street lighting infrastructure
- CO2 emissions reduced
- Implemented remote management of lighting points (dimming)

Dimming:

- Turning on/off and dimming (dimming level) individually or by zones
- Programming luminaire operating profiles (on/off, light intensity) for different time periods

Telemanagement

- Display the lighting system configuration in a tree structure, by levels: city, neighborhood, street, streetlight, light point
- Evaluation and display of electricity consumed, per luminaire and per group of luminaires
- Graphical display of the variation over time of the parameters of each luminaire: voltage, current, power factor, temperature, power consumed, number of operating hours and energy consumed
- Easy maintenance, as the application is web-based

Braila City Hall won the Trophy of Excellence in Public Lighting at the Gala of the Association of Romanian Municipalities organized under the patronage of the President of Romania on 06.11.2017, being the first municipality in Romania to modernize public lighting using entirely LED lighting fixtures.

The public lighting modernization project falls into the category of smart solutions in the field of energy through the technological innovations brought to the operating and control system.

B. Water supply network

Information on the NAIADES Project is available on the BRAILA DUNAREA BRAILA CUP website.

Since June 2019, CUP "Dunărea" Brăila is participating in the European Project entitled NAIADES - "A holistic water ecosystem for the digitalization of the urban water sector" - part of the HORIZON 2020 Programme - Framework Programme for Research and Innovation 2014 - 2020, a project that was planned to run for a period of 36 months, starting from June 2019 until 01 June 2022, with a subsequent request for an extension until 30.11.2022. The NAIADES ecosystem facilitates the transformation of the water industry through automated and intelligent water resource management and environmental monitoring, providing a high level of water services to residential and commercial consumers, leveraging the efficient use of the physical and digital components of the water supply ecosystem.

Participants in the project are research centers, higher education institutions and telecommunication companies from countries such as Greece, Ireland, Germany, the Netherlands, Estonia, Switzerland, Spain, Slovenia and Romania, which are brought together to develop innovative hardware and software technologies with application in drinking water services (e.g. Centre for Research and Innovators with applicability in drinking water services (e.g. Centre for Research and Technology-Hellas, KONNEKTABLE Technologies Ltd, Mandat International, UDG Alliance, Asociación de investigación metalúrgica del noroeste, Institute of Communication and Computer Systems, Jozef Stefan Institute, Advantic Sistemas y Servicios S.L., SIVECO Romanian SA, Disy Informations Systeme GmbH, IHE Delft Institute for Water Education, IBATECH Tecnología S.L., Guardtime AS, Vrije Universiteit Brussel, Eurecat Technology Centre and the 3 pilots operating in the field of public utilities Aguas Municipalizadas de Alicante, Empresa Mixta Spain, Ville de Carouge Switzerland and CUP "Dunărea" Brăila.

The non-reimbursable value of the Project allocated to the Public Utility Company "Dunărea" Brăila is 108.500 euro, within the project the following were purchased and installed:

1.4 continuous water flow monitoring equipment (flowmeters) to determine the quantities (hourly, daily, monthly, annual) of water supplied to consumers within the designated monitoring area (Radu Negru neighborhood).

2. 4 equipments for continuous monitoring of drinking water pressure in the distribution system;

3. 4 equipment for monitoring noise on drinking water pipelines Within the NAIADES project, the Public Utility Company "Danube" Brăila aimed to improve the operational control of the water distribution network by monitoring and forecasting water demand in order to correctly estimate the water balance (water supplied and losses) and to reduce the current level of water losses by monitoring pressure and noise on the water supply networks

C. Public transportation network

The Brăila Public Transport application is available both on the Braila City Hall and SC Braicar SA websites.

The Brăila Transport Public application can be found at: www.braila-transport.com and then, depending on the operating system of your phone (Android or IOS), choose Google Play (for Android) or App Store (for Apple). The app is free.

Get easy access to the lines, stations and places where you travel and visit frequently.

"Brăila Public Transport" guides the traveler to a chosen destination, anywhere in the city in the easiest and fastest way. One can get travel directions for optimal routes by bus, tram, or a combination of them.

Get updates when there are changes on your preferred lines and waiting time at the station, if there are traffic jams or accidents delaying your arrival at the station.

Purchase travel tickets: You can purchase travel tickets and activate them when boarding the means of transportation by providing the details of a valid bank card.

On the SC BRAICAR SA website there is information about the modern fleet.

Fleet modernization

The bus fleet has been modernized with 16 KARSAN ATAK and 4 KARSAN JEST buses, equipped with air conditioning, heating and ventilation system and interior audio-video announcement system for citizens, regarding the routes.

Good news for Braila's citizens who travel by public transport of S.C. Braicar S.A. Braila. The company is modernizing its fleet with four modern buses that will run on routes in the municipality.

The company's new acquisitions for the fleet meet current European Union standards in the field of urban passenger transport. The buses have air-conditioning, heating and a platform that provides access for people with disabilities according to the standards.

Safety and comfort in public passenger transport is one of the main priorities on our agenda, which will bring satisfaction to citizens. Moreover, permanent checks will be made in vehicles, in order to detect those who create discomfort and problems for our citizens.

Features:
Motorization Euro 5
Ramp for people with locomotor disabilities
CCTV video monitoring

D. Relationship with the environment

One of the key points that must be fulfilled in order to include a city in the smart city category is care for the environment. In this area, the program promotes the implementation of solutions on the following themes:

- reducing urban pollution;
- selective collection, selective transportation and selective processing;
- consumption efficiency in waste transport and storage;
- implementing the principles of circular economy.

At the level of Braila Municipality, these themes are implemented through the existing ADI ECO DUNAREA BRAILA and the purchase of electric public transportation.

In the “Air quality plan for azot dioxide and azot oxides (no2/nox) in the municipality of Brăila” approved by decision of the Braila Municipal Council every year the fulfillment of this objective of environmental protection is monitored.

4. Conclusions

The Local Development Strategy includes all the strategic aspects regarding the social, economic and administrative elements that have a direct impact on the development of Brăila Municipality and on the quality of life of the citizens. The present section contains the main conclusive aspects as a result of the data collected and presented in the previous chapters.

In this context, as a result of the research carried out, the following conclusions can be highlighted regarding the current situation recorded at the level of the municipality from the point of view: demographic, economic, social, educational, touristic,

- active population, in Brăila Municipality finding more than 80% of the average number of employees in the county, population dynamics that is however threatened by an accelerated rate of population aging and a low share of young people attending higher education courses in institutions in the municipality;
- a local economy in full development, the number of companies increasing by approximately 3%, but there is the risk of hypertrophy! to a single economic sector, the trade

and repair of motor vehicles gathering 3.7 times more companies than the next economic field placed in the municipal hierarchy;

- an infrastructure of the health system that constitutes an optimal starting point in the development of this sector, at the level of the municipality there are four hospitals, 88 medical offices and a transfusion center. A worrisome aspect is revealed in the situation of employees in the medical system, observing a decrease in the number of doctors in the public system, they choosing to go to another city or moving to the private system;

- in the area of education and training, there is a downward trend both in terms of the number of educational units, but also in the number of enrolled students. With 13% less in 2018 compared to the beginning of the analysis, the decrease in the number of students may be due to population migration or the low birth rate. However, a favorable aspect can be noted in terms of professional education, the number of those enrolled in this form increased 6 times, constituting, compared to the period of analysis, an approximately 542% higher share in 2018;

- tourism and cultural heritage enjoy the active involvement of local authorities in this area, with 127 cultural, artistic, educational and sports events planned for 2020. However, the field presents deficiencies at the level of tourism infrastructure, the number of accommodation units being decreasing or non-existent when it comes to the "low-budget" sector. However, there are numerous opportunities for the development of this sector given the abundance of natural areas that are insufficiently exploited by the dimensions of modern tourism (ecotourism) and by capitalizing on urban tourism;

- improving the existing urban mobility system, a strategic objective to be achieved through the modernization and expansion of the transport system (with an emphasis on the development of ecological transport), the expansion of the car fleet used in public transport, the establishment of recharging stations for electric vehicles;

- protecting and preserving the environment, by developing an infrastructure that is friendly to the environment, with as little negative impact as possible, through information actions and awareness of the importance of preserving the environment.

"An Attractive City" - through:

• the development of tourism at the level of Brăila Municipality, a strategic objective that can be achieved through: the development of ecotourism and educational tourism, the modernization of the tourist infrastructure;

• capitalizing on the cultural dimension of Brăila Municipality, by modernizing and rehabilitating buildings from the local cultural heritage;

• increasing the administrative capacity of public institutions in the Municipality of Brăila, by improving the skills and services offered by the employees of public institutions;

"An Inclusive City" - through:

• increasing the quality of the educational system at the level of Brăila Municipality, a strategic objective that can be achieved by improving the educational infrastructure;

• improving the quality of life of the citizens of Brăila Municipality, through: the regeneration and modernization of urban areas, the creation of protection and safety measures for citizens;

• the development of the medical system, by expanding the health infrastructure at the level of marginalized areas;

• improving the social system, by: protecting rights and reducing social exclusion among groups at risk, designing effective social services for vulnerable groups;

"A Smart City" - through:

• the fruition of the advantages of digitization, for the benefit of citizens at the level of Brăila Municipality, a strategic objective that can be achieved by: improving public safety, expanding and modernizing the traffic network and public transport, strengthening public services;

• supporting economic and entrepreneurial competitiveness, by developing the infrastructure of the local economic environment.

In conclusion, the Local Development Strategy elaborated at the level of Brăila Municipality aims to ensure an integrated urban development, respecting the principles of sustainable development, in social, economic and ecological terms and with a significant impact on the standard of living of the local community, aiming for the fastest possible transition to a successful smart-city model

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THE ROLE OF EXTENSION SERVICES FOR FARMERS IN MOLDOVA

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Abstract. *Agricultural extension services play a vital role in improving the productivity, sustainability, and resilience of Moldova's farming sector. As a key contributor to the national economy, agriculture supports a significant portion of the population. However, farmers face numerous challenges, including climate change, increasing production costs, limited market access, and financial constraints. Addressing these challenges requires strategic interventions from extension service institutions to equip farmers with innovative solutions and technical expertise. The crucial role into the existing ecosystem has the farmers associations that are losing the terrain in terms of their involvement and implication. Moreover, the need for a single vision and force that would bring all farmer's needs in a single bucket is imperious. This article explores the importance of agricultural extension services in Moldova, focusing on their impact on modernising farming techniques, enhancing financial literacy, and increasing market access. Based on data from 110 micro and medium-sized farming enterprises, findings suggest that extension programs help farmers adopt climate-resilient practices, develop sound business strategies, and integrate into competitive value chains. These services not only improve productivity but also contribute to economic stability and food security in rural areas. To further enhance extension services, future efforts should prioritise the expansion of digital advisory platforms, the strengthening of regional extension network, and increased collaboration with international organizations. Moreover, fostering the participation of youth and women in agriculture will be essential for long-term sustainability. Strengthening extension services is crucial for ensuring that Moldova's agricultural sector remains competitive, resilient, and capable of addressing evolving environmental and economic challenges. By investing in robust extension services, Moldova can build a more innovative, sustainable, and inclusive agricultural system that benefits both farmers and the broader economy.*

Keywords: *Extension, agriculture, farmers.*
JEL Classification*: Q10, Q13, Q16.*

1. Introduction

Significance of agriculture sector in Moldova

Agriculture occupies a central place in Moldova's economy. As of 2023, agricultural activities accounted for approximately 7,61% of the nation's Gross Domestic Product (GDP) and employed about 21% of the workforce (the Global Economy, 2024). Moldova's strategic geographical location offers proximity to significant markets, notably the European Union, enhancing the potential for agricultural exports.

In the context of multiple internal and external crises, the economy of the Republic of Moldova is undergoing an important phase of recovery and stabilization. In 2023, Moldova's Gross Domestic Product (GDP) reached 300,421.3 million MDL at current market prices, registering a real growth of 0.7% compared to 2022 (World Bank, 2023).

From a resource perspective, the key sectors contributing to GDP growth in 2023 were:

- ✓ Agriculture, forestry, and fishing – 2.6%;
- ✓ Health and social assistance – 0.7%;
- ✓ Information and communication – 0.5%.

Despite this moderate GDP growth, industrial production continued to decline for the second consecutive year, decreasing by 3.6% compared to 2022. Conversely, total agricultural production across all types of households saw a remarkable increase of 23.6% (in comparable prices) in 2023. This growth was primarily driven by an impressive 35.1% increase in crop

production, while livestock production declined slightly by 1.9%, marking its seventh consecutive year of decline.

Challenges Facing Moldova's Agricultural Sector

Despite its inherent strengths, Moldova's agricultural sector confronts a multitude of challenges that impede its progress and sustainability:

- **Climate risks**

Moldova is highly vulnerable to the adverse effects of climate change. These climatic fluctuations have led to decreased agricultural yields and elevated risks for farmers. For instance, natural hazards in 2007 resulted in losses amounting to 3.5-7% of Moldova's GDP, predominantly affecting the agricultural sector.

- **Economic and Market Access Challenges**

The agricultural sector's contribution to Moldova's GDP has declined significantly, due to various political and economic challenges that country faced during the years.
This reduction underscores the need for diversification and modernization within the sector. Farmers often encounter obstacles such as limited access to credit, high production costs, and bureaucratic procedure in obtaining subsidies. Additionally, market access barriers, including price volatility and a lack of organized value chains, hinder the sector's growth and competitiveness (Econstor, 2022).

- **Institutional and Organizational Limitations**

The fragmentation of farmer representation has led to diminished advocacy efforts and weaker support systems for small-scale producers. The decline in the influence of farmer associations has weakened collective bargaining power, making it challenging to address systemic issues within the sector. Strengthening these associations and creating a unified network for farmer representation are crucial steps toward enhancing policy engagement and service delivery.

The Role of Agricultural Extension Services

Agricultural extension services are instrumental in bridging the gap between research and practical farming applications. They serve as conduits for disseminating knowledge, introducing innovative technologies, and providing training to farmers. In Moldova, the extension services as a structured mechanisms is lagging behind due to various factors, including social capital, human resources, limited level of trust among farmers, etc. In Moldova, these services have been pivotal in:

- Technological Advancement and Innovation

Extension services facilitate the adoption of climate-smart agricultural practices, such as precision farming and conservative agriculture. However, adoption rates remain low due to inadequate funding and insufficient technical support. Enhancing these services is essential for promoting sustainable agricultural practices and improving productivity. Also, the role of sectorial business driver becomes essential in order to advance in this respect.

- Financial Literacy and Business Development

By improving farmers' understanding of business planning, credit management, and risk mitigation, extension programs empower them to make informed decisions. Nevertheless, many farmers still struggle to navigate the complexities of financial instruments, underscoring the need for enhanced training programs. Moreover, with the latest trends into the global

arena, the funding becomes a burdensome not only for farmers but for other sectors and players.

- Market Integration and Value Chain Development

Extension services play a crucial role in facilitating access to market information and establishing linkages with buyers. However, challenges persist, including inconsistent quality standards, limited cold storage facilities, and high transportation costs. Addressing these issues is vital for integrating farmers into competitive value chains and enhancing their profitability.

Objectives of the Study

This study aims to:

- Assess the current state of agricultural extension services in Moldova.
- Assess the farmers' needs and expectations in respect to the existing country associations and extension services.
- Identify the challenges faced by these services in meeting the needs of farmers.
- Provide recommendations to enhance the effectiveness of agricultural extension services in Moldova.

2. Research methods

This study employed a mixed-methods research approach, combining quantitative and qualitative techniques to ensure a comprehensive understanding of the role of agricultural extension services in Moldova. The research focused on gathering insights from farmers, extension service providers, and policymakers to assess the current challenges and opportunities within the sector.

Data Collection Methods

The primary data for this study was collected through structured questionnaires administered to 110 farmers who are members of the existing farmer's association in Moldova. The selection of respondents was based on their active participation in agricultural activities, representation of diverse farm sizes (micro and medium-sized enterprises), and involvement in various agricultural value chains. The questionnaires aimed to capture the perspectives of farmers regarding their experiences with extension services and their expectations for future improvements.

In addition to the survey, focus group discussions and expert interviews were conducted with extension service providers, representatives of the farmer association mentioned above, and policymakers. These discussions provided deeper insights into the institutional framework of extension services and the role of farmer associations in supporting agricultural development.

Structure of the Questionnaire

The questionnaire was structured into five key sections to address different aspects of agricultural extension services and farmer needs:

1. **Farmer Profile and Farm Characteristics**
   - Farm size, production type, and level of market engagement
   - Use of modern agricultural technologies and practices
2. **Challenges in Production, Processing, and Sales**
   - Access to inputs, machinery, and financial resources

- Climate change adaptation and resource constraints
- Processing capabilities and value addition
- Market access barriers and price volatility

3. **Integration into Value Chains**
   - Participation in producer cooperatives and farmer groups
   - Engagement with processors, wholesalers, and retailers
   - Awareness of certification and quality standards
4. **Expectations from Extension Services**
   - Training needs in modern agricultural techniques, financial literacy, and market access
   - Preferred methods of receiving advisory services (in-person, digital, group training)
   - Assessment of current extension services and areas for improvement
5. **The Role of Farmer Associations**
   - Perceived benefits of farmer associations in lobbying, advocacy, and service provision
   - Barriers to active participation in farmer organizations
   - Strategies to enhance the effectiveness of farmer associations

The research findings provide valuable insights into the realities faced by Moldovan farmers and offer evidence-based recommendations for strengthening extension services and farmer associations to enhance the agricultural sector's competitiveness and sustainability.

This study is based on primary data collected from 110 micro and medium-sized farming enterprises across Moldova

3. Results and discussion

This section presents the key findings from the research, focusing on the role of agricultural extension services in Moldova. The findings are structured around the key challenges identified by the surveyed farmers, their expectations regarding extension services, and the role of farmer associations.

Extension Services and Technological Advancement

The research findings indicate that farmers who engage with extension services are more likely to adopt climate-smart agricultural practices, such as precision farming and drought-resistant crop varieties. However, the adoption rates remain low due to limited financial resources, inadequate training, and the lack of access to updated technology.

A key barrier identified was the insufficient funding allocated to extension services. Survey data revealed that only 35% of farmers received direct advisory support in the last three years. Moreover, 78% of respondents reported that they lack access to essential digital tools that could improve agricultural practices.

Table 1. Farmers' Access to Extension Services

Access to extension services.	Percentage (%)
Regular access	35%
Occasional access	42%
No access	23%

Source: Developed by the author based on the results of the surveys

The results also highlight that farmers utilizing extension services showed a 20% higher adoption rate of climate-resilient practices compared to those who did not.

Findings indicate that farmers who engage with extension services are more likely to adopt climate-smart agricultural practices, such as precision farming and drought-resistant crop varieties

Financial Literacy and Business Development

Agricultural extension programs have played a role in improving farmers' understanding of business planning, credit management, and risk mitigation. However, only 29% of farmers indicated that they had received financial literacy training in the past five years. Farmers expressed concerns over high-interest rates, limited collateral for loans, and bureaucratic difficulties in obtaining subsidies. Survey results indicate that 64% of farmers struggle with understanding financial instruments, particularly loan schemes and insurance options. As shown in Figure 1, the lack of financial education continues to hinder investment in modern technologies.

Table 2. Financial literacy

Financial literacy trainings received	Percentage (%)
Yes	29%
No	71%

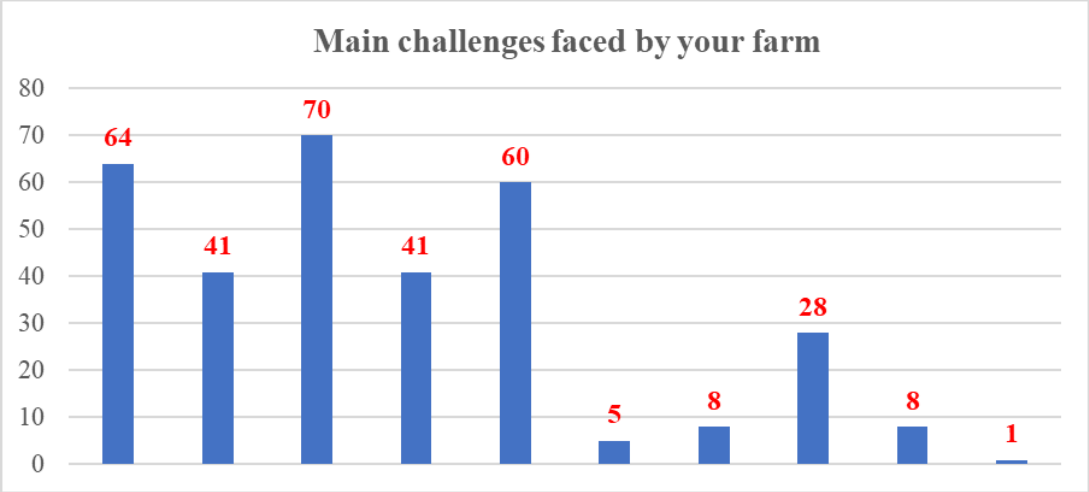
Source: Developed by the author based on the results of the surveys

The data underscores the need for extension programs to incorporate structured financial literacy modules, which could enhance farmers' ability to make informed investment decisions. Agricultural extension programs have played a role in improving farmers' understanding of business planning, credit management, and risk mitigation. Nevertheless, many farmers still struggle to navigate the complexities of financial instruments, underscoring the need for enhanced training programs.

Problems and challenges

In order to analyze the challenges faced by farmers, a set of questions was developed regarding various issues, including accessing subsidies, market availability, and obstacles in product commercialization. The results reflect the significant difficulties encountered by farmers in several key areas.

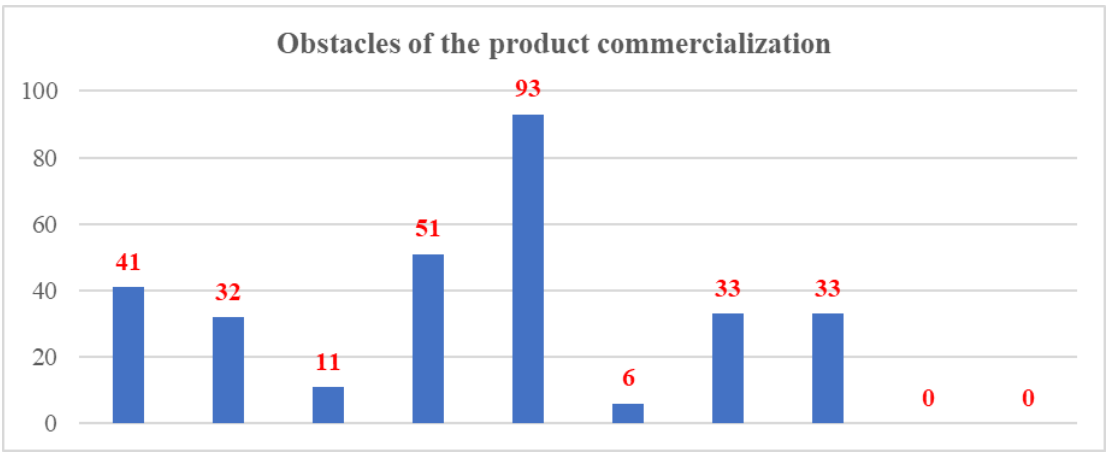
Figure 1. Main challenges



Source: Developed by the author based on the results of the surveys

Main Challenges: When asked about the primary challenges they face, 70 respondents (out of 108) cited high input costs, making it the most frequently mentioned challenge. This was followed by access to markets, reported by 64 respondents, and the impacts of climate change and associated risks, noted by 60 respondents. These findings highlight the financial pressures that farmers face due to rising costs, as well as the vulnerabilities caused by climate change.

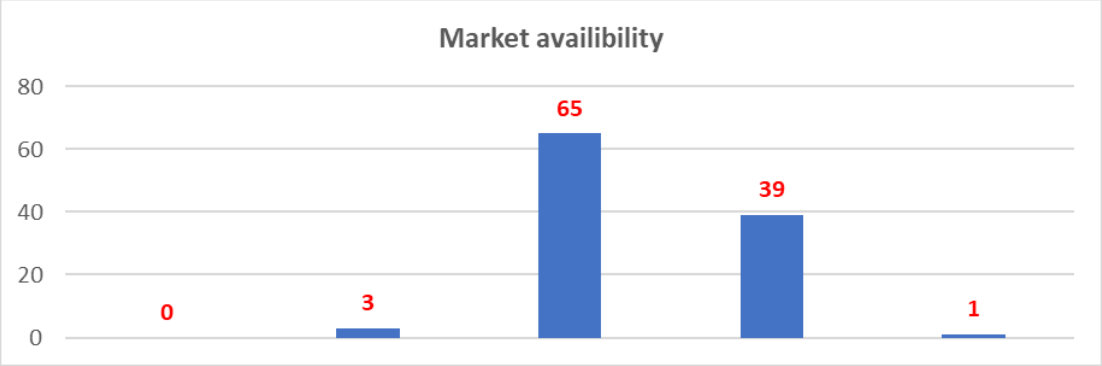
Figure 2. Obstacles and barriers



Source: Developed by the author based on the results of the surveys

Obstacles in Product Commercialization: Regarding obstacles in the commercialization of agricultural products, 93 respondents identified low prices offered by intermediaries as a significant issue. This was followed by 51 respondents mentioning the lack of local sales markets, and 41 respondents pointing to the lack of storage infrastructure. These results suggest that farmers struggle with market access and insufficient infrastructure, which hinder their ability to achieve fair prices for their products.

Figure 3. Market availability



Source: Developed by the author based on the results of the surveys

Market Availability: When asked to evaluate the availability of markets for their agricultural products, 65 respondents considered it satisfactory, while 39 rated it as unsatisfactory. The relatively low number of extreme opinions, both positive and negative, indicates that while there is a general sense of market availability, it is not universally satisfying, pointing to the need for improvement in market access.

Subsidy Access: Regarding subsidies, 86 respondents reported having received subsidies in the last two years, while 19 were non-recipients, and 3 respondents declined to answer. The accessibility of subsidies was mostly rated as moderate by 62 respondents, with 21 rating it as easy, 19 as difficult, 6 as very difficult, and no respondents considered it very easy. These results reflect that while most farmers benefit from subsidies, the process remains cumbersome and moderately challenging for many.

These findings underline the pressing issues that farmers face, from financial strain due to input costs to difficulties in market access and infrastructure. The mixed responses regarding subsidy access also highlight the need for more streamlined and accessible support systems. Addressing these challenges will be essential for improving the overall sustainability and profitability of the agricultural sector.

4. Conclusions

The findings of this study reveal that Moldovan farmers face a complex array of challenges that require multi-faceted and coordinated responses. Farmers associations have a unique opportunity to strengthen their role as a central support system for farmers by enhancing communication, promoting cooperative models, expanding training and consultation services, facilitating access to funding, and actively engaging in policy development.

By implementing these recommendations, farmers associations can significantly contribute to the long-term growth and resilience of the agricultural sector, ensuring that farmers receive the necessary support to overcome challenges and capitalize on emerging opportunities. A well-structured and farmer-centric approach will not only benefit individual producers but will also drive sustainable economic development and food security in Moldova (FAO, 2019).

Furthermore, farmers associations should work closely with relevant authorities and stakeholders to ensure that all proposed measures are implemented effectively. Continuous monitoring and evaluation of these initiatives will be essential to measure their impact and

adjust strategies as needed. Through a concerted effort, farmers associations can establish themselves as leading advocates for Moldovan farmers, fostering a thriving agricultural sector that contributes to national economic stability and prosperity.

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EDUCATION FINANCING AND THE EFFICIENCY OF EDUCATIONAL SYSTEMS

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Abstract: *This article explores the dynamics of education financing in Romania and its impact on the efficiency of the national educational system. Using recent statistical data and empirical insights, it analyzes systemic challenges related to underfunding, regional disparities, and governance. It also examines policy initiatives such as the 'Educated Romania' strategy and proposes reform measures aimed at aligning Romanian education with EU standards. Education represents a fundamental element in the development of modern societies, and its financing is essential to ensure both quality and equity within educational systems. Funding models—whether public, mixed, or private—play an important role in shaping educational outcomes, and the use of quantitative assessment methods, such as data envelopment analysis (DEA) or value-added models, allows for an objective evaluation of performance. At the same time, a systemic reform is needed, one that focuses on teacher professionalization, infrastructure modernization, continuous training expansion, and the balanced, efficient implementation of educational technology.*

Keywords*: education financing, Romania, educational efficiency, education policy, public investment.*
JEL Classification*: I21, I22, I28.*

1. Introduction

Education is a key pillar of sustainable development and the way it is funded directly impacts the efficiency of the educational system. In the current European context, marked by budgetary pressures and demographic changes, it is essential to analyze the relationship between financial allocations and educational outcomes. Romania faces significant challenges in this area, consistently ranking below the EU average in terms of GDP percentage allocated to education. Spending does not automatically lead to performance; teaching quality is key. Inputs include student, family, school, and community characteristics. This study explores the complex relationship between education financing and the efficiency of educational systems, beginning with a theoretical overview and continuing with an empirical evaluation based on European data and the specific case of Romania. In academic literature, education funding is addressed not only as an economic concern but also as a reflection of political priorities and social responsibility. Various models of education financing exist, reflecting ideological, cultural, and institutional differences among countries. Public, mixed, and predominantly private models each carry distinct implications for equity, accessibility, and the sustainability of educational systems. Recent scholarship supports the notion that balanced funding, aligned with performance indicators, can improve educational outcomes. The analysis includes data on public spending as a share of GDP and total government expenditure over a ten-year period (2014–2023), complemented by a critical assessment of Romania's institutional framework. Persistent urban-rural disparities and implementation challenges in education policy are highlighted. The conclusions call for an integrated strategy involving sustainable investment, evidence-based policy, and coherent educational governance aimed at enhancing efficiency and reducing structural inequalities in access to education. Outputs are measured through graduation rates, test scores, and job integration. Regional and socio-economic disparities significantly influence outcomes. Parental background and socio-economic status are key performance drivers.

2. Theoretical Framework and Literature Review

The literature explores multiple methods for analyzing efficiency: production functions, DEA, and value-added models. Becker (1997) highlighted the role of human capital in economic development, while De Witte & López-Torres (2017) emphasized the use of efficiency indicators in education policy. Recent studies (Akresh et al., 2023) show that only 10–20% of school performance variation can be explained by direct spending, with the rest influenced by social and institutional factors.

3. Methodology

This article uses a quantitative-comparative approach, analyzing Eurostat and OECD data from 2010 to 2023. It compares the percentage of GDP allocated to education with PISA scores and analyzes relative efficiency based on funding models (public, mixed, private).

The analysis integrates descriptive statistics and visual correlation methods to identify trends and disparities among EU countries, with a specific focus on Romania's performance relative to regional peers. By using cross-sectional data alongside time-series observations, the study aims to capture both structural patterns and dynamic changes in education financing and outcomes.

4. Data Analysis and Results

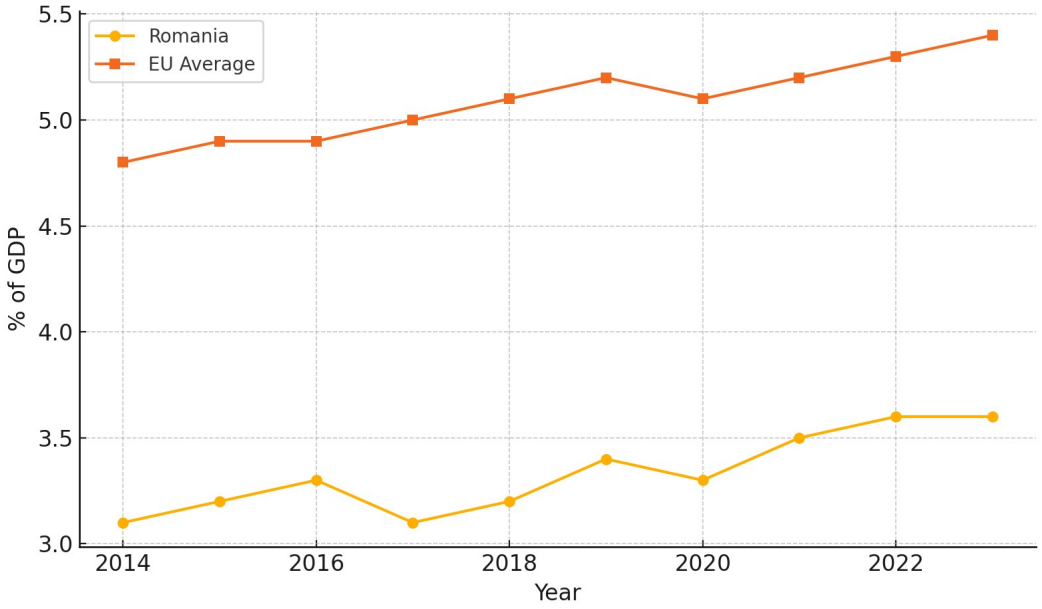
4.1. Comparative Perspective: Central and Eastern Europe

While Romania allocates approximately 3.6% of its GDP to education, other Central and Eastern European (CEE) countries have followed more ambitious trajectories. For instance, Poland and Estonia consistently exceed 5% of GDP in educational spending, correlating with better outcomes in the PISA rankings. Hungary and Bulgaria, although closer to Romania in terms of GDP allocations, have implemented more centralized education quality monitoring systems and better digital integration. These examples indicate that efficiency is not solely a function of investment level but of strategic policy direction, transparency, and stakeholder accountability.

A longitudinal analysis of education expenditure as a percentage of GDP over the period 2014–2023 (Figure 1) reveals that Romania consistently underperforms compared to the EU average, maintaining values below 3.7%, while the EU trend demonstrates a gradual increase toward the 5.4% benchmark, indicating a structural funding gap that correlates with lower educational efficiency in the Romanian system.

In the context of the United Nations 2030 Agenda for Sustainable Development, education financing must be seen not just as an economic tool but as a sustainability imperative. Goal 4 (Quality Education) calls for inclusive and equitable education and the promotion of lifelong learning. Romania's current trajectory shows partial alignment with these objectives, but more targeted investments are needed in environmental education, green campus initiatives, and sustainability-centered teacher training. Integrating sustainability into school management and curricula would enhance Romania's ability to develop resilient, informed future generations.

Figure 1. Education Expenditure as % of GDP (2014-2023)



Source: made by the author based on Eurostat data

Romania maintains a consistently low level, while the EU average shows a slight upward trend.

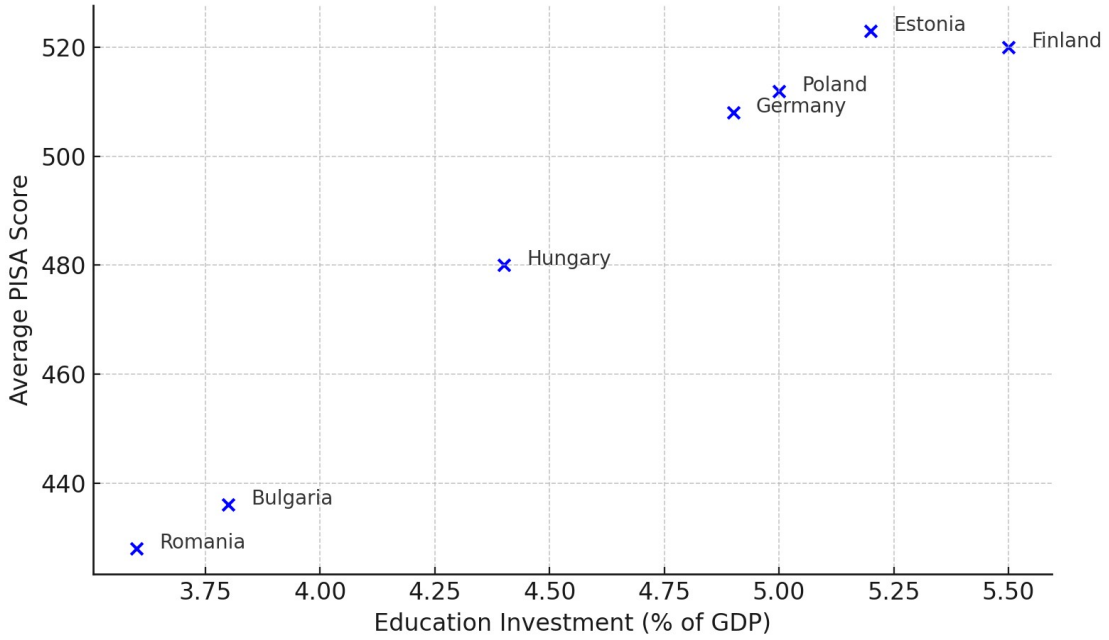
4.2. Human Capital Development and Economic Growth

Education financing plays a pivotal role in shaping human capital, which in turn drives economic competitiveness. Empirical studies underline that nations investing in high-quality education experience long-term growth through increased productivity and innovation. The correlation between tertiary education expansion and GDP per capita is especially evident in knowledge-based economies. In Romania's case, however, brain drain and mismatches between education and labor market needs reduce returns on investment. Thus, aligning educational policies with labor market trends and entrepreneurship initiatives is critical to maximizing the benefits of public spending.

The PISA assessments, administered by the OECD, serve not only as a benchmark for student performance in reading, mathematics, and science, but also as an indirect indicator of a country's capacity to develop human capital. High scores generally reflect the presence of robust cognitive skills essential for innovation, adaptability, and productivity in a knowledge-driven economy. Countries with strong PISA performance—such as Estonia or Finland—have consistently aligned educational content, teaching quality, and systemic support mechanisms to produce graduates equipped for both academic success and labor market integration.

In contrast, Romania's PISA results highlight persistent weaknesses in functional literacy and problem-solving, especially among students from disadvantaged backgrounds. These shortcomings undermine the formation of a competitive and resilient workforce, reinforcing the link between educational inequality and economic vulnerability. Addressing these gaps requires more than funding; it calls for targeted investment in early education, differentiated teaching strategies, and inclusive curricular reforms. Therefore, improving Romania's human capital stock begins with a measurable uplift in foundational skills as captured by standardized international evaluations like PISA.

Figure 2. PISA Scores vs Education Investment (as % of GDP)



Source: made by the author based on Eurostat data

Figure 2 illustrates a positive correlation between the percentage of GDP allocated to education and average PISA scores across selected European countries, suggesting that while financial inputs alone do not guarantee performance, underinvestment—as observed in Romania and Bulgaria—tends to coincide with systematically lower educational outcomes. Countries with higher investment tend to achieve better PISA scores, indicating a positive correlation.

4.3. Digitalization and Educational Technology Integration

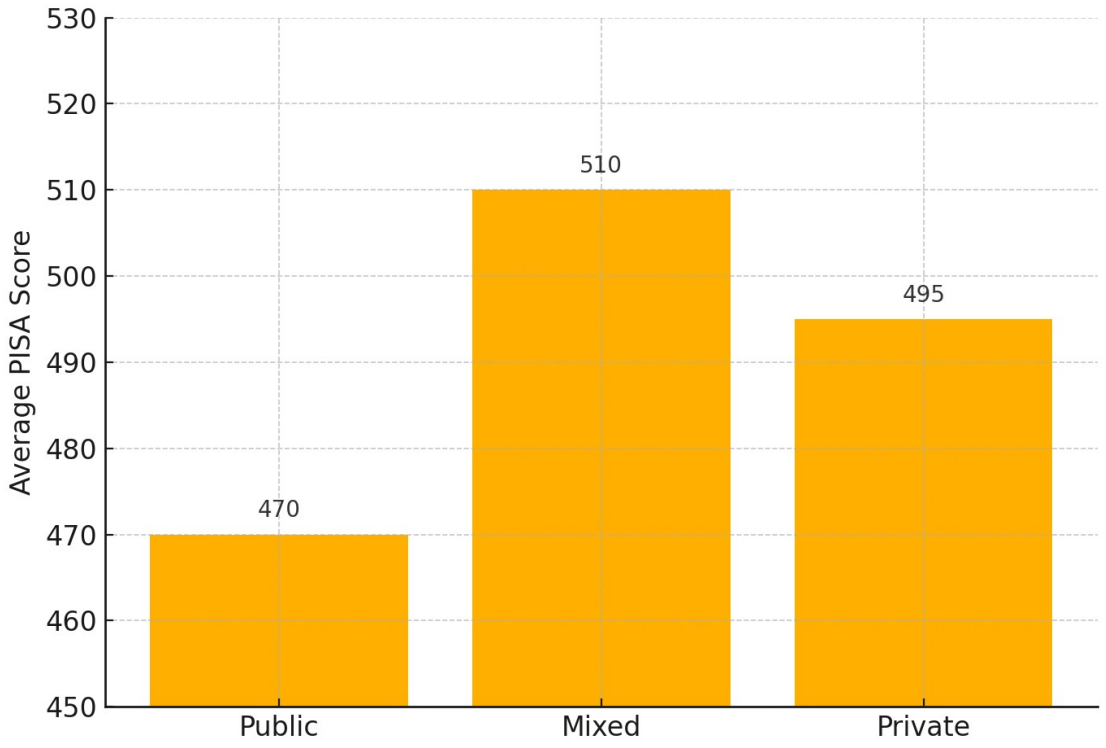
One of the key pillars of modern educational efficiency is digital transformation. Countries that have invested heavily in infrastructure, e-learning platforms, and teacher digital training—such as Finland or the Netherlands—demonstrate significant improvements in both student engagement and learning outcomes. In Romania, the COVID-19 pandemic exposed major gaps in digital readiness, especially in rural and marginalized areas. A comprehensive digital education strategy must address access disparities, ensure curriculum adaptation, and

provide continuous professional development to educators to ensure long-term effectiveness and inclusiveness.

4.4. Local Budget Allocation and Administrative Efficiency

Another dimension of educational efficiency relates to how funds are distributed at the local level. In Romania, school units under the authority of local councils often face fragmented budgeting and inconsistent resource availability. The lack of fiscal decentralization and capacity building within local administrations hinders the equitable distribution of educational opportunities. Introducing performance-based funding mechanisms at the county and municipal levels—linked to student outcomes, attendance, and graduation rates—could significantly improve resource targeting and institutional accountability.

Figure 3. Average Educational Performance by Financing Model



Source: made by the author based on Eurostat data

As shown in Figure 3, educational systems operating under mixed financing models—where public funds are supplemented by private contributions—tend to achieve the highest average PISA scores, highlighting the potential benefits of diversified funding strategies in enhancing educational efficiency and resource responsiveness.

Mixed models show the highest performance, effectively combining public and private resources.

5. Discussion

The results highlight the need for systemic reform and strategic investment in education. High-performing models integrate equity, digitalization, and teacher professionalism. Romania must overcome chronic underfunding and address structural inequalities.

A comparative reading of the data shows that Romania's structural underinvestment in education has long-term implications not only for learning outcomes, but also for national development. Despite marginal annual increases in education spending, the gap with EU averages remains significant, reflecting insufficient political prioritization. The lack of correlation between existing inputs and desired outputs indicates systemic inefficiencies in fund allocation and usage.

Moreover, public policies have not consistently targeted the foundational drivers of educational quality—such as early childhood education, teacher support, or equitable digital access. The current governance framework remains fragmented, with overlapping responsibilities between central and local authorities, leading to delays in reform implementation and uneven results across regions.

Maintaining the status quo in funding and administration risks exacerbating socio-economic inequalities and perpetuating a cycle of low productivity and limited innovation. Therefore, the Romanian government must shift toward a long-term, strategic vision of education as an engine of inclusive and sustainable development, aligning budgetary decisions with measurable performance indicators and demographic needs

6. Conclusions and Recommendations

Education must be treated as a priority investment. It is recommended to progressively increase the education budget, reform salary structures, expand digital infrastructure, and support vulnerable students. Educational efficiency depends not only on resources but also on how they are managed.

An effective education financing strategy must go beyond increasing the budget in absolute terms; it should focus on optimizing allocations based on evidence and outcome-based criteria. This includes funding programs with demonstrated impact, particularly in rural and underserved communities, and incentivizing schools and educators to pursue innovation and quality improvement.

Furthermore, educational reform should be guided by a participatory approach, involving local stakeholders, school leaders, and civil society, to ensure that policy implementation reflects real-world needs and reduces institutional inertia. Transparent monitoring and evaluation mechanisms must be embedded in the funding process to promote accountability and continuous learning.

Romania stands at a crossroads where modest improvements are no longer sufficient. A paradigm shift is needed—one that views education as a strategic sector interconnected with economic growth, technological progress, and democratic resilience. Aligning Romanian education policy with European best practices and SDG benchmarks is not merely desirable, but imperative.

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