

# INTERNAL AUDITING & RISK MANAGEMENT



YEAR XX, Supplement No. 71, May 2025



**ATHENÆUM  
UNIVERSITY**



# **INTERNAL AUDITING & RISK MANAGEMENT**

---

**Quarterly journal published by the „Athenaeum“ University &  
Centre of Excellence in Financial Management and Internal Audit**

**YEAR XX, Supplement No. 71, May 2025**

**Disclaimer:** Facts and opinions published in Internal Auditing & Risk Management Journal express solely the opinions of the respective authors. Authors are responsible for the English translation of their text, their citing of sources and the accuracy of their references and bibliographies. The editors cannot be held responsible for any lacks or possible violations of third parties' rights.

**BREN Publishing House**  
12 Lucăcești Street, District 6, Bucharest, Romania  
Tel/Fax: 0318179384  
[www.editurabren.ro](http://www.editurabren.ro)  
e-mail: [brenprod@gmail.com](mailto:brenprod@gmail.com)  
ISSN 2065 – 8168 (print) ISSN 2068 - 2077 (online)

**Indexed by:**  
RePEc , CEEOL, SSRN, EBSCO, CiteFactor, Google Scholar

# INTERNAL AUDITING & RISK MANAGEMENT

Quarterly journal published by the „Athenaeum” University &  
Centre of Excellence in Financial Management and Internal Audit  
YEAR XX, Supplement No. 71, May 2025

---

## EDITORIAL BOARD:

### Editor-in-chief:

PhD Professor, Emilia VASILE, “Athenaeum” University of Bucharest, Romania

### Editors:

PhD Associate Professor, Dănuț SIMION, “Athenaeum” University of Bucharest, Romania

PhD Associate Professor, Bendic VASILE, Politehnica University Timisoara, Romania

PhD, Julia M. PUASCHUNDER, The New School, USA

### Advisory board:

Academician Lucian-Liviu ALBU

PhD Professor, Emilia VASILE, “Athenaeum” University of Bucharest

PhD Professor, Daniel ARMEANU, The Bucharest Academy of Economic Studies

PhD Professor, Djilali BENABOU, University of Mascara, Algeria

PhD Professor Eng., Petru ANDEA, Politehnica University Timisoara

PhD Professor, Pellegrino MANFRA, City University of New York, USA

PhD Professor, Mariana MAN, University of Petrosani

PhD Associate Professor, Luciana BEZERITA, “Athenaeum” University of Bucharest

PhD Associate Professor, Nadir Ali KOLACHI, University of Fujairah, UAE

PhD Associate Professor, Brîndusa RADU, “Athenaeum” University of Bucharest

PhD Associate Professor, Valentin RADU, Valahia University of Targoviste

PhD Associate Professor, Dănuț SIMION, “Athenaeum” University of Bucharest

PhD Associate Professor, Mimouna ZITOUNI, Mohamed Ben Ahmed University, Algeria

PhD Lecturer, Gheorghe RADU, “Athenaeum” University of Bucharest

PhD, Titilade AJAYI, Osun State College of Technology, Esa Oke, Nigeria

PhD, Niaz ALI, Shaheed Benazir Bhutto University Dir Upper, Pakistan

PhD, Alice BELCHER, University of Dundee, United Kingdom

PhD, Asli HASSAN, Khalifa University in Abu Dhabi, UAE

PhD, Ivana MARINOVIĆ MATOVIĆ, University of Nis, Serbia

PhD, Salam OMAR, Abu Dhabi University, UAE

PhD, Chi Wei SU, Qingdao University, Economy School, China  
PhD, Willy TADJUDJE, University of Luxembourg, Belgium  
PhD, Raheem YOUNG, Argosy University, USA  
PhD, Hadiza WADA, Kaduna State University, Nigeria  
PhD, Wenjing WANG, Aarhus University, Denmark

#### **Founder:**

PhD Professor, Emilia VASILE, “Athenaeum” University of Bucharest, Romania

#### **Editorial Office: “Athenaeum” University of Bucharest, Romania**

Felicia Mihaela NEGOI, “Athenaeum” University of Bucharest, Romania

## **CONTENTS**

|                                                                                                                                                           |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| THE CRISIS OF GRIEVANCE. HOW GOVERNMENT, BUSINESS AND THE RICH<br>BECAME SOCIAL ENEMIES OR SOCIAL FEARS CAN MORPH INTO RESENTMENT<br><i>Radu GHEORGHE</i> | 9  |
| RESTRICTIVE MEASURES AGAINST RUSSIA: EU POLICY AND ROMANIA'S<br>LEGAL IMPLEMENTATION<br><i>Dalina-Maria ANDREI</i>                                        | 19 |
| THE IMPLICATIONS OF DEMOGRAPHIC AGEING ON THE LABOR MARKET<br><i>Brîndușa Mihaela RADU</i>                                                                | 29 |
| THE DIGITALIZATION OF PREVENTIVE FINANCIAL CONTROL: IT SOLUTIONS<br>FOR THE EFFECTIVE MANAGEMENT OF EU-FUNDED PROJECTS<br><i>Adrian NICOLAU</i>           | 37 |
| ARTIFICIAL INTELLIGENCE AND DECISION MAKING IN THE ECONOMY<br>IN THE CONTEXT OF INTERNATIONAL MOBILITY<br><i>Matei DUMITRESCU</i>                         | 49 |
| PROJECT-BASED ACCOUNTING AS A STRATEGIC INSTRUMENT IN<br>CONTEMPORARY FINANCIAL MANAGEMENT<br><i>Adrian NICOLAU, Larisa Roxana MANEA</i>                  | 58 |
| COST ACCOUNTING METHODS IN THE PHARMACEUTICAL INDUSTRY<br><i>Marius Daniel SISU, Emilia VASILE</i>                                                        | 70 |

## **The 16th Scientific International Conference**

### **CHALLENGES OF THE MODERN ECONOMY IN THE CONTEXT OF GLOBALIZATION**

Bucharest, Romania  
May 22-23, 2025

#### **SCIENTIFIC COMMITTEE**

Academician Lucian Liviu Albu, Institute for Economic Forecasting - Romanian Academy  
Prof.PhD Valeriu Ioan Franc, Corresponding Member, Romanian Academy  
Prof.PhD Emilia Vasile, "Athenaeum" University of Bucharest  
Prof.PhD Chi Wei Su, Quingdao University, China  
PhD CS I, Marioara Iordan, Institute for Economic Forecasting - Romanian Academy  
Prof.PhD Miryam Gonzalez Rabanal, National University of Distance Education, Spain  
Prof.PhD Mihaela Simionescu, Institute for Economic Forecasting - Romanian Academy  
PhD CS I, Carmen Beatrice Păuna, Institute for Economic Forecasting - Romanian Academy  
Assoc.Prof.PhD Simion Dănuț, "Athenaeum" University of Bucharest  
Assoc.Prof.PhD George Calotă, "Athenaeum" University of Bucharest  
Assoc.Prof.PhD Brîndusa Radu, "Athenaeum" University of Bucharest, Institute for Economic Forecasting - Romanian Academy  
Assoc.Prof.PhD Cătălin Dumitrescu, "Athenaeum" University of Bucharest  
Assoc.Prof.PhD Ion Croitoru, "Athenaeum" University of Bucharest  
Assoc.Prof.PhD Luciana Bezeriță, "Athenaeum" University of Bucharest  
Assoc.Prof.PhD Oana Popovici, Institute for Economic Forecasting - Romanian Academy  
PhD CS II Mihaela Nona Chilian, Institute for Economic Forecasting - Romanian Academy  
Lect. PhD Gheorghe Radu, "Athenaeum" University of Bucharest  
Assoc.Prof.PhD Mimouna Zitouni, Mohamed Ben Ahmed University, Algeria  
PhD Felice Langiu, Universita degli Studi di Sassari, Italy  
PhD Mahmoud Ali Eid, Al Zarka High Institution Computer & Business Administration, Egypt  
PhD Mohamed Salem Mashal, Higher Institute of Commercial Studies Mahalla, Egypt  
PhD Yasr Mohamed Al Garf, Tanta University, Egypt  
PhD Youns Hassan, Helwan University, Egypt

#### **ORGANIZING COMMITTEE**

President: Emilia Vasile, PhD Professor  
Members: Radu Brîndușa, PhD Associate Professor  
Bezeriță Luciana, PhD Associate Professor  
Radu Gheorghe, PhD Lecturer  
Secretary: Felicia Mihaela Negoii



DOI:10.5281/zenodo.17102717

## THE CRISIS OF GRIEVANCE. HOW GOVERNMENT, BUSINESS AND THE RICH BECAME SOCIAL ENEMIES OR SOCIAL FEARS CAN MORPH INTO RESENTMENT

**Radu GHEORGHE, PhD Lecturer**

Athenaeum University, Bucharest, Romania

radu.gheorghe@univath.ro

**Abstract:** *The Edelman Trust Barometer signaled at the beginning of 2020 the development of a huge sense of institutional distrust, a feeling amplified by the perception of the unprecedented proliferation of social inequities and inequalities. Most citizens, especially in the most developed countries, have sent an unequivocal message: not only do social inequalities give rise to great concerns, but the invalidation of the belief that sustained work leads to social advancement makes the hope for a better future unrealistic, even in conditions of economic growth or moderate unemployment. Shaped also by an unprecedented fragmentation of trust, the new paradigmatic landscape invited at the beginning of 2020 to intransigence regarding the way that trust should be granted, namely taking into account the respect of at least two criteria: competence (the ability to fulfill promises made) and ethical behavior (the ability to act correctly, contributing to changing society for the better). After only five years, at the beginning of 2025, the Edelman Trust Barometer signals not only the preservation of the same construct regarding the crisis of institutional trust among citizens. Moreover, the belief that both the government and business people serve the interests of the rich, to the detriment of ordinary people, seems to have taken root in public perception. It is a perception that, however, fuels a high level of resentment towards the government, the business environment and wealthy individuals, and which develops an essential question: Could it be a signal that in recent years society has traveled a path from fears to polarization, and now to resentment? Moreover, have the economic fears of the early 2020s already transformed into resentment within just five years?*

**Keywords:** *competence, economic growth, economic fears, ethical behavior, fragmentation of trust, institutional distrust, moderate unemployment, polarisation, resentment, social fears*

**JEL Classification:** *A10, A13, A14, Z10*

## **2020 – A world of two different realities of trust**

The effects of the economic crisis at the beginning of this century were much deeper. One of the facets seems to have been the sudden increase in inequality or the reversal of convergence in living standards, which led to a fueling of a big individual fears. In fact, the signs of generalized uncertainties were also felt in the Edelman Trust Barometer, with distrust in institutions reaching alarming levels at the beginning of 2020. All over the world, but especially among the populations of the most developed countries, including those of the EU, there have been growing concerns since 2020 about the increasingly non-inclusive nature of economic development. Concerns that practically derive from the fact that the growth of the Gross Domestic Product is no longer favorable to inclusion. Because there is rightly no longer any specific correlation between the growth of a state's GDP and the individual income of citizens (GDP per capita), more and more attention is being to the way in which income earned in an economy is distributed unevenly across the population or to the gap between the richest and poorest members of society that is a significant factor in economic and social well-being. Both have profound meanings in the area of equal access to the goods and services produced in a national economy. And this attention was increasingly transformed into social signals that seemed to send governments and decision-makers an invitation to change the way they approached the problem of inequality.

The increasingly categorical message of a part of the population in the most developed European countries has more than ever the vocation of a final warning: the huge level of inequality undermines not only trust in institutions, but also social equity. As part of the current mechanism of wealth distribution, the current dimension of inequality is increasingly seen as an unfortunate accident of history that must be corrected, as it has already significantly eroded social cohesion and a shared sense of belonging. In addition to the huge level of inequality at the beginning of 2020, there is also a very large gap (14%) between the informed public (65%) and the general public (51%). Thus, for the informed public, three of the four institutions under consideration are trustworthy (government, media and business). For the general public, no institution passes the trust test (government, NGOs, media and business), for all of which the population's trust was below 50%.

A very large number of countries record a huge fragmentation of trust, the most significant being in generally highly developed countries such as Australia (23 points), France and Saudi Arabia (21 points), Germany (20 points), the United Kingdom (18 points), Spain (17 points). If in terms of skills, the business environment ranked best, being 54 points behind government as institution that is good at what it does (64% / 10%), in terms of ethics, NGOs had

a fairly large lead compared to the government (31-point gap) and the business environment (25-point difference). However, it should be emphasized that at the beginning of 2020, no institution (government, business, NGOs, media) was seen as both competent and ethical, only businesses being considered competent or NGOs being seen as ethical.

Some statistical data are relevant to underline the importance of the message sent by a large part of the populations that calling for the urgent launch of a strong mechanism to combat poverty and social exclusion, designed for a Europe that seems to have forgotten that the benefits of development must be present in all its regions, thus strengthening the process of economic, social and territorial cohesion:

- For 61% of respondents, the pace of technological change is too fast;
- A higher percentage (66%) expresses fear that technology will make it impossible to distinguish between what is real and what is fiction;
- A cohort of 61% believe that governments do not understand emerging technologies enough to regulate them effectively;
- Approximately 57% believe that the media they read is likely infected with contaminated (unsafe) information, while approximately 76% are concerned that fake news will be used as a weapon;
- 66% do not trust that current leaders will be able to successfully solve current problems;
- 57% are worried that they will lose the respect and dignity they once enjoyed in their countries (the highest values in European countries are: Italy - 67%; Spain - 64%; France - 62%; Germany - 52%).

The Edelman Trust Barometer highlighted at the beginning of 2020 the start of a serious trust institutional crisis, with no institution seen as both competent and ethical (government, business, NGOs, media).

## **2025 - Polarization and felt inequalities. Political and economic systems under pressure**

According to the Edelman Trust Barometer, at the beginning of 2025 more than 60% of respondents reported a feeling of dissatisfaction, from moderate to high, especially targeting governments and the business environment. Such a perceptual construction is not accidental, however. A closer look at the data reveals an undeniable truth: in the last decade, society has traveled a path from fears to polarization, then to a deep dissatisfaction, similar to the transformation of fears into resentment.

The Edelman Trust Barometer 2025 also records a lack of confidence among leading economies, with five of the ten largest global economies among the least confident nations in the trust index: Japan (37%), Germany (41%),

the United Kingdom (43%), the United States (47%) and France (48%), while developing nations are more optimistic: China (77%), Indonesia (76%), India (75%) and the United Arab Emirates (72%). From a political perspective, we are already seeing major changes in the US, UK, France, Canada and even South Korea, amid the discontent of voters who have lost their jobs due to globalization and inflation. Shaped by a zero-sum mentality (according to which in such a situation there can only be a winner and a loser, one's gain being equivalent to the other's loss), the current functional paradigm certainly lacks several variables willing to work within the development equation: cooperation, trust, tolerance. The zero-sum mentality can rather lead to hard competition, lack of collaboration and difficulties in building positive relationships, indirectly legitimizing extreme measures such as violence and disinformation as tools for change.

Four key factors appear to underlie the new construction:

- Lack of hope for the next generation and huge distrust that things will look better than today for the next generation,
- Fragmentation of trust based on income (respondents with low incomes have less trust in institutions than those with higher incomes),
- Huge lack of trust globally in institutional leaders (government representatives, business people and journalists) seen rather as individuals willing to deliberately mislead,
- Generalized confusion around credible information (major uncertainties around routes leading to credible sources of information).

A mixture of fears and a decline in institutional trust unprecedented in human history somehow shapes the beginning of 2025, indirectly signaling possible paradigm shifts at a global level.

### ***Globalization, economic, and technological fears worsen job insecurity***

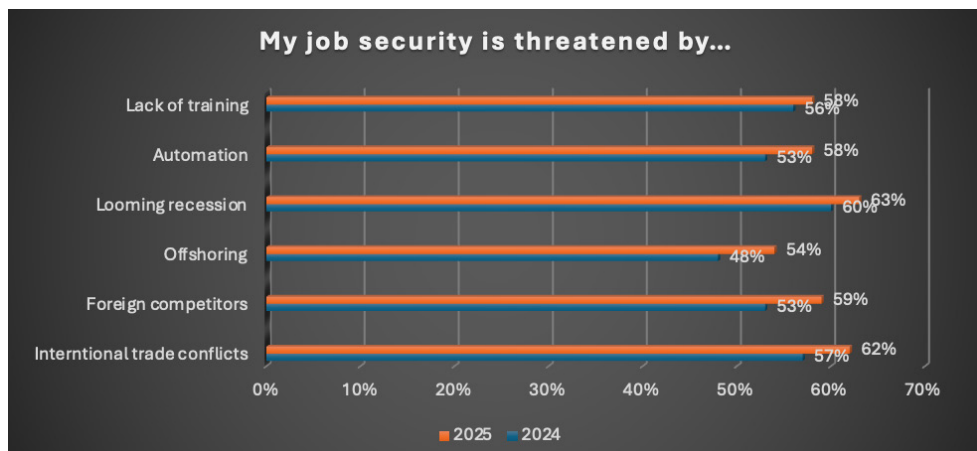


Figure 1. Percent of employees who worry, 2025. *Source: Author*

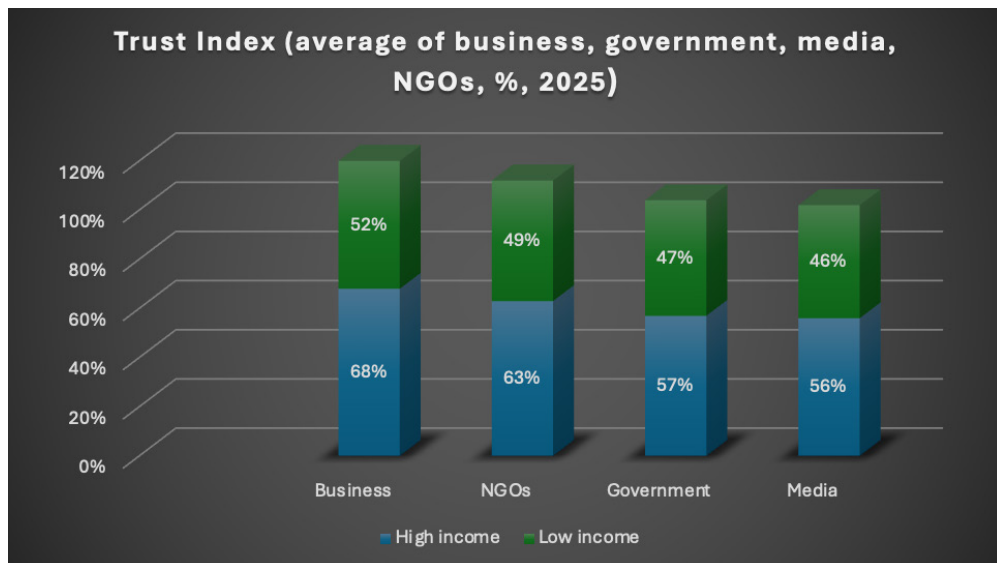
***Low income mired in distrust***

Figure 2. Trust Index (average of business, government, media, NGOs, %, 2025).

*Source: Author*

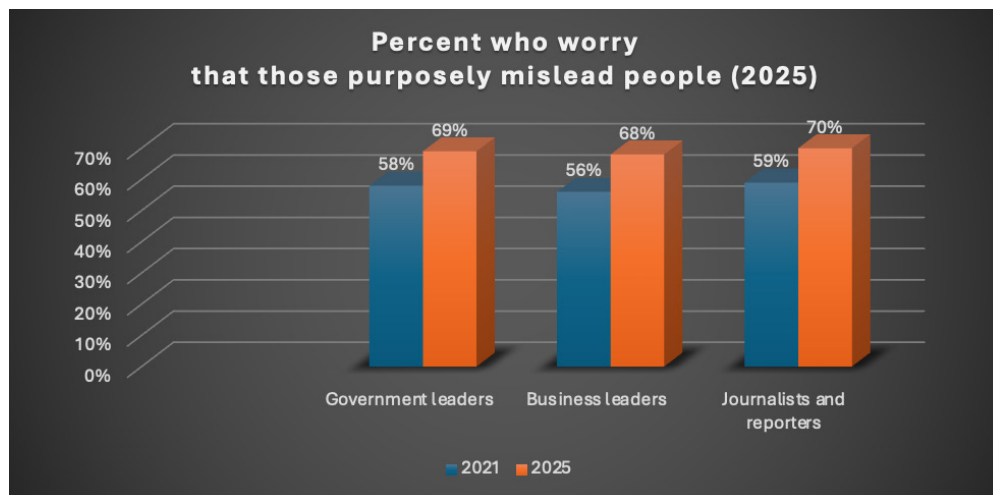
***Fear that leaders lie to us at all-time high***

Figure 3. Percent who worry that those purposely mislead people (2025)

*Source: Author*

*In most developed countries, less than 1 in 5 say next generation is better off*

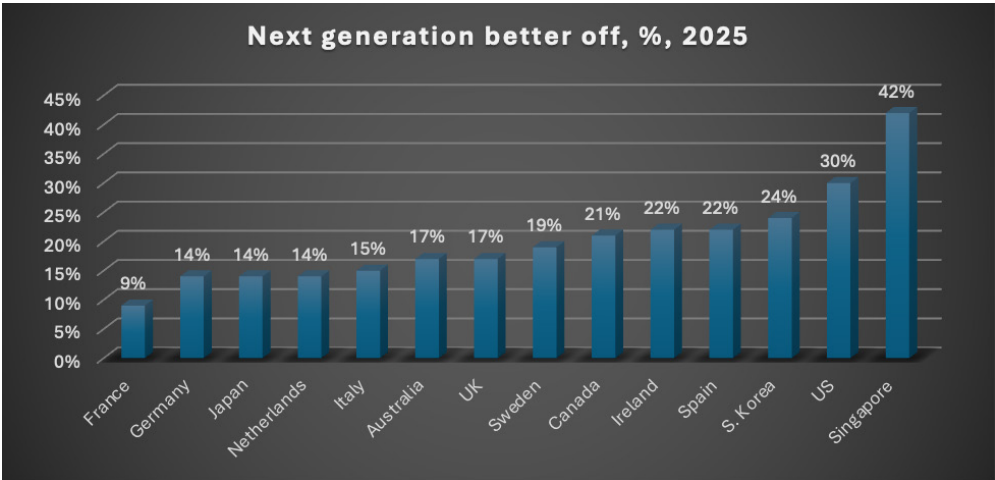


Figure 4. Compared to today, the next generation better off (%, 2025)

Source: Author

*Fear of being discriminated against surges to all-time high (an average increase of 10 percent in a single year)*

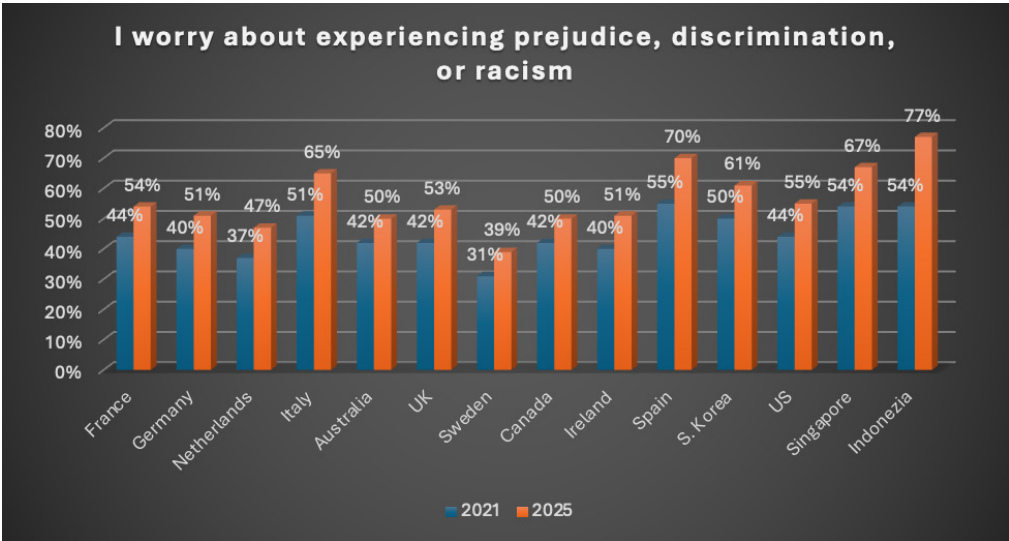


Figure 5. Percentage of people who express concern about experiencing prejudice, discrimination, or racism

Source: Author

## 6 in 10 Hold Grievances Against Business, Government, and the Rich

Concerning 2025 Edelman Trust Barometer, they hold a sense of grievance because:

- Business and government serve select few,
- Business and government actions hurt they,
- The system favors the rich,
- The rich are getting richer.

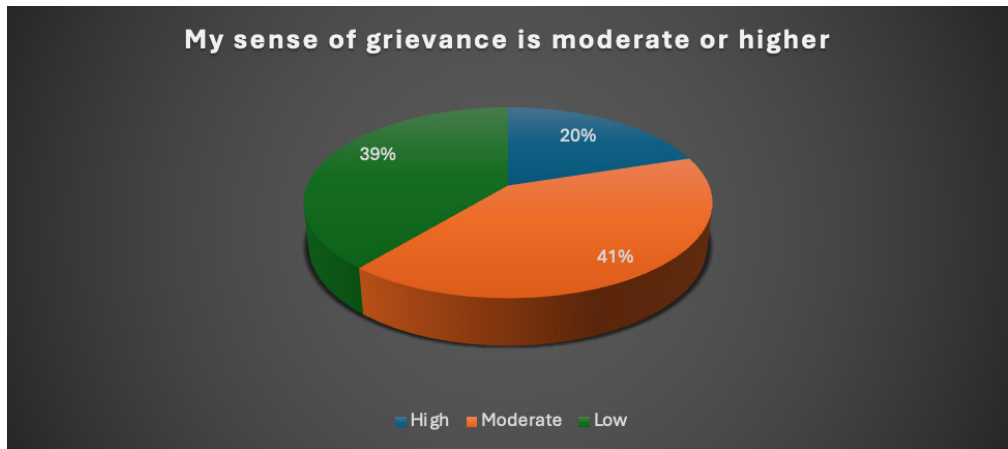


Figure 6. Percent who hold a low, moderate, or high sense of grievance

*Source: Author*

## Majorities Hold Grievances in Nearly All Countries Measured

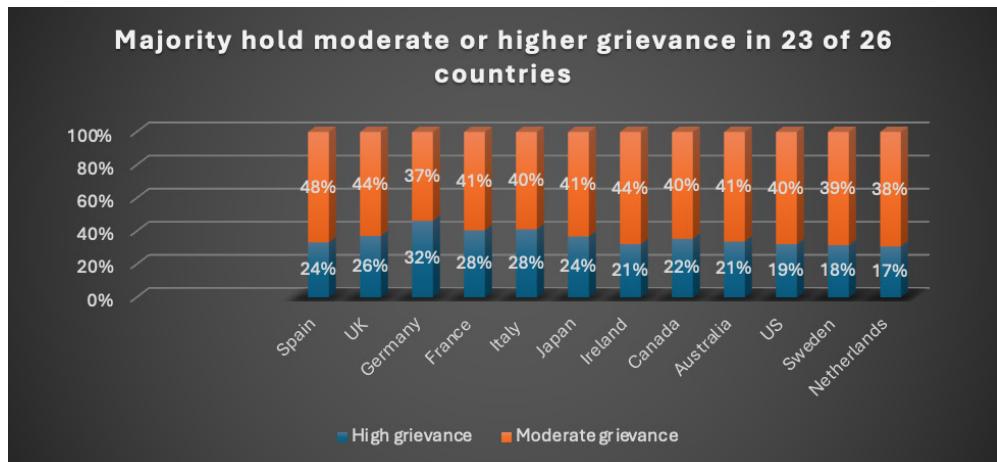


Figure 7. Majority hold moderate or higher grievance. *Source: Author*



### ***Your Gain is My Loss: Grievance Instills a Zero-Sum Mindset***

What is interesting is that there is a very big percent who say, by sense of grievance: “I have a zero-sum mindset: what helps people who don’t share my politics comes at a cost to me”. In these conditions social contract is at risk: with high grievance, there are 2x more likely to have a zero-sum mindset than low grievance.

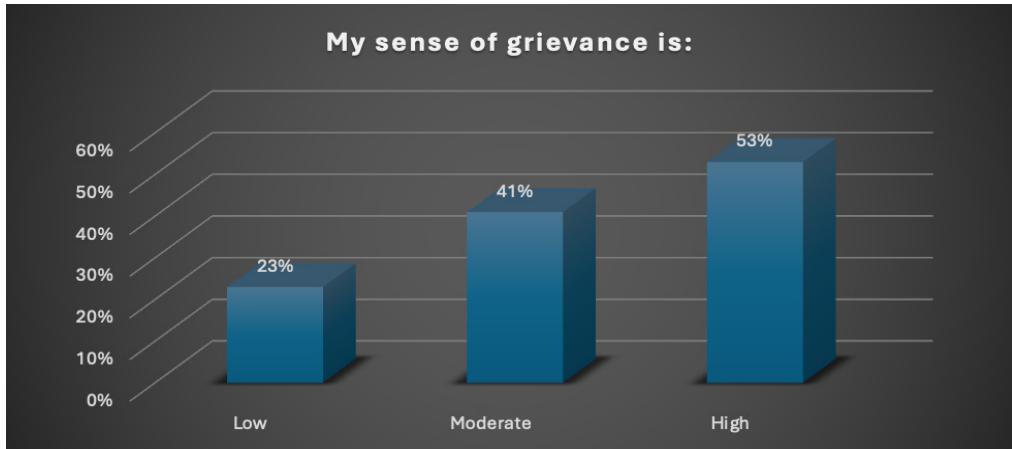


Figure 8. Your Gain is My Loss: Grievance Instills a Zero-Sum Mindset

*Source: Author*

### ***Grievance Imposes a Trust Penalty***

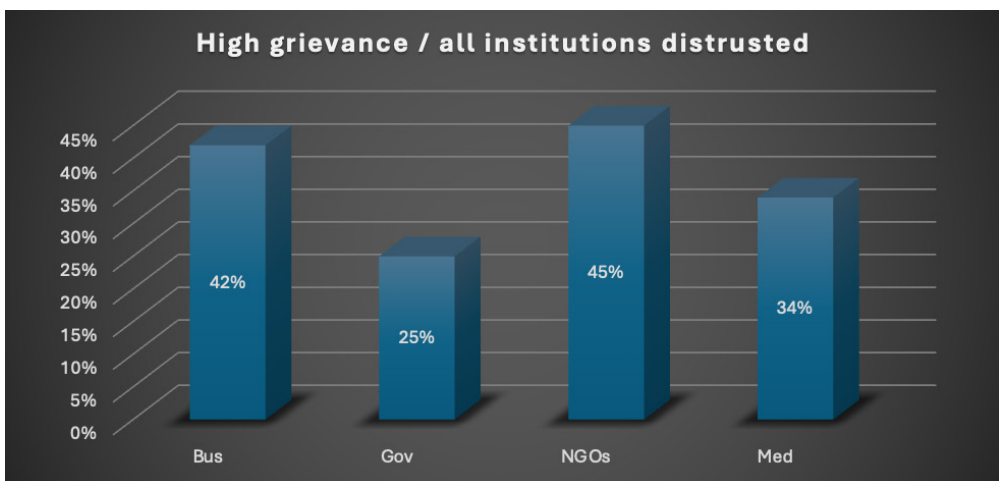


Figure 9. Percent trust, by sense of grievance. *Source: Author*



## NGOs: Fight Divisiveness and Repair the Social Fabric

Non-governmental organizations have regained trust (53% of those moderately dissatisfied, 52% of those very dissatisfied and 43% of those slightly dissatisfied trust NGOs), being seen as the only institution with a unifying force among those with a high sense of dissatisfaction and the institution with the greatest trust among this group.

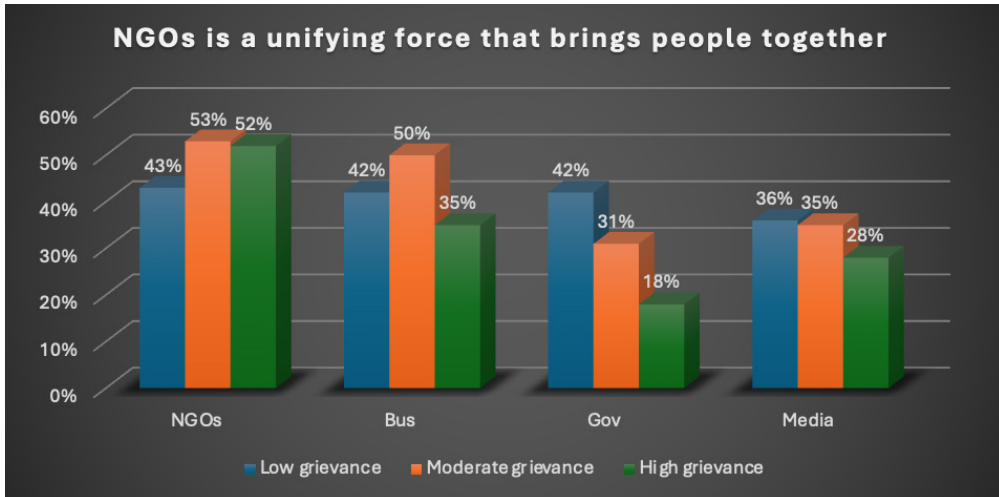


Figure 10. NGO's regained trust

Source: Author

## Conclusions

1. In the last decade, society has evolved from fear to polarization, and now to resentment, fueled by at least four perceptions:

- Lack of hope for the next generation,
- There is a difference in trust conditional on income (fragmentation of trust),
- Unprecedented global lack of trust in institutional leaders,
- There is general confusion about credible information.

2. Economic anxiety grows globally

- Globalization, technology, and the threat of recession all drive up fears of job insecurity

3. Grievance undermine trust

- Majority worldwide feel a sense of grievance against business, government, and the wealthy

4. The lack of confidence among the top economies seems alarming, with five of the ten largest global economies being among the least confident nations in the confidence index: Japan (37%), Germany (41%), the United Kingdom (43%), the United States (47%) and France (48%), while developing nations are more confident: China (77%), Indonesia (76%), India (75%) and the United Arab Emirates (72%).

5. There is an unprecedented crisis of confidence that humanity is going through:

- People expect business and the media to fix the problems they have created
- 61% think that governments do not enough understand emerging technologies to regulate them effectively;
- About 57% think that read media is likely infected with contaminated (unsafe) information, while about 76% are concerned that fake news will be used as a weapon;
- In the last time, non-governmental organizations have regained trust.

Non-governmental organizations have regained trust (53% of those moderately dissatisfied, 52% of those very dissatisfied and 43% of those slightly dissatisfied trust NGOs), these being seen as the only institution with a unifying force among those with a high sense of dissatisfaction and the institution with the greatest trust among this group.

## References

- Edelman (2020). *2020 Edelman Trust Barometer: A growing sense of Inequity is undermining Trust*. <https://www.edelman.com/trust/2020-trust-barometer>
- Edelman (2025). *2025 Edelman Trust Barometer: Trust and the crisis of grievance*. <https://www.edelman.com/trust/2025/trust-barometer>

DOI:10.5281/zenodo.17102739

# RESTRICTIVE MEASURES AGAINST RUSSIA: EU POLICY AND ROMANIA'S LEGAL IMPLEMENTATION

**Dalina-Maria ANDREI, PhD**

Institute for Economic Forecasting, Romanian Academy, Bucharest, Romania  
dalinaandrei@yahoo.com

**Abstract:** *This paper analyzes the set of sanctions imposed by the EU on its member countries' direct relationships with the Russian Federation, as a response to the military aggression against Ukraine. This paper presents a synthesis of restrictive measures taken in large domains, such as finance, energy, trade, and technologies, along with proposed direct targets and objectives, and their consequences. Besides, it will be seen the Romanian position on this set of measures, which means together with both the existent deficiencies of the national legislative and institutional background and the present context of reforms in this country. It will be about the efficiency of transposing these measures into legislation and about the institutional capability of applying and assessing their effects. Finally, a summary of impact elements of these sanctions on Russia will be tried and so our answer regarding the results of such a kind of restrictive policies applied.*

**Keywords:** *energy efficiency, EU energy policy, EU integrated national energy and climate plans (NECPs), European Union (EU)*

**JEL Classification:** *Q40, Q43, Q48*

## 1. Introduction

The starting point of this contribution and its related facts is, of course, the February 2022 Russian invasion of Ukraine, an event that triggered an unprecedented wave of international reactions, at the center of which are the economic, financial, and other sanctions imposed by the EU, the US, and other developed democratic countries. Implemented in several successive phases, these sanctions aim to limit Russia's capacity to sustain such a military effort and to discourage its violations of international law.

According to Black's Law Dictionary (the 6th edition, 1990), the economic sanctions are "measures taken or actions against persons and legal entities, including States, in order to impose a law or an international treaty or agreement to be respected" (Black, 1990). Actually, a State or States

group agrees on a set of restrictions to be taken against States, all kinds of organizations and persons in order to sanction some law broken and/or to obtain some behavioral changes or foreign policy objectives. By different criteria of classifying, sanctions might be economic and financial (e.g. freezing of assets, trade restrictions), diplomatic, military or just individual, or they might be unilateral – i.e. taken by just one State – or multilateral – when taken by groups of States, here including the EU or UN. A State is likely to be sanctioned for its acts and/or facts that prove unacceptable to those who sanction or to the international community given principles – of course, here including abuses of all kind, human right problems and aggression against other States. Sanctions are assumed to influence the sanctioned State to change its policy and acting. One also might talk about a true inventory of sanctions historically accumulated by authorities like the UN, EU, USA, and UK (Lexis Nexis, 2024).

As for the last and present case of sanctions against Russia – for its aggression against Ukraine since February 2022 – not only the EU and US, but equally Canada, Japan, Australia and not only came to impose about 16,500 individual sanctions related to industrial sectors like energy, finance, transports and technologies accessed (BBC, 2024). The most common examples among these sanctions could be cited as: banning technology exports to Russia, freezing the assets of Russian banks and officials in Western banks, and embargoes on Russian crude oil and derivatives, as well as natural gas. The EU has banned imports of sea-borne crude oil, and the US and the UK have completely blocked purchases of oil and gas from Russia. The Russian State institutions, the same as the business environment, were targeted by these sanctions. A context in which important and famous companies working on a global scale – e.g., McDonald's, Coca-Cola, Starbucks, Heineken – have chosen suspension of activities or leaving the Russian home market, as a consequence. Though there are contrary individual examples – i.e., some firms do prefer to continue their operations in Russia, be it indirectly in some of the cases.

Not to be omitted in context, some aspects through which Russia seems to have succeeded in avoiding or diminishing the effects of sanctions at least partly – e.g., the probable existence of a “ghost fleet” of approximately 1,000 oil tankers, used to export oil at prices above the ceiling set by G7 (Atlantic Council, 2024). The International Energy Agency also mentions an amount of approximately 8.3 million barrels of crude oil per day exported by Russia to India and China, as redirected from initial Western destinations (IEA, 2023). In addition, on the Russian imports side Kapatadze (2023) explains the ways of accessing western goods under the same sanctions through indirect routes and/or using trade networks of other countries like Kazakhstan, Belarus or Georgia.

In this context, the present paper seeks to address a series of essential questions:

- What types of sanctions have been imposed and how do they function?
- What are the legal and institutional mechanisms through which sanctions are enforced in the European Union?
- How is the new European sanctions legislation being implemented in Romania?

## **2. General framework of the current EU sanctions against Russia (Council of the EU, 2024)**

The EU Treaty (1992) does allow the Council of the EU to adopt sanctions against other countries, entities, and individuals off the territory in order to determine (at least) behavioral changes to them according to European values and EU objectives – i.e., by Article 29 in the chapter afferent to the common Foreign and Security Policy of the EU (PESC). As compared to decisions related to economic aspects – these are supposed to be taken by a qualified majority –, decisions related to sanctions require unanimity within the Council. The content of such sanctions is made especially by export bans, travel restrictions, and asset freezing. It is the European Commission (EC) that monitors the sanctions' application and sustains the member States and other actors involved (Euro-Lex, 2021).

The EU has adopted a total of 17 large sanctions packages, as currently in force, against the Russian Federation since the invasion of Ukraine on 24 February 2022 and equally illegal annexation of territories in context. These sanctions were also preceded, at their time, by another set of sanctions in force since 2014, when the annexation of Crimea and Sevastopol, and so breaking provisions of the Minsk agreement.

As also mentioned above, these current EU sanctions include restrictions for economic sectors – e.g., energy, finance, transport, exports-imports – and activities – e.g., goods of double usage, financing of exports and imports – and for individuals – e.g., visas for individuals, special restrictions for some Russian citizens (EEAS, 2024; Council of the EU, 2022). In the same context of its Common Foreign and Security Policy (CFSP), the EU organization enacted corresponding decisions and regulations in order to be transmitted to member States for shaping a uniform behavior within the region (EEAS, 2024).

It is this way that, besides the objectives of economic and military weakening of Russia, with consequences targeted on both short and long terms, the EU Organization intends its message of principles' unanimity on the Western side vis-à-vis the Russian authority and citizens.

## **2.1. The EU economic sanctions against Russia. An overview**

In addition to all of the above, the EU has blocked the activities of Russian media accused of propaganda and restricted the dissemination of disinformation content on its territory. Currently, the sanctions regime covers 1,783 individuals and 469 entities involved in actions considered a threat to the sovereignty and territorial integrity of Ukraine (EEAS, 2024). See the following classification.

*Financial sanctions against Russia* include banning access to the SWIFT system for 10 Russian banks, thus preventing them from using the global interbank communications network needed for fast and secure financial transactions. More than this, Russia meets serious access restrictions on the financial and capital markets of the EU region. Transactions between the EU and the Central Bank and Regional Development Bank of Russia are banned. The high amount deposits of Russian citizens in the European banks are to be limited. There are also banned the EU region origin investments in projects that belong to the Russian Fund for Direct Investments. Not banned, but restricted the supply of euro banknotes and crypto-assets, as well as the consulting on trusts belonging to Russian citizens. Limited the access of Russian entities to the “SPFS-Transfer System of Financial Messages” (Council of the EU, 2024). A total amount of about 260-billion-euro assets, in cash and securities, that belongs to the same Central Bank of Russia has been blocked by the EU and Australia, as G7 partners and, actually, about two thirds of this amount stay in EU member countries.

In its session of May 2024, the EU Council decides that the exceptional profits afferent to the Russian sovereign assets in Europe under freezing be re-directed to the Ukraine’s self-defense and future reconstruction. Then, in June 2024, the G7 announces a new financial package of sanctions against Russia of about 50 billion dollars as related to these same extraordinary revenues. Or, such a new initiative aims both a strong political message and an increasing economic and military pression in the sense of weakening the Russian military system by way of its resources (EEAS, 2024).

*Sanctions in the energy sector* aim to limit Russia’s revenues from this sector and to reduce the EU region’s dependence on Russian resources. There are here included, besides price ceilings for the sea transportation of all oil related products coming from Russia, the ban of imports from Russia and of re-exports to the EU region of Russian crude oil, petrol, liquefied petroleum gas (LPG), coal and liquefied natural gas (LNG). On the EU’s exports side, there are banned all exports afferents to technologies for the energy industry of Russia, to gas storage capacities for Russian nationals, as well as to all new possible investments in the Russian energy and mining sectors, here including the GNL type projects (Andrei 2025).

*Sanctions in the transport sector* aim to limit logistical and transportation capacities and capabilities of Russia in view of closing the EU airspace and ports to Russian aircraft and ships. One is banning the exports to Russia of products and technologies of maritime and space industries. The same for exports of complete aircraft, spare parts and turbojet fuel to Russia. The same for Russian road transport operators transporting goods to the EU, as well as trailers and semi-trailers registered in Russia. The same for all transactions with the Russian Naval Register and/or provision of repair, maintenance and related financial services (Andrei, 2025).

*Sanctions in the defense and technology sectors* regards only EU exports to Russia. There are here included military dual-use items, drone components, weapons, ammunition, military vehicles and equipment. Exports of electronic, optical, IT equipment and chemicals that could support Russia's defense and security industry are also prohibited.

*Trade sanctions* are aimed at reducing Russia's industrial capabilities and include bans on exports to Russia of luxury goods and restrictions on imports from Russia of steel, iron, cement, copper, aluminum, wood, paper, synthetic rubber, helium, and various consumer goods such as seafood, spirits, cigarettes, cosmetics, diamonds, and gold.

*Sanctions on the services* provision regard the services of accounting, auditing, tax, legal and IT consulting, as well as architectural, engineering, advertising and market research. Technical, financial assistance and brokerage for sanctioned products are also prohibited, as well as the transfer of intellectual property rights and the use of software for business management and industrial production (Andrei, 2025).

*Others.* The EU sanctions include banning media organizations and individuals involved in disseminating disinformation. The same for suspending visa agreements – e.g. excluding travel documents issued by the Russian authorities in the occupied regions of Ukraine and the separatist territories of Georgia, as they are not valid for accepting the reduction in the search front (Council of the EU, 2024). The same for a series of measures aimed at countering hybrid threats. These latter include actions such as undermining democratic processes, economic and critical infrastructure sabotage, cyberattacks and migration manipulation – e.g. in 2021, when Lithuania, Poland and Latvia were affected by a coordinated influx of illegal migrants from Belarus (EU Council, 2024).

The EU decided in December 2023 to ban imports of diamonds of Russian origin. This decision is part of another joint initiative of the G7 countries to implement a coordinated international ban, aimed at reducing the revenues obtained by Russia from this strategic sector (EEAS, 2024).



The EU settled a distinct legal mechanism for the introduction of individual sanctions. These are targeted against individuals and also organizations accused of involvement in systematic abuses -- e.g. violation of fundamental human rights, suppression of civil society, repression of democratic political opposition and erosion of the rule of law in Russia, without presumable effects on the economy as a whole (Council of the EU, 2024a).

To counter the indirect support provided by country-States, as well as by individuals and/or organizations of their territories, the EU expanded the scope of sanctions to include all these, targeting in particular entities and individuals from Belarus, Iran and the Democratic People's Republic of Korea (EEAS, 2024).

A complex approach regarding Belarus. Measures adopted in March 2022 reflect, encompassing both individual sanctions and sectoral restrictions (Council of the EU, 2022a). These cover strategic areas such as trade in sensitive goods – e.g. firearms, dual-use technologies and equipment from the aeronautics, space and defense industries –, as well as the road transport sector, with bans for Belarusian operators. In addition to the trade dimension, financial measures were also imposed: disconnecting Belarusian banking institutions from the SWIFT system, blocking financial relations with the Central Bank of Belarus, limiting capital flows from Belarus to, and banning a state-issued banknote in the country. Subsequently, on 29 June 2024, the sanctions regime was strengthened by a new package of trade measures, designed to align the restrictions imposed on Belarus with those already in force against Russia (EEAS, 2024).

Regarding Iran, in July 2023 the European Union adopted another package of sanctions aimed at limiting this country's contribution to supporting Russia's military effort in the war against Ukraine. These measures focus on activities related to the design and manufacture of drones (unmanned aerial vehicles /UAVs) actively used in the conflict illegally initiated by Russia. The sanctions also include restrictions on the supply of equipment and parts intended for the assembly of these UAVs (EEAS, 2024).

In February 2024, the European Union also adopted restrictive measures against entities and individuals suspected of involvement in facilitating the transfer of arms from the Democratic People's Republic of Korea to Russia. These sanctions aim to prevent the delivery of military equipment and weapons that could support Russia's war effort (EEAS 2024).

Last, but not least, the EU imposed all these sanctions against Russia through formal legal instruments called EU Council Regulations and Decisions. These are binding and automatically apply in all member States, without the need for national laws to implement them. However, in practice the concrete application (how compliance with the sanctions is verified, how violations are



investigated and sanctioned, etc.) has depended on each member State in part. This means that there may be differences between countries in the interpretation or rigor with which sanctions are implemented.

## ***2.2. The new European legislation on sanctions***

On 24 April 2024, the European Parliament and Council adopted the EU Directive 2024/1226 defining criminal offences and sanctions for breaching Union restrictive measures (Eur-Lex, 2024) and so correspondingly modifying the previous EU Directive 2018/1673 (Eur-Lex, 2018). The new Directive is for investigating and sanctioning violations and circumvention of EU restrictive measures. It standardizes the definition of crimes, so eliminates the approach differences between member States and strengthens the deterrent effect of acting against. There are to be found in its content: (i) failure to freeze assets, violating embargoes, providing prohibited services, or concealing funds; (ii) penalties for individuals, including imprisonment (minimum 5 years for certain cases) and fines; legal entities can receive fines of up to 5% of turnover or EUR 40 million; (iii) aggravating and mitigating factors, as clarified; (iv) stricter rules on freezing and confiscating assets; (v) minimum statutes of limitations; (vi) obligation for the member States to cooperate with European institutions, i.e. the European Commission, the European Public Prosecutor's Office, the European Union Agency for Criminal Justice Cooperation (Eurojust) and the European Union Agency for Law Enforcement Cooperation (Europol). The EU Directive had to be transposed into the national legislation of the member States by May 20, 2025, together with the implementing rules.

## **3. Romanian legal framework for the sanctions' appliance and institutions**

In Romania, one of the EU member States since 2007, international sanctions are regulated by Government Emergency Ordinance (GEO) No. 202/2008, supplemented by GEO No. 79/2022, approved by Law No. 357/2023 (Parliament of Romania, 2023). However, it is the terms of implementation and control mechanisms that these normative acts did not bring significant progress in. Plus, the main institutions here involved – i.e. Ministry of Foreign Affairs, National Agency for Financial Administration (NAFA), Office for Prevention and Combating the Money Laundering and Corruption Prevention – face difficulties in effectively implementing restrictive measures, due to the lack of resources, clear procedures and inter-institutional cooperation. In context, the Government also issued Decision No. 269/2022 that establishes the new Interministerial Committee for the Application of International Sanctions on 7 April, 2022.

Basically, all Romanian authorities and public institutions are legally committed to implement the international sanctions each for its own competence area. National Agency for Financial Administration (NAFA) is in charge for respective economic resources and funds freezing, as ordained by the special ordinance of this Institution's president, issued and published in the Official Gazette. Thus, NAFA managed to block funds of up to 10 million euros and confiscate a total amount of 13.1 million Ron, as part of actions in accordance with international sanctions related to the Russian-Ukrainian war (Economedia, 2022). Seven international companies, including Aeroflot, TMK and four companies belonging to the same group, such as Metalloinvest Trading, MMK Metalurji and MMK Metalurji Sanayi, were subject to these restrictive and punishment measures. To these, contravention fines totaling 280,000 Ron were added as imposed for failure to comply with sanctions.

The National Office for Prevention and Combating of Money Laundering and Corruption Prevention also has its own competence and power to impose restrictions on fund transfers and financial services, particularly for the purpose of preventing nuclear proliferation (One–Two Thoughts, 2025). On the other hand, there were also nine sanctions waiver orders issued, given the social and economic impacts of sanctions. These other measures were taken to allow certain companies, including employees, to continue their activities without directing financial resources to Russian media figures on the sanctions list (Economedia, 2022).

GEO No. 135/2024, amending and supplementing GEO No. 202/2008 on the implementation of international sanctions, was aimed at strengthening the capacity to apply sanctions and so increase compliance with the country's European obligations (Government of Romania, 2024). It remains to be seen whether these changes will be implemented efficiently.

#### **4. Conclusions**

In summary, the restrictions against Russia targeted multiple key sectors, including energy, with embargoes on oil, coal, and liquefied gas, so affecting Russian export infrastructure. Besides, there are harsh financial sanctions imposed, as those for excluding Russia from the SWIFT system, limiting Russian entities' access to international financial markets, and banning the use of cryptocurrencies to evade sanctions. Another important pillar of the same sanctions was the ban on the export of critical technologies to Russia, including advanced drone equipment, electronic components and software, along with other severe restrictions on metal imports from Russia, such as steel and aluminum. Even more, a new critical aspect was the fight against

Russian propaganda and disinformation, by banning media outlets such as RT and Sputnik. These sanctions were complemented by measures on transport, investment, the cultural and sports industry, and the protection of Ukraine's cultural heritage. All of these restrictions were designed to weaken Russia's ability to sustain the conflict, to undermine its economy and to isolate Russia on the international stage. The effectiveness of sanctions, however, depends not only on the severity of the measures themselves, but also on the coherence of implementation at national level by each member State.

As for Romania, its whole context is basically aimed at harmonizing national legislation with European Union regulations, to introduce specific obligations for Romanian entities. The same applies to strengthening the regulatory framework specific to the sanctioning regime and aligning it with the EU one. In context, Romania adopted GEO No. 135/2024, amending and supplementing GEO No. 202/2008 on the implementation of international sanctions. The new brought in by these Acts might consist in: introducing the obligation of due diligence for Romanian entities – i.e. verification of buyers and partners to avoid transactions with persons subject to sanctions –, and clear mechanisms of inter-institutional cooperation – i.e., involving the Ministry of Foreign Affairs, the Ministry of Finance, the National Anti-Money Laundering and Corruption Prevention Office, the National Bank of Romania, etc.). At the same time, the ordinance establishes a national sanctioning regime for non-compliance with these measures.

## References

- Andrei, D.M. (2025). *The EU-Russia Trade Relationship: Trends, Restrictions and Structural Changes in the Goods Trade (2013-2023)*. Annals of the „Constantin Brâncuși” University of Târgu Jiu, Economy Series, 2/2025. Available at: <https://www.utgjiu.ro/revista/?page=curent&nr=2025-02>
- Atlantic Council (2024). *The threats posed by the global shadow fleet and how to stop it*. Report December 6/2024. Available at: <https://www.atlanticcouncil.org/in-depth-research-reports/report/the-threats-posed-by-the-global-shadow-fleet-and-how-to-stop-it/>
- BBC (2024). *What are the sanctions on Russia and have they affected its economy?* Available at: <https://www.bbc.com/news/world-europe-60125659>
- Black, H.C. (1990). *Black's law dictionary*. 6th ed. St. Paul, MN: West Publishing Co.
- Council of the EU (2022). *Special Meeting of The European Council*, 24 February 2022. Available at: <https://www.consilium.europa.eu/en/meetings/european-council/2022/02/24/>
- Council of the EU (2022a). *EU sanctions against Belarus*. Available at: <https://www.consilium.europa.eu/en/policies/sanctions-against-belarus/>

- Council of the EU (2024a). *Russia: EU sets up new country-specific framework for restrictive measures against those responsible for human rights violations and lists 20 persons*. Press release. Available at: <https://www.consilium.europa.eu/en/press/press-releases/2024/05/27/russia-eu-sets-up-new-country-specific-framework-for-restrictive-measures-against-those-responsible-for-human-rights-violations-and-lists-20-persons/>
- Economedia (2022) *ANAF blocked over 10 million euros and seized 13 million lei in the context of international sanctions following the outbreak of the war waged by Russia in Ukraine*. Available at: <https://economedia.ro/anaf-a-blocat-pesto-10-milioane-de-euro-si-a-confiscat-13-milioane-de-lei-in-contextul-sanctiunilor-internationale-dupa-inceperea-razboiului-dus-de-rusia-in-ucraina.html>
- EEAS (2024). *European Union sanctions*. The Diplomatic Service of the European Union. Available at: [https://www.eeas.europa.eu/eeas/european-union-sanctions\\_en?etran=ro](https://www.eeas.europa.eu/eeas/european-union-sanctions_en?etran=ro)
- Eur-Lex (2018). *Directive (EU) 2018/1673 of the European Parliament and of the Council on combating money laundering by criminal law*. JO L 284, 12.11.2018, pp. 22–30. Available at: <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32018L1673>
- Eur-Lex (2021). *Sanctions (restrictive measures)*. Available at: <https://eur-lex.europa.eu/EN/legal-content/glossary/sanctions-restrictive-measures.html>
- Eur-Lex (2024). *Directive (EU) 2024/1226 defining criminal offences and penalties for the violation of EU restrictive measures*. Available at: <https://eur-lex.europa.eu/EN/legal-content/summary/criminal-offences-and-penalties-for-the-violation-of-eu-restrictive-measures.html>
- Government of Romania (2024). *Emergency Ordinance No. 135 amending and supplementing Government Emergency Ordinance No. 202/2008 on the implementation of international sanctions*. Official Gazette, 1221/ 4 December 2024. Available at: <https://legislatie.just.ro/Public/DetaliuDocumentAfis/292023>
- IEA (2023). *Oil Market Report - May 2023*. Paris. Available at: <https://www.iea.org/reports/oil-market-report-may-2023>
- Kupatadze, A. & Marat, E. (2023). *Under the Radar: How Russia Outmaneuvers Western Sanctions with Help from its Neighbors*. Research Paper, 18 University of Birmingham. Available at: <https://www.socace-research.org.uk/publications/under-the-radar-russia-sanctions-rp18>
- LexisNexis (2024). *What are sanctions?* Available at: <https://www.lexisnexis.com/en-us/professional/risk-management/glossary/sanctions.page>
- One–Two Thoughts (2025). *Sanctions Against Russia: Application in the Romanian Jurisdiction*. Available at: <https://pnsa.blog/sanctions-against-russia-application-in-the-romanian-jurisdiction/>
- Parliament of Romania (2023). *Law no. 357/28 November 2023 on the approval of Government Emergency Ordinance No. 79/2022 for supplementing Government Emergency Ordinance No. 202/2008 on the implementation of international sanctions*. Official Gazette No. 1083 of 29 November 2023. Available at: <https://legislatie.just.ro/public/DetaliuDocument/276872>

# THE IMPLICATIONS OF DEMOGRAPHIC AGEING ON THE LABOR MARKET

**Brîndușa Mihaela RADU, PhD Associate Professor**

Athenaeum University, Bucharest, Romania

Institute for Economic Forecasting, Romanian Academy

bmradu@yahoo.com

**Abstract:** *One of the profound social and demographic challenges of contemporary society is the demographic aging of the population—an objective process, resulting from the increase in life expectancy at birth and the reduction of fertility. This phenomenon has affected most countries, especially the economically developed ones, having multiple implications at the economic, social, political, and cultural levels. Europe has the highest rate of demographic aging compared to other continents and is considered to have already reached a critical stage. In European documents, measures are proposed to increase the legal and de facto retirement age, as well as to increase the employment rate of the older adult population (50–65 years). Currently, within the European Union, the median age is 43.1 years, but according to the latest estimates made by Eurostat, in 2050 the average age of Union citizens will be 49 years. This work aims to examine the implications of the demographic aging phenomenon on the labor market in the near future.*

**Keywords:** *demographic aging, labor market, population*

**JEL Classification:** *E24, J11, J18, J19, J21*

## 1. Introduction

Demographic aging is a process that refers to groups, collectives of people (and not to the individual as a singular case) in terms of the structure, composition of the population in relation to the “age” characteristic and is a risk factor related to the evolution of the population and of its structure. At the same time, population aging is a multidimensional problem: demographic, economic, social, political and cultural.

The demographic aging process is characterized by the increase in the proportions of adults and the elderly in a population, while the proportions of children and adolescents decrease, a characteristic fact for the reproduction of the narrow-type population and which leads to an increase in the median

age of the population. A significant amount of scientific research is dedicated to the problems of population aging, its multiple consequences, as well as the demographic aspects and economic consequences of aging (the impact on the labor market, the pension system and the social assistance system for the elderly). The causes that explain the aging of the population are the decrease in the birth rate, advances in medicine and the increase in the standard of living, which increase the numerical growth rate of the elderly population by reducing morbidity and mortality.

## **2. Theoretical approaches**

The migration flow, having a double meaning, can contribute to the deepening of demographic aging, or vice versa - it leads to the rejuvenation of the population. The demographic process around the globe is determined by two basic patterns:

1) the “elderly population” model, which corresponds to areas with a low level of birth and infant mortality and, respectively, with a higher level of life expectancy at birth;

2) the “young population” model, which is valid for areas with high birth and mortality rates, including infant mortality, with increasing natural growth, as well as low life expectancy at birth. The aging of the population is considered mobile, when the share of people over 60 constitutes 12 - 14% in the total population; stable, with the share of people of this age at the level of 15-19%; the aging of the population causing depopulation, with the share of people aged 60 and over over 20%.

Demographic aging is a firm and long-lasting process, which, once established, continues its evolution in the sense of its emphasis. The analyzes and studies carried out at a given moment have a limited value and their conclusions are valid for not too long periods, a fact that convinces that aging is a process of both actuality and perspective. The aging of the population, as a phenomenon, constitutes a challenge not only as a biological process, which takes place at an individual level, but also as a social phenomenon, with an impact on all sectors, such as public finances, social-economic policy, the labor market, infrastructure, social relations, and so on.

The increase in life expectancy, as a determining factor of population aging, is linked to success in medicine and economics, in particular it is due to the improvement of living conditions, the modification of the morbidity structure and the reduction of the impact of external factors on mortality. Life expectancy is a “barometer of social progress”<sup>3</sup>, but its extension is a reflection of living conditions, working conditions, food, habits, environment, health and



education. The aging of the population has a socioeconomic importance and a significant impact both on society as a whole and on the elderly, in particular, a positive assessment of the elderly and their role in society contributes to the progress of the economic potential and favors the effective and comprehensive integration of the elderly in society.

According to the demographic aging scale of J. Beaujeu-Garnier – E. Rossett, the aging threshold is determined at the age of 604. Taking this criterion into account:

- countries where the share of people aged 60 and over, in the total population, is less than 8%, are classified, from a demographic point of view, as “young” countries;
- countries in which the share of this group varies between 8-12% are characterized as countries in the “pre-aging” period;
- countries with a 12% or more share of people aged 60 and over are classified as “aged” countries.

With reference to the countries in the “aged” group, the classification of the level of aging is as follows:

- the “initial level of aging” in the case of the share of the elderly between 12-14%;
- the “average level of aging” in the case of the share of the elderly between 14 -16%;
- “advanced level of aging” in the case of the share of the elderly between 16-18%;
- “very high level of aging” in the case of the share of the elderly over 18%.

At the same time, according to J. Sandberg’s classification, the determination of the level of demographic aging is carried out based on the changes that appear in the structure of the three main age groups: 0-19 years, 20-59 years, 60 years and over. According to J. Sandberg’s scale, the aging of the population is manifested when the share of people belonging to the first age group (0-19 years) is less than 30%, while the share of people from the third group (60 years and over) exceeds the 15% level. So, the main indicators that characterize the demographic aging of society are the number of the population aged 19 and the number of the population aged 60 and over.

In the age structure of the population, demographic aging is manifested by: the aging of the “bottom” population, in the case of low fertility (A. Boiarski, Russia, Jean Bourgeois-Pichat and A. Sauvie, France; Ansley Johnson Coale, USA, etc.), and aging “from above”, as a consequence of the reduction of mortality in the elderly and in the category of the elderly, which is a result of advances in the field of medicine, and, therefore, the increase in life expectancy.

Thus, the reduction of mortality contributes to aging in the following cases: more people reach old age and the life expectancy of the elderly increases.

The demographic aging process of the population has multiple consequences in the social, economic, political, cultural, etc. fields. Thus, in the economic field, this process can have an impact on economic growth, investments, savings, the labor market, the change in the structure of consumption. In the social field, the aging of the population has an impact on the change in the composition of the family, the standard of living, the demand for housing, social and medical services, education, pension insurance, etc., and in the political sphere - on the results of the elections, the system of political representation, etc. The analysis of the process of quantitative and qualitative changes in the structure of the population is a necessity for the development of programs, which include directions of a social and economic nature, as well as for making decisions in the field of health care, education, social security, employment, etc.

Demographic aging is an almost global phenomenon that faces, or threatens to affect, all countries at a more advanced stage of development. It appears against the background of the decrease in the birth rate of the population, doubled by the increase in life expectancy. It is a phenomenon that begins to raise problems after a rather long interval since its appearance, and for this reason there is a risk of not treating it with sufficient seriousness. And the reverse is true, from the moment the population starts growing again, the effects of population aging take a long time to disappear. The implications of this phenomenon are multiple, in many spheres of economic and social life, but in this chapter only the effects on the labor market will be discussed.

The implications that the aging of the population has on the labor force is a less publicized topic, although as will be seen they are multiple, but they are more difficult to quantify. Population aging implies a reduction in the number of young people, we are mainly referring to people aged between 15-29, who enter the labor market, and who are the future workforce, which in fact boils down to the reduction of the workforce, under conditions of constant participation rates. The aging of the population actually also means an aging of the labor force, which has implications in the field of qualifications, as well as the expenses for the continuous training of employees. Demographic aging also affects labor costs, as there is a positive correlation between age and salary, which implies an increase in average salary only due to the increase in average age. On the total economy, this implies an increase in the expenses with wages, so in the unit costs, in the conditions of similar productivity of the two categories of labor force. These topics will be detailed below.

In this work, it is aimed to highlight the effects that the aging of the population will have in the future on the available labor force.



### 3. The effects of population aging on the labor force in Romania

In the case of Romania, the aging of the population is a very serious phenomenon, for several reasons, first of all due to the fact that in our country the phenomenon of demographic decline has been established for a long time, and secondly, the budgetary implications are more serious, especially due to the poor representation of the pension/health system alternative to the state one. The year 1990 is the moment when Romania's population began to decrease, a decrease accelerated in recent years by the phenomenon of external migration and the sharp decrease in the birth rate.

Table 1 presents an evolution of Romania's population, and based on this evolution, a whole series of future projections of the population number were penciled, projections that are not very gratifying.

Any population forecast is based on a series of assumptions related to the value of some rates related to birth, mortality, life expectancy, by age category, therefore they must be taken as informative, and may be disproved by the subsequent demographic evolution in the case of some rate developments not anticipated by the respective forecast. Having said that, the differences between different forecasts are not very substantial, especially from the point of view of long-term trends.

Table 1. The demographic evolution of Romania's population

|                          | 1990        | 2005        | 2010        | 2019        | 2020        | 2021        | 2022        |
|--------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Total</b>             | 23211395    | 21382354    | 20294683    | 19425873    | 19354339    | 19229519    | 19042455    |
| <b>0-14 years</b>        | 5508479     | 3735907     | 3206067     | 3056051     | 3058900     | 3056590     | 3089023     |
| <b>% of the total</b>    | <b>23.7</b> | <b>17.5</b> | <b>15.8</b> | <b>15.7</b> | <b>15.8</b> | <b>15.9</b> | <b>16.2</b> |
| <b>15-29 years</b>       | 5229133     | 4972314     | 3829423     | 3180455     | 3083637     | 3042004     | 2951926     |
| <b>% of the total</b>    | <b>22.5</b> | <b>23.3</b> | <b>18.9</b> | <b>16.4</b> | <b>15.9</b> | <b>15.8</b> | <b>15.5</b> |
| <b>30-49 years</b>       | 6072530     | 6047504     | 5920312     | 5779333     | 5714156     | 5613516     | 5404506     |
| <b>% of the total</b>    | <b>26.2</b> | <b>28.3</b> | <b>29.2</b> | <b>29.8</b> | <b>29.5</b> | <b>29.2</b> | <b>28.4</b> |
| <b>50-64 years</b>       | 4017818     | 3600473     | 4064182     | 3814553     | 3837104     | 3814273     | 3890679     |
| <b>% of the total</b>    | <b>17.3</b> | <b>16.8</b> | <b>20.0</b> | <b>19.6</b> | <b>19.8</b> | <b>19.8</b> | <b>20.4</b> |
| <b>65 years and over</b> | 2383435     | 3026156     | 3274699     | 3595481     | 3660542     | 3703136     | 3706321     |
| <b>% of the total</b>    | <b>10.3</b> | <b>14.2</b> | <b>16.1</b> | <b>18.5</b> | <b>18.9</b> | <b>19.3</b> | <b>19.5</b> |

*Source: Romania's National Statistics Institute (INS, n.d.)*

The age distribution between women and men is quite different, thus, although the total number of women is higher than that of men, at ages up to 50, men are more numerous, the situation changing for older ages.

In the conditions of the predicted demographic changes, it is interesting to see what the effects are on the workforce. Most obviously, demographic aging will affect the workforce quantitatively, as participation rates are different for different age groups.

As can be seen from table 2, the 35-44 age group has the highest participation rates, with over 80% of the active population. At the opposite pole is the population over 65 years old, which has participation rates of 11.9%. The population aged 55-64 also has low participation rates, at approximately 38%. As the aging of the population reduces the population aged up to 45, which has the highest participation rates, in the long term a de facto decrease in the labor force will also be observed at unchanged participation rates.

In the context of a fairly low unemployment rate in Romania, the only reserve to at least maintain, if not increase, the number of employees remains the increase in participation rates. And from this point of view, the objectives of the Lisbon Agenda to obtain participation rates of 70% for the working-age population, as well as participation rates of 60% for women and 50% for the elderly. In the long term, when the participation rates for people up to the age of 45 cannot be increased, there will be a substitution of the young labor force with the older labor force.

Table 2. Participation and employment rates of the population by age category, in 2022

|         | <b>Activity rate</b> | <b>Occupancy rate</b> |
|---------|----------------------|-----------------------|
| Total   | 51.8                 | 50.5                  |
| 15-25   | 27.8                 | 22.0                  |
| 25-34   | 80.2                 | 75.0                  |
| 35-44   | 84.6                 | 80.1                  |
| 45-54   | 79.8                 | 77.2                  |
| 55-64   | 39.4                 | 35.1                  |
| Over 65 | 11.9                 | 9.8                   |

*Source: Romania's National Statistics Institute (INS, n.d.)*

In this context, we must identify the effects that population aging has on the availability of labor in Romania, in order to study how affected it will be in the medium and long term. However, this can only be studied under the conditions of some assumptions related to the various participation rates of the different age categories. Table 2 presents the participation rates of the various age categories at the level of 2022, the most recent year for which the respective data exists.

## 4. Conclusions

The aging of the population strongly influences the labor supply. A series of measures are becoming necessary now and in the next period, for the labor market. They look at several aspects:

- Reforms that generate employment and growth rates will allow better resistance to the pressure of population aging and to maintaining the level of social benefits in Europe. Extending active life is a response to a major political challenge. The promotion of an active old age of the population, the postponement of retirement, calls for changes in attitude on the part of elderly workers, but also on the part of entrepreneurs (regarding, for example, the conversion of the elderly workforce).

- Favoring a transition between work and retirement, in favor of a progressive withdrawal.

- Women are, in the future, the main source of growth of the active population. The aging of the active population poses problems related to equal opportunities between men and women, progress in dividing roles and responsibilities in the family.

- The integration of the inactive (women, unemployed) into activity and the reduction of retirements can alleviate, temporarily, the reduction of the labor force. The concentration of the unemployed among the less skilled and less competent indicates that, in a culture of technological progress, a labor shortage can coexist with a significant number of unemployed.

- The early retirement system proved ineffective and very costly for society. The retirement of elderly workers was operated at the price of long-term public financing. Early retirement policies benefited the private sector, which restructured and reduced the workforce without replacing older workers with younger ones.

- Current retirement age policies need to be reviewed. An increase in the retirement age has a positive effect on public spending and allows maintaining the job offer in the following decades.

- Work methods must be reconfigured for all age groups, within a global policy regarding work, family, social protection, retirement.

## References

- Börsch-Supan, A. (1992). *Population aging, social security design, and early retirement*, Journal of Institutional and Theoretical Economics (JITE)/ Zeitschrift für die gesamte Staatswissenschaft.
- Boldrin, M., Dolado, J. J., Jimeno, J. F., & Peracchi, F. (1999). The future of pensions in Europe. *Economic Policy*, 14(29), pp. 288-320.

- Corneo, G. and Marquardt, M. (2000). Public pensions, unemployment insurance, and growth. *Journal of Public Economics*, 75(2), pp.293-311.
- Düvell, F. (Ed.). (2006). *Illegal Immigration in Europe: Beyond Control?* Palgrave Macmillan.
- Esping-Andersen, G. and United Nations Research Institute for Social Development. (2000). *Social indicators and welfare monitoring*. Geneva: United Nations Research Institute for Social Development.
- Galasso, V. and Profeta, P. (2002). *The political economy of social security: a survey*, European Journal of Political Economy, 18(1), pp.1-29.
- Hagen, J. and Walz, U. (1995). *Social security and migration in an ageing Europe*, Politics and Institutions in an Integrated Europe.
- Holzmann, R. (1988). Ageing and social-security costs. *European Journal of Population/Revue européenne de Démographie*, 3(3), pp.411-437.
- Jimeno, J. F., Rojas, J. A. and Puente, S. (2008). Modelling the impact of aging on social security expenditures. *Economic Modelling*, 25(2), pp. 201-224.
- Khan, J., Gerdtham, U. G. and Jansson, B. (2004). Effects of macroeconomic trends on social security spending due to sickness and disability. *Journal Information*, 94(11), pp.2004-2009.
- Radu, G. (2021). Impact of demographic change in Europe: between maintaining the financial sustainability of pension system and ensuring adequate income for retirees. *AIMR Journal*, 61(1), pp. 20-31.
- Romania's National Statistics Institute (INS).(n.d.). Tempo-online database, <http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table>
- Turner, J. A. (1984). Population age structure and the size of social security. *Southern Economic Journal*, pp. 1131-1146.
- Zhang, Q. (2009). The Labour Market Effect of Social Security in Germany. *Canadian Social Science*, 5(6), p. 131.

DOI:10.5281/zenodo.17102754

## THE DIGITALIZATION OF PREVENTIVE FINANCIAL CONTROL: IT SOLUTIONS FOR THE EFFECTIVE MANAGEMENT OF EU-FUNDED PROJECTS

**Adrian NICOLAU, PhD Lecturer**  
Athenaeum University, Bucharest, Romania  
nicolau.adrian@univath.ro

**Abstract:** *The acceleration of digitalization in both public administration and the private sector has created significant opportunities for modernizing preventive financial control mechanisms applied in EU-funded projects. In a context where both public institutions and private companies manage substantial budgets derived from non-reimbursable funds, it becomes essential that preliminary verifications of expenditure compliance be integrated into robust, standardized, and user-friendly IT systems. This paper analyzes how digitalization supports the efficiency, traceability, and transparency of preventive financial control activities, based on best practice studies and real-world implementation examples. A particular focus is placed on the MySMIS 2021 platform, which includes a dedicated public procurement module requiring the upload of related documentation. However, in the absence of automatic validation or approval from the managing authority, this process remains incomplete, and the risk of financial disengagement persists. It is proposed that IT systems should include preliminary validations, automatic generation of procurement calendars, and standardized electronic forms based on the procedure type and applicable legislation. Another development path concerns the institutional digitalization of the preventive financial control visa (CFP), enabling both public and private beneficiaries to receive electronic payment authorizations, with complete traceability integrated throughout the project lifecycle. The study employs a qualitative methodology, combining documentary analysis with selected case studies, and highlights both the benefits of digitalization and the challenges posed by limited system interoperability and the need to adapt human capital.*

**Keywords:** *digitalization, preventive financial control, European funds, IT solutions, public procurement, CFP visa, financial management, public sector, private sector*

**JEL Classification:** *G32, P43, H10, H83*

## 1. Introduction

Over the past two decades, the process of digitalization has evolved rapidly, becoming a central pillar in the modernization of public administration and economic governance mechanisms. Particularly in the context of managing European funds—where transparency, efficiency, and accountability are paramount—digitalization is no longer merely a technological aspiration but a fundamental prerequisite for sound financial governance.

EU-funded projects inherently operate within a complex regulatory framework, marked by strict deadlines and procedural obligations, applying equally to public institutions and private beneficiaries. Within this framework, preventive financial control, a cornerstone of internal control systems, plays a strategic role by validating the legality and regularity of expenditures in advance. In Romania, this mechanism is institutionalized through the CFP visa, a formal condition for authorizing payments within the public sector.

Digitalizing such mechanisms can bring significant benefits in terms of efficiency, traceability, and reduced error risk. For instance, the MySMIS 2021 platform—used in the management of EU-funded projects—includes a module for uploading procurement documentation. However, in its current form, it does not offer automatic validation or approval by the managing authority. This shortcoming perpetuates uncertainty among beneficiaries and may lead to financial losses or temporary project suspensions. There is a clear need for the development of enhanced functionalities, such as prior digital approval of procurement documentation, automatic generation of procedural calendars based on procurement type, and the use of standardized smart forms.

This paper aims to examine how digitalization can transform preventive financial control into a proactive, intelligent, and integrated process, tailored to the operational realities of EU-funded projects. The study considers both existing digital solutions and prospective development directions, with a focus on creating a unified national framework applicable across the public and private sectors alike.

The guiding research question is: *How does the use of IT solutions influence the efficiency and effectiveness of preventive financial control in managing EU-funded projects, within an evolving administrative and regulatory digital environment?*

The article is structured as follows: the first part presents the theoretical and conceptual framework concerning preventive financial control and public sector digitalization; the methodology section then outlines the documentary analysis and case studies. The central part addresses key findings and related discussions, followed by conclusions and recommendations for policymakers and practitioners.

## **2. Theoretical and Conceptual Framework**

Preventive financial control represents a fundamental component of the internal control system, tasked with verifying the legality, regularity, and compliance of economic and financial operations prior to the commitment or disbursement of public funds. In Romania, this mechanism is regulated by Order no. 923/2014 of the Ministry of Public Finance and serves as an institutional safeguard designed to prevent financial losses to the public budget. In the case of EU-funded projects, preventive control takes on heightened significance due to the stricter compliance requirements imposed by European legislation, funding regulations, and financing agreements—responsibilities that apply equally to public institutions and private beneficiaries.

Within this context, digitalization emerges not merely as a technological trend, but as a functional necessity for enhancing efficiency, traceability, and accountability in public fund management. The evolution of digital transformation in the public sector initially occurred in a fragmented and reactive manner. However, recent years have witnessed the maturation of national digital strategies aimed at promoting interoperability, automation, and standardization of information flows. These processes have been accelerated by conditionalities under the 2014–2020 cohesion policy and by the need to implement more transparent and rigorous control mechanisms.

IT solutions developed to support preventive financial control now play a strategic role. These range from specialized verification modules embedded in ERP systems to integrated platforms such as MySMIS, which manage the entire project lifecycle. Despite evident progress, the digitalization of these processes remains incomplete. For example, although procurement documentation can be uploaded electronically, the absence of automated validation or managing authority feedback reduces overall system efficiency. Additionally, the lack of standardized forms complicates procedural compliance and undermines consistency in implementation.

The academic literature addresses these issues from multiple perspectives. Some scholars (e.g., Dimitriu, 2020; Mihăilescu, 2018) highlight the operational efficiencies generated by digitalization, while others (Popa and Ștefănescu, 2022) emphasize the value of traceability and institutional accountability in financial execution. Persistent challenges are also identified: limited interoperability, institutional resistance to change, insufficient training of personnel, and regulatory fragmentation.

Examples of good practices include the use of MySMIS in Romania, applications developed by well-established providers such as Integrisoft and SIVCO for local government, and international solutions aligned with



advanced digital governance models, such as those implemented in Estonia or the Netherlands. These cases underscore the fact that the success of digital financial control depends not only on technology but also on legislative coherence, organizational culture, and the capacity to integrate financial and operational processes into a standardized, intelligent framework.

In conclusion, the theoretical and conceptual framework of this research positions preventive financial control as a dynamic process, situated at the intersection of legal compliance, institutional efficiency, and technological innovation. Digitalization is not an end in itself, but a means of transforming financial practices into a coherent, predictable, and integrated system applicable across both the public and private sectors.

### **3. Concrete benefits of digitalization in preventive financial control**

The digitalization of preventive financial control in EU-funded projects has led to a series of structural improvements in financial decision-making, procedural transparency, and institutional risk management capacity. These benefits are particularly evident in projects utilizing the MySMIS 2021 platform, as well as among beneficiaries who have implemented project-configured ERP systems.

A first observable benefit is the optimization of operational workflows within the financial verification process. MySMIS 2021 centralizes project-related documentation—budgets, procurements, payment requests, contracts, reports—in a standardized and secure format, thereby reducing informational fragmentation and minimizing the risk of data loss or degradation. This centralization facilitates fast access to key documents for internal or external verification and ensures complete, auditable digital archiving.

Additionally, a significant reduction in document processing time has been noted, particularly during the verification of reimbursement claims. The platform allows real-time tracking of document status, while built-in notification features reduce delays caused by communication gaps between internal departments and the managing authority. In institutions using ERPs integrated with internal control workflows, these time savings are even more substantial due to automated internal approvals.

Another key benefit is the increased traceability of financial decisions, a fundamental condition for sound public fund governance. Every action performed on the platform—upload, modification, resubmission—is logged and linked to a specific user, allowing for an accurate reconstruction of the operation history. This not only enhances administrative transparency, but also simplifies the work of audit bodies (Managing Authorities, Court of Accounts, internal auditors), which can directly access the documents without requiring additional submissions from beneficiaries.

A collateral, yet significant advantage is the prevention of financial disengagements—a phenomenon that, in the EU funding context, can lead to substantial budgetary losses for Romania. When digitalization is properly implemented, it enables early identification of incomplete documentation, procedural errors, or discrepancies between supporting documents and legal requirements. This early detection allows beneficiaries to rectify issues in due time, avoiding situations where already-incurred expenses are later deemed ineligible. Moreover, digital systems contribute to strengthening institutional capacity by enforcing procedural discipline and creating the foundations for financial management based on clear, predictable, and verifiable rules. These benefits are particularly pronounced in public institutions with complex hierarchical structures, where digitalization facilitates interdepartmental coordination and accountability of those involved in project management.

In summary, digitalization offers not only enhanced speed and efficiency, but also a paradigm shift in how preventive financial control is understood and applied: moving from a formal, often bureaucratic validation, to an integrated, intelligent process genuinely focused on mitigating financial risk.

### ***3.1. Systemic Limitations and Dysfunctionalities***

Despite clear progress in the digitalization of preventive financial control, the applied analysis of ongoing EU-funded projects reveals a series of systemic dysfunctions and technical limitations that hinder the overall efficiency and coherence of the process—particularly within the MySMIS 2021 platform.

The most frequently reported issue is the absence of real-time validation mechanisms for documents uploaded to the system, especially in the public procurement module. In its current form, the platform allows the submission of procurement documentation but does not provide automated, institutional, or formal feedback on the compliance of submitted materials. This procedural ambiguity leads, in practice, to beneficiaries advancing to subsequent stages (e.g., contracting, implementation) without prior confirmation of the legality or validity of the preceding steps.

The direct consequence of this dysfunction is the occurrence of financial disengagements—that is, the classification of incurred expenses as ineligible due to procedural noncompliance that was not detected or flagged in time. This leads to direct financial losses for the national budget and undermines the credibility of the EU fund management mechanisms.

Another major limitation lies in the redundancy of the document submission process, which requires beneficiaries to upload the same documents in multiple sections of the platform or at different implementation stages. The lack of functionality to automatically retrieve previously validated documents results in unnecessary delays, consistency errors, and an inflated administrative

burden. This issue is especially acute for institutions managing multiple projects simultaneously and struggling with limited specialized personnel.

A further challenge is the lack of interoperability between MySMIS 2021 and other essential financial systems, most notably the State Treasury's digital infrastructure. In the absence of direct interconnection, beneficiaries must operate in parallel digital environments, using different document formats and separate approval procedures. This fragmentation significantly reduces institutional responsiveness and diminishes the overall added value of digitalization.

Beyond technical shortcomings, the research highlights recurring institutional problems, including:

- resistance to change among administrative personnel,
- insufficient continuous training for system users,
- the lack of standardized internal procedures across different types of beneficiaries (e.g., public authorities, universities, NGOs).

These dysfunctions are not merely operational—they reflect a deeper issue of digital governance, namely the lack of a unified and coherent vision regarding the digitalization of financial control processes, both at the policy-making level and within institutional practice.

In conclusion, while existing IT platforms provide a promising technological framework, the actual effectiveness of digital preventive financial control remains constrained by the absence of key functionalities, limited system interoperability, and institutional inconsistencies that hinder the coherent implementation of good financial governance principles.

#### **4. Development Directions: Technical and Institutional Proposals**

Based on the analyzed results and consultations with practitioners directly involved in the implementation of EU-funded projects, a clear set of development directions and intervention measures emerges, aimed at enhancing the efficiency and relevance of digital preventive financial control. These proposals address both the technological dimension—by introducing essential functionalities into digital platforms—and the institutional component, through the harmonization of procedures and the development of professional competencies.

A first necessary measure is the integration of a digital pre-validation module into the MySMIS 2021 platform, particularly in the area of public procurement. This module should allow the managing authority to issue an electronic approval or digital visa confirming the compliance of procurement documentation before the contract is signed with the supplier. Such validation—whether fully automated or assisted by human expertise in a digital

environment—would significantly reduce the risk of financial disengagements and provide greater predictability for beneficiaries.

In parallel, the development of an automated procedural calendar generation mechanism is recommended, based on the procurement type, estimated value, and initiation date. This function would ensure compliance with legal deadlines and serve as a digital operational guide, directly integrated into the project management platform.

Another crucial aspect is the standardization of forms through the use of smart, dynamic PDF formats, with predefined fields tailored to the applicable legislation and the project typology. This would eliminate unnecessary variation in content and structure, streamline verification procedures, and accelerate approvals. From an institutional standpoint, it is vital to ensure interoperability between the MySMIS 2021 platform and the State Treasury's IT system, to maintain continuity in the financial process. This interconnection would enable the automatic transmission of approvals, supporting documents, and payment requests to the national payment system, thereby eliminating duplicate procedures and the risk of inconsistencies across parallel platforms.

Additionally, a unified regulatory framework is needed to explicitly govern digital financial control workflows in EU-funded projects. Currently, many best practices arise from local initiatives and are not embedded in a standardized procedural structure applicable to all beneficiaries.

Equally important is the continuous professional development of staff involved in project implementation. Specific training modules should be developed on digital financial control, targeting both beneficiaries and managing authority representatives, to ensure a consistent level of competence and coherent rule application.

Altogether, these proposals outline an integrated vision for the future of preventive financial control—one that not only digitizes existing processes but redefines them based on modern technological and institutional foundations, aligned with the principles of good governance and the demands of effective EU fund management.

## **5. Conclusions**

This research has provided a structured assessment of the current state of digitalization in preventive financial control in Romania, focusing on its application within EU-funded projects. The analysis revealed that, despite visible progress in the implementation of digital solutions—such as the MySMIS 2021 platform and customized ERP systems—digitized preventive financial control remains a partially functional process, heavily dependent on technical, institutional, and human factors.

One of the study's key conclusions is that digitalization alone does not guarantee efficiency; it merely establishes the preliminary conditions for it. In the absence of critical functionalities—such as automated validation, interoperability with the State Treasury, or standardized forms—digital platforms risk becoming mere repositories of documents, offering limited added value in decision-making or in mitigating financial risks. Therefore, digital efficiency is inherently tied to the quality of the IT architecture, the coherence of procedures, and the skill level of its users.

The study also found that the main benefits of digitalization manifest where IT systems are fully integrated into the operational workflows of beneficiaries and where there exists a minimum level of organizational culture geared toward prevention, compliance, and transparency. In such contexts, the platforms facilitate not only faster verification but also enhanced traceability, greater capacity for digital audit, and a tangible reduction in the risk of financial disengagements. Conversely, the lack of a unified system-wide vision—reflected in fragmented regulations, non-interoperable systems, and inconsistent procedural application—significantly undermines the transformative potential of digitalization. This challenge is exacerbated by disparities in administrative capacity among beneficiaries, particularly between experienced public institutions and smaller private or non-governmental entities, where preventive financial control is often either absent or applied informally, without digital support.

In conclusion, the digitalization of preventive financial control should not be approached solely as an IT infrastructure issue, but rather as a systemic reform, requiring legislative coherence, procedural standardization, professionalization of human resources, and—most importantly—a paradigm shift in the understanding of financial responsibility within EU-funded project management.

### ***5.1. Practical Implications***

The findings of this research have direct and relevant implications for how digitalized preventive financial control is perceived, regulated, and implemented in practice, both at the level of EU fund beneficiaries and public authorities involved in coordinating and verifying these projects.

First and foremost, for managing authorities, the study highlights the need to reconfigure the architecture of the control process, shifting from a focus solely on formal compliance toward actively supporting beneficiaries during the critical phase of financial risk prevention. This reconfiguration entails a transition from a reactive control system—based on post-factum detection of irregularities—to a proactive, digitally assisted system, where pre-validation mechanisms, automated alerts, and self-assessment tools are integrated into project implementation.

For beneficiaries—whether public institutions, NGOs, or eligible private entities—digitalization presents both the opportunity to professionalize financial project management and the challenge of integrating these tools into an organizational culture oriented toward prevention, compliance, and performance. IT platforms become not only procedural frameworks but also decision-making environments, where budget execution can be monitored, bottlenecks anticipated, and expenditures justified to control bodies.

For control institutions (such as the Court of Accounts, audit structures, and certifying authorities), digitalization facilitates a more objective, faster, and deeper verification of public fund spending processes. The ability to track the full path of a document—from upload to approval or rejection—eliminates many of the ambiguities associated with traditional paper-based controls, reducing subjectivity and ensuring full traceability of decisions.

The study also draws attention to the real risk of institutional inequality: in the absence of a coherent national framework and sustained investment in personnel training, less prepared or under-resourced beneficiaries may be penalized—not out of bad faith, but due to procedural incapacity. In this sense, uneven digitalization can generate a new form of institutional vulnerability, which runs counter to the declared purpose of digital reform—to simplify and clarify administrative processes.

In conclusion, the practical implications of this research go beyond the technical sphere and extend to the broader administrative and managerial logic of EU fund management. They highlight the need for a balance between standardization and support, between control and administrative capacity, and between digitalization and institutional adaptability.

## ***5.2. Technical and Institutional Recommendations***

Based on the empirical and conceptual analysis carried out in this research, a set of strategic recommendations can be formulated to transform digital preventive financial control from a standalone technological tool into a functional, predictable, and integrated mechanism within the financial governance framework of EU-funded projects.

### ***5.2.1. Technical Recommendations***

#### **– Implementation of electronic pre-validation in MySMIS 2021**

The platform should include functionality allowing the managing authority to issue a digital visa or formal approval for procurement documentation before contract signing. This digital validation would reduce procedural risks and enhance beneficiaries' confidence in their financial decisions.



**– Automation of procedural calendars**

It is recommended to develop an integrated algorithm that generates legal timelines automatically, based on procurement type and estimated value, highlighting all deadlines and mandatory steps for each stage.

**– Standardization of digital forms**

All control-related documents should be transformed into **dynamic PDF formats** with intelligent fields, auto-fill options, and internal logic validation, thereby reducing human error and processing time.

**– Interoperability with the State Treasury's IT system**

A critical step is to establish functional integration between MySMIS 2021 and the Treasury's digital platform, enabling real-time, fully digital payment authorization workflows that accurately reflect project financial execution.

*5.2.2. Institutional Recommendations***– Development of a unified legal framework for digital preventive financial control**

Currently, this control is governed by fragmented regulations. A dedicated set of norms is required to support digitalization, applied uniformly across all beneficiary types.

**– Introduction of preventive control mechanisms in the private sector, via tailored regulations**

Given the significant share of EU funds managed by private entities, it is justified to establish a preventive control mechanism (formal or digital) adapted to the private sector, ensuring an equivalent level of accountability and traceability.

**– Investment in professional training and digital competency development**

Digital transformation cannot succeed without properly trained human resources. Mandatory, continuous training programs should be implemented for all stakeholders—beneficiaries, financial officers, controllers, auditors—focused on digital control procedures and the use of specialized platforms.

**– Creation of real-time technical support for MySMIS users**

Many procedural errors occur not from negligence but from misunderstanding how to properly use the system. A dedicated support system—such as a call center, integrated chat, or interactive guides—would reduce user errors and streamline processes.

These recommendations aim to strengthen the state's capacity to exercise effective and intelligent preventive control, adapted to the demands of the digital era and safeguarding Romania's financial interests within the broader EU funding framework.



### **5.3. Future Research Perspectives**

The digitalization of preventive financial control is a rapidly evolving field, situated at the intersection of economics, public administration, and information systems engineering. This study has provided a solid qualitative foundation for understanding the existing challenges and opportunities, while also opening a series of relevant avenues for future research with both national and European applicability.

A first promising direction is the quantitative analysis of the impact of digitalization on the financial performance of EU-funded projects. Comparative studies could be conducted between projects that actively utilize digital functionalities and those that make minimal use of them, using indicators such as document processing time, disengagement rates, frequency of financial corrections, or levels of procedural compliance. Such research would support data-driven policy-making and help prioritize investments in the most efficient IT components.

In addition, it is worthwhile to conduct an international comparative analysis to identify best practices from EU member states that have successfully implemented integrated digital financial control systems. Countries such as Estonia, the Netherlands, and Finland can offer scalable models adaptable to the Romanian administrative context. This type of research would enable both knowledge transfer and the formulation of legislative and technical proposals aligned with European standards for interoperability and digital governance.

Another valuable research direction is the cost-benefit evaluation of digitalizing preventive financial control, from the perspectives of both managing authorities and beneficiaries. Such a study should consider not only the initial technological costs but also the indirect benefits—reduced errors, shorter implementation times, increased absorption rates, and improved staff professionalism.

Finally, it would be beneficial to explore the ethical and accountability dimensions of digital control systems. Automation should not eliminate human responsibility, and the design of IT systems must reflect a balanced approach between automated verification and professional judgment. This perspective could be developed through interdisciplinary research involving experts in audit, IT, administrative law, and public policy.

In conclusion, research in the area of digital preventive financial control holds significant potential to support structural reforms in the management of EU funds—provided that future investigations are institutionally grounded, methodologically rigorous, and oriented toward concrete application.

## References

- Dimitriu, M. (2020). Efficiency of Financial Control in Public Institutions. *Finance and Control Journal*, 2, pp. 41–52.
- European Commission (2021). *Guidance on Simplified Cost Options and Digital Controls for EU-Funded Projects*. Brussels: Directorate-General for Regional and Urban Policy.
- Integrisoft Solutions (2023). *IT Solutions for Public Administration: Financial Control and Procurement*. Internal Technical Guide.
- Mihăilescu, A. (2018). Digitalization of Public Administration: Challenges and Solutions. *Public Administration and Management Journal*, 30, pp. 27–38.
- OECD (2021). *Digital Government Review of Romania: Towards a New Digital Strategy*. Paris: OECD Digital Government Studies.
- Popa, V., Ștefănescu, R. (2022). Financial Transparency through Digitalization in the Public Sector. *Digital Economy and Society*, 5, (1), pp. 59–71.
- Project Management Institute (PMI) (2022). *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – 7th Edition. Newtown Square, PA: PMI.
- Ristea, M., Dumitru, C. G., & Ioanăș, C. (2019). *Fundamentals of Managerial Accounting*. Bucharest: CECCAR.
- Romanian Authority for Digitalization (2023). *National Strategy for the Interoperability of Public Sector Information Systems 2023–2030*.
- Romanian Court of Accounts (2022). *Annual Report on the Use of European Funds and Internal Control Systems*. Bucharest.
- Romanian Ministry of Finance (2014). Order No. 923/2014 on Internal Preventive Financial Control. *Official Gazette*, Part I, No. 685, September 18, 2014.
- Romanian Ministry of Investments and European Projects (2023). *MySMIS 2021 Beneficiary Guide*. Updated version, available at <https://mfe.gov.ro>.

DOI:10.5281/zenodo.17102757

# ARTIFICIAL INTELLIGENCE AND DECISION MAKING IN THE ECONOMY IN THE CONTEXT OF INTERNATIONAL MOBILITY

**Matei DUMITRESCU, PhD Student**

University of Bucharest, Romania;

Co-tutoring, Free University of Brussels, Belgium

mateidumi7@gmail.com

**Abstract:** *In the last decade, Artificial Intelligence (AI) has become a key component for the development of decision-making systems in the economy in the context of international mobility. AI algorithms have been developed for various applications in the economy, such as decision-making at the firm level to the prediction of macroeconomic policies at the government level. At the macro level, AI contributes to the precise implementation of policies for the integration of people from international mobility into the economy in order to efficiently manage resources. At the micro level, AI supports companies in obtaining competitive advantages by optimizing supply chains, personalizing job offers and efficiently managing customer data. Finally, the conclusions highlight the importance of ethical, privacy and accessibility challenges regarding the use of AI for the integration of people and resources into the economy in the context of international mobility.*

**Keywords:** *EU, human mobility, AI, decision making, economic stability*

**JEL Classification:** *C23, C26, C38, C55, C81, C87*

## 1. Introduction

The contemporary period is an era of international human mobility, on a very large scale, in which approximately 200 million international migrants from all over the world seek economic opportunities and social security. A large-scale phenomenon, as economies open, international migration has sometimes seen dramatic increases. In European regions, third-country nationals, in 2023, represented 9% of the population, with women being almost half (48%) of the migrant population. Outcome indicators highlight significant gaps between people coming from mobility and native populations in the areas of work and education. Thus, increasing migration has become a major problem of the

contemporary world. Under the reign of the global multi-crisis, the integration of migrants remains a challenge for all destination states, classic and new, which are faced with a significant influx of immigrants, with high levels of voluntary or forced, legal or irregular mobility. At the international level, a broad, but not unique, framework for migration governance has been established, which supports this process, especially at the national level, and which includes binding norms of international law, best practices and non-binding principles to facilitate regular migration and the integration of migrants. In this context, decision-making systems based on Artificial Intelligence algorithms began to be used.

Decision-making is today an increasingly difficult process, due to the increase in the volume of information circulated and the degree of complexity of decision-making problems.

According to the specialized literature, solving a decision-making problem is a process based on the following stages:

- investigation of the problem in which an attempt is made to formulate and define it;
- conception that involves the development of different possible solutions for the previously defined problem;
- decision in which the best solution must be chosen depending on the objective pursued and the criteria imposed;
- evaluation involves the analysis of the effects of the decision as well as ensuring its application.

For this reason, decision makers need technical assistance to make quality decisions in a minimum amount of time. This assistance can be provided by using Decision Support Systems. Such a system is an interactive computer system designed to support the decision-making process. It should be noted that decision support computer systems involve the use of AI concepts and algorithms. The development of a decision support computer system must be based on a set of characteristics, the most important of which are:

- to be flexible and generate as many options as possible for data analysis and evaluation;
- to be able to develop a wide variety of styles and classifications;
- to have the ability to analyse as many decision alternatives as possible and their consequences.

AI is increasingly being used in the context of migration and international mobility to integrate people into the economy. Applications with AI algorithms for decision-making are used in the mobility process, for example for identity verification, visa application submission and processing, but also to predict trends in economic integration and resource management. However, AI poses a variety of challenges for policymakers, practitioners and migrants,

including concerns about the surveillance of individuals through technology, the potential for systemic bias in AI decision-making in the areas of migration and mobility, increased interactions between the public and private sectors and their competing interests, and the negative impact of AI technologies on the protection of human rights for migrants (Beduschi, 2022).

## **2. Theoretical framework: Europeanism and (anti)discrimination in EU member states in the context of mobility**

The construction of this human identity was not an easy task. It has been the result of gestation by a long and vast historical process with the intervention of a rich and varied multiplicity of factors, rhythms and circumstances that, in a desire to synthesize, can be reduced to four foundations that gave shape and meaning to the concept of European culture: Greek culture, Roman jurisprudence Christianity and the Political Heritage of the Germanic Peoples (Vergara, 2007).

The foundations are closely linked to the question of inclusion and exclusion is that of how the constituent elements of Europe should be integrated into the European entity. *Prima facie*, the dominant hypothesis, from the proposals of the “United States of Europe” to the EU enlargement mechanisms to the “candidate countries”, was that a consolidated Europe would take the form of a partnership between European states, agreed via intergovernmental agreements. Europeanism also understands other models, ranging from conceptions of Europe as a union of alternative spatial or demographic units – “peoples”, nations, regions, see workers’ councils – to those of an undifferentiated community or even subsumed administrative subunits of a monolithic nation-empire (Ostrowski, 2023). But these conceptions were significantly altered with the strong national feeling developed from the First World War and the effects are seen even today.

“Europeanism” is understood as “social and cultural civilization” and is opposed to “distant countries.” It is also important to note that, talking about the “similarity” of Ukrainian refugees with Europeans, none of the journalists mentions a specific country or a country in the European Union, which makes “Europeanness” an object of knowledge and control. At the same time, in the given quotations of refugees from distant and poor countries (most often Afghanistan, Iraq or Syria) act as a collective “Other,” without provoking outrage or sympathy from the authors of the quotations. Often, the names of these “other” countries are given as an example. This creates the effect of “standardization” of the image of the refugee as coming from the poor, underdeveloped countries are a typical representative of the indigenous ethnic groups of these countries (Morgunova and Moraru, 2022).

We will argue that the injunction to “go back to Europe” by Europeanization is made possible and conditioned by the mythologies of Western civilization, and that Europeanization both marks (enacts) and demarcates (naturalizes) racial whiteness. In other words, we view Europeanization as a deeply – albeit contingent – racialized process, where racial whiteness is trivialized as a “natural” contiguity of the West (Nadzeya et al., 2023).

The issue of migration, legal and illegal, is present in the policies of all European Union states, and the creation of the Schengen Area as an area without internal borders in which the free movement of people is ensured, requires efficient management of the external border for its proper functioning. This area is conceived as an area of freedom, security and justice, within which there is a common policy on asylum, immigration and management at the external borders of the Union. Analyzing the structure of immigration policy networks can provide important insights beyond those found in other political and economic characteristics. The examples also illustrate that network size and structure matter beyond a simple count of how many social ties each member has and suggest that measures of betweenness or centrality capture different aspects of network structure. This illustrates that migration governance is of real practical interest to all European states but raises the question of identifying those areas and sub-areas of integration policies that could contribute most significantly to superior macroeconomic performance.

### ***2.1. Methodology: case selection, sources, type of analysis***

#### *At the administrative level*

Article 2 of Chapter 1 of Directive 2001/55/EC, titled “General provisions” contains a definition at point c) that specifies the people who can be considered as “displaced persons” (United Nations, 1951). Sub-point i) places people who have fled areas of armed conflict in a special category that should benefit from immediate and temporary protection. Directive 2001/55/EC also stipulates the obligation of Member States to respect the rights of refugees relating to the status of refugees agreed in the Geneva Convention of July 1951. to refugees without discrimination as to race, religion or country of origin (United Nations, 1951). In France, the temporary protection directive has been valid for three months granting several rights to exiled people: a right to reside, access to the labor market, housing, education or even social and medical benefits. But foreign students living in Ukraine were excluded from this emergency provision.<sup>8</sup> In no other conflict, involving large population displacement, whether Iraqi, Afghan, Syrian, Libyan, the countries of the Union had adopted such a provision. 2001 in the wake of the Balkan War (France 24, 2022). A major controversy is thus open in French society that is sorting out refugees fleeing the war in Ukraine

on criteria that clash with the definitions of international conventions. Pierre Henry, the president of France Fraternities, explains to France 24 that “France has excluded foreign students from temporary protection by giving them a one-month residence permit and considering that after all, their country of origin is not at war, they could return” (France 24, 2022).

### *At the level of borders*

The central question in ideological debates about Europe’s borders is which regions of the continent are included and excluded from the term “Europe”. The prospects of European integration have revolved around relations between France and Germany since the beginning of the modern European debate; around them clustered a coherent set of nations, including the Benelux and Italy, which together formed the heart of Europe (Ostrowski, 2021). as the continentalist epicenter of European unification projects. With the invasion of Ukraine by the Russian army on February 24, 2022, we have again seen the political and media news of the last year being saturated with the issue of borders. The conflict over the European Union’s eastern demarcation line reinforces the discussion around borders as a political object and the need to study borders and their effects. Controversies over borders in Europe are not new. They continue after the Syrian refugee crisis of 2015 when more than 100,000 migrants and refugees arrived in Europe via the Mediterranean according to the United Nations Refugee Agency (Guerres, 2009).

At the border level, systems are used for decision-making based on AI algorithms for facial recognition, fingerprinting, person identification and possibly video monitoring of migrant reception centers. Thus, it is possible to simulate the effects of decisions by using models, estimating the consequences of decisions, developing alternatives, optimizing solutions, etc. It is observed that the activities developed by the system are of the type of prediction, simulation, optimization. Knowledge-oriented decision support systems use concepts and methods of artificial intelligence. These are also called intelligent decision-assistance or expert information systems. Document-oriented decision support systems ensure the storage and retrieval of documents and information by using search engines. Communication-based decision support systems have as their main element communications based on computers and computer networks (Ujwary and Florek-Paszkowska, 2025). Analyzing the previous classification, it can be observed that the specific functions of a decision-support system refer to: data management, model management, knowledge management and management of system communication with the user.



Figure 1 schematically presents the three components of the decision support system according to the specialized literature (Ujwary, Florek-Paszowska, 2025).

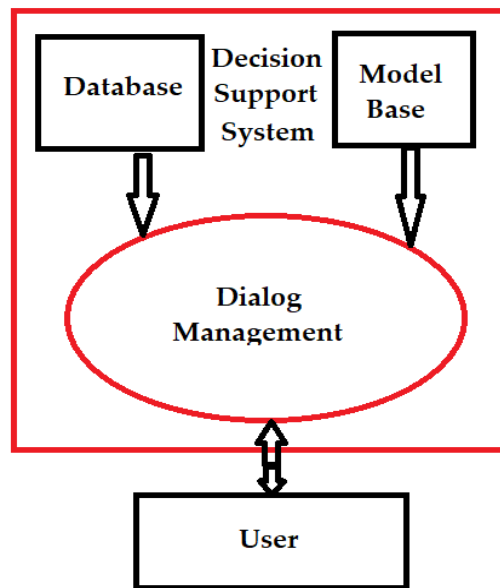


Figure 1. Decision support system architecture.

The data management subsystem component includes data relevant to the decision-making problem and is managed by software called the database management system. The model management subsystem includes quantitative models that provide the system with analytical capabilities, as well as modeling languages that allow the development of new models. The dialogue management component refers to the software and hardware resources involved in developing the interface of the decision support system. In the case of intelligent decision-making assistance systems, architecture includes the following components: the data management subsystem, the model management subsystem, the knowledge management subsystem, and the dialogue management subsystem or user interface (Ujwary and Florek-Paszowska, 2025). It is noted that this approach refers to a knowledge-oriented decision support system or expert system. The expert systems used in this context will focus on analyzing the decision-making problem and identifying models that can provide solutions for it. However, many sociologists and political scientists insist that we have entered a postmodern era in which the boundaries of politics tend to disappear, dissolved by economic flows, networks of non-governmental actors, the primacy of international law and the exploitation of medical technologies. and means of transport (Ostrowski, 2023). The first fact that strikes in this statement is the

utter contradiction with political discourses in countries like Hungary where differences between men are used to emphasize the importance of preserving borders through strict and targeted controls put in place by the enemy. Since the 2015 refugee crisis, Hungary has refused to admit refugees from non-EU countries (BBC News, 2020). Prime Minister Victor Orban has described non-European refugees as Muslim invaders and migrants as poison (DW, 2022) claiming that Hungary should not accept refugees from different cultures and religions to preserve its cultural and ethnic homogeneity in Europe, May 2016 of justice concluded that Hungary's arbitrary detention of asylum seekers in transit areas at its border with Serbia was unlawful (DW, 2022).

#### *At the level of the press and media*

Europeanism is often portrayed as a kind of emerging social property, a picture that aims to capture an idealized vision of European perfection (Beverelli, 2022) The print press and reports that covered the massive influx of people resulting from the invasion of the invasion sound in the name of how worthwhile the Europeanists and who reinforce principles or characteristics related to the political, economic and cultural unity of the European continent.

### **3. Conclusion**

The rich literature on migration and mobility governance, on migrant integration policies, has not led to a single point of view on their implications. There are several studies whose conclusions have not tended towards an effect on the economic integration of migrants (Blumenstock, Chi, and Tan, 2022). However, our analyses confirm (for a large sample of countries) previous economic studies have also focused on individual countries and have shown that immigration policies affect the economic integration of migrants (Council of the European Union, 2024a, 2024b). In conclusion, migration policies affect the economic integration of migrants, differentiated by targeted measures that can constitute starting points for improving the lives of migrants in destination countries, as well as their contribution to achieving superior performances of macroeconomic outcomes.

This illustrates that migration governance is of real practical interest to all European states but raises the question of identifying those areas and sub-areas of integration policies that could contribute most significantly to superior macroeconomic performance.

As highly generalizable conclusions:

- a) Labour mobility policy is closely linked to family reunification policy,
- b) There is a certain inconsistency/inadvertence between Labour mobility policy and education policy,

c) The use at EU level of AI-based decision-making systems for the integration of people with migration and mobility backgrounds in macroeconomics (Frontex, 2023).

## References

- BBC News (2020). EU court Censures Hungary Over Migrant Detentions, Mai 14, 2020. Lien: <https://www.bbc.com/news/world-europe-52663910>
- Beduschi, A. (2022). *Artificial intelligence, migration and mobility: Implications for policy and practice*. World Migration Report. Geneva: International Organization for Migration.
- Beverelli, C. (2022). Pull factors for migration: The impact of migrant integration policies. *Economics & Politics*, 34(1), pp. 171–191.
- Blumenstock, J., Chi, G. and Tan, X. (2022). Migration and the Value of Social Networks, Gender, Growth, and Labour Markets in Low Income Countries Programme (G<sup>2</sup>LM|LIC) *Working Paper* No. 60. Bonn: IZA.
- Council of the European Union (2024a). Proposal for a Regulation of the European Parliament and of the Council introducing a screening of third country nationals at the external borders and amending Regulations (EC) No 767/2008, (EU) 2017/2226, (EU) 2018/1240 and (EU) 2019/817, No 6403/24.
- Council of the European Union (2024b). Proposal for a Regulation of the European Parliament and of the Council addressing situations of crisis and force majeure in the field of migration and asylum, No 6379/24.
- DW (2022). Victor Orban's Most Controversial Migration Comments. DW, March 2, 2022. <https://www.dw.com/en/viktor-orbans-most-controversial-migration-comments/g-42086054>
- Vergara, J. (2007). The History of Europe and its constituent Countries: considerations in favour of the new Europe. *Journal of Social Science Education*, 6(1), pp. 15–22.
- France 24 (2022). Une situation absurde : la galère des étudiants africains en France après avoir fui l'Ukraine. *France 24*, Mai 04, 2022. <https://www.france24.com/fr/france/20220504-une-situation-absurde-la-gal%C3%A8re-des-%C3%A9tudiants-africains-en-france-apr%C3%A8s-avoir-fui-l-ukraine>
- Frontex (2023). *Detections of illegal border-crossing*. News release. Warsaw: Frontex.
- Husakouskaya, N. and Gressgård, R. (2020). Europeanization as civilizational transition from East to West: Racial displacement and sexual modernity in Ukraine. *Intersections. East European Journal of Society and Politics*, 6(3), pp. 74–96.
- Jourdain, E. (2009). *Guerres, frontières, politique dans*. Les champs de Mars, pp. 5-17, 2009. <https://www.cairn.info/revue-les-champs-de-mars-ldm-2009-1-page-5.htm>

- Morgunova, O. A., & Moraru, N.-F. (2022). Discourses of “Europeanness” in asylum practices in the postcolonial context. *Vestnik RUDN. International Relations*, 22(4), 741—754. <https://doi.org/10.22363/2313-0660-2022-22-4-741-754>
- Ostrowski, M.S. (2021). Europeanism: A Historical View. *Contemporary European History*, 32 (2): Agents of Changes Families, Welfare and Democracy in Mid-to-Late Twentieth-Century Europe , May 2023 , pp. 287-304
- Ujwary-Gil, A. and Florek-Paszkowska, A. (2025). *AI, analytics and strategic decision-making*. Abingdon: Routledge
- United Nations (1951). Convention relating to the status of refugees, adopted 28 July 1951, entered into force 22 April 1954.
- Vergara, J. (2007). The History of Europe and its constituent Countries: considerations in favour of the new Europe. *Journal of Social Science Education*, 6(1), pp. 15–22. Geneva: United Nations.

DOI:10.5281/zenodo.17102759

## **PROJECT-BASED ACCOUNTING AS A STRATEGIC INSTRUMENT IN CONTEMPORARY FINANCIAL MANAGEMENT**

**Adrian NICOLAU, PhD Lecturer**

Athenaeum University, Bucharest, Romania

nicolau.adrian@univath.ro

**Larisa Roxana MANEA, PhD Student**

Valahia University, Targoviste, Romania

larisamanea@yahoo.com

**Abstract:** *In the context of the growing transition toward a project-based organizational model, both in the private sector and within public institutions, project-based accounting emerges as a key component in the modern architecture of financial management. This paper examines how accounting practices structured around individual projects contribute to improved financial efficiency, support strategic decision-making, and ensure responsible resource management. The study is grounded in the premise that, in a complex and dynamic economic environment, detailed monitoring of costs and revenues per project is not merely advantageous but essential for financial sustainability. Using a qualitative methodology based on documentary analysis and case studies of best practices, the research explores both the advantages of project-based accounting—such as increased transparency, traceability, and resource allocation optimization—and the challenges it poses, including the need to adapt existing IT systems and enhance the professional skills of financial-accounting staff. The paper also highlights the integration of project accounting with modern management tools (such as ERP systems and project management software) as a critical requirement for generating relevant, real-time data. The findings support the idea that projects can no longer be treated as simple budgetary subunits; instead, they must be viewed as responsibility centers that directly reflect organizational performance. In this regard, project-based accounting asserts itself as a strategic vector of financial modernization, providing genuine support to managerial decision-making and contributing to the strengthening of internal control mechanisms in project-oriented organizations.*

**Keywords:** *project-based accounting, financial management, financial control, projects, organizational performance*

**JEL Classification:** *G32, H43, O22*

## **1. Introduction**

The structural transformations that have shaped the global economy in recent decades have led to a profound reconfiguration of organizational and financial management models. In an environment marked by volatility, uncertainty, and growing pressure for efficient resource use, an increasing number of organizations—whether private companies, public institutions, or non-governmental entities—have shifted toward a project-based operational model. This transition reflects the need for flexibility, control, and results orientation—fundamental attributes of a modern and competitive economy.

Project-based management implies not only a reorganization of activities around clearly defined goals and deliverables, but also the adaptation of monitoring and control systems, particularly in the area of financial management. In this framework, project-based accounting emerges as an essential and strategic tool, surpassing its traditional bookkeeping function. By enabling granular tracking of expenditures, revenues, allocations, and budget execution for each individual project, it provides a robust foundation for decision-making, performance evaluation, and financial transparency.

This approach is markedly different from traditional accounting, which is centered on organizational structure, and corresponds to a modern paradigm in which the project is viewed as the primary unit of economic analysis and control. Moreover, integrating project accounting with advanced IT tools—such as ERP systems or project management applications—offers organizations a real-time, integrated perspective on the financial and operational progress of each initiative.

This paper aims to analyze the role and utility of project-based accounting in the context of contemporary financial management, with a focus on its concrete benefits, implementation challenges, and the conditions necessary to harness its strategic potential. The guiding research question is: How does project-based accounting contribute to enhancing financial efficiency and strengthening decision-making capacity in modern organizations?

The study is structured as follows: after this introduction, the theoretical and conceptual framework is presented, followed by the research methodology, the main findings and related discussions, and finally the conclusions and recommendations for both practitioners and scholars.

## **2. Theoretical and conceptual framework**

Project-based accounting is increasingly recognized in both academic literature and managerial practice as a comprehensive tool for financial tracking, analysis, and control, adapted to the growing prevalence of project-structured

activities—each with distinct objectives, budgets, and timelines. This accounting model goes beyond the simple recording of financial transactions, offering an analytical perspective on resource allocation and utilization at the level of each individual project. Unlike traditional accounting, which mirrors an organization's hierarchical structure and is centered around general ledgers and functional cost centers, project accounting introduces a cross-functional dimension to financial management. In this system, each project is treated as an autonomous entity, with its own set of expenditures, revenues, commitments, and funding sources. This enables granular monitoring of budget execution, real-time performance assessment, and enhanced capacity to identify deviations from financial planning.

A defining feature of project accounting is its role in evaluating economic and financial performance. By clearly allocating direct and indirect costs, tracking implementation stages, and calculating efficiency indicators, this system provides in-depth insights into the profitability of each investment initiative. Moreover, by highlighting results at the project level, it supports team accountability and facilitates strategic decision-making grounded in real-time data, rather than in aggregated organizational reports.

The integration of project accounting with modern management tools is essential for its effective implementation. IT systems such as ERPs (SAP, Oracle, Microsoft Dynamics) and applications like Microsoft Project enable data flow automation, alignment of operational and financial activities, and the generation of relevant reports across all decision-making levels. These platforms ensure not only process coherence, but also a transparent and controllable framework for financial governance.

Specialized literature increasingly supports the view that in a project-driven economy, traditional accounting becomes insufficient. Project-based accounting is not merely a technical evolution, but a strategic necessity that redefines the relationship between financial management and organizational governance. In this context, it must be understood as a pillar of financial sustainability and competitiveness, with direct applicability in fields such as construction, IT, education, research, and public administration.

### **3. Methodology**

This study is based on a qualitative, exploratory approach, aimed at understanding the role and effectiveness of project-based accounting within the context of contemporary financial management. The chosen methodology allowed for both a conceptual analysis and the direct observation of how organizations structure and apply their accounting practices, depending on whether or not they report on a project-by-project basis.



In concrete terms, we studied real accounting practices from organizations conducting project-based activities, particularly in sectors such as construction, IT, consulting, and public administration. The study included two main categories of entities:

- Organizations that apply integrated project accounting, with clearly separated tracking of costs, revenues, and budget execution for each individual project;
- Organizations that operate under a generalist accounting system, without explicit project separation or cost center allocation.

This comparative approach made it possible to highlight the significant advantages offered by project-based accounting, especially in terms of visibility into the profitability of individual initiatives. In traditional general accounting, the poor performance of specific projects or activities can remain “concealed” by overall company aggregates, potentially leading to misguided strategic decisions or the continuation of loss-making operations. In contrast, project-based accounting allows for precise identification of each project’s, client’s, or cost center’s contribution to the organization’s financial outcomes, thereby enabling more informed decisions and tighter financial control.

Data collection was conducted through:

- Documentary analysis (specialized literature, best practice guides, accounting standards);
- Direct observation of accounting structures implemented within selected organizations;
- Study of ERP systems that offer dedicated modules for project-based accounting (e.g., SAP, Microsoft Dynamics, Oracle).

The analysis focused on aspects such as the recording of direct and indirect costs, integration with operational planning, the degree of reporting automation, and the use of financial data in the decision-making process.

Research limitations stem primarily from the qualitative nature of the study and restricted access to detailed financial data from private companies, limiting the generalizability of conclusions. Nevertheless, the diversity of cases studied and the methodological contrast between the two accounting models analyzed provide a robust foundation for evaluating the practical applicability and added value of project-based accounting.

#### **4. Impact on financial performance**

When properly implemented, project-based accounting becomes a decisive instrument in assessing an organization’s economic and financial performance. This study has shown that a detailed, project-structured accounting system not only enables rigorous tracking of budget execution, but also provides a

functional diagnostic of the efficiency of investments, activities, and resource allocation. Organizations that rely on a project-oriented accounting system report a markedly superior ability to detect budget deviations in real time, which allows for rapid and targeted corrective action. For instance, when a project exceeds its approved expenditure limits, the accounting system can automatically signal the source of the deviation, specifying the cost category, the responsible party, and the likely nature of the discrepancy—be it operational, contractual, or procedural. In the absence of this visibility, such deviations may remain undetected until the end of the fiscal year, at which point corrective action is both delayed and ineffective.

Moreover, project-based accounting enables a direct correlation between expenses and outcomes, fostering a realistic analysis of the cost-benefit ratio for each activity carried out. This direct link between inputs (resources consumed) and outputs (deliverables, objectives achieved) forms an objective foundation for strategic decisions on whether to continue, scale, or discontinue a project.

A key contribution of this accounting model is its ability to precisely identify unprofitable projects that, under traditional accounting systems, might be “hidden” within an overall positive financial result. For example, in a company managing several concurrent projects, global profitability can obscure the losses of a single initiative, masked by the success of others. Without project-level accounting, this loss remains invisible, leading to inefficient resource allocation and the continuation of unnecessarily costly activities.

At the same time, this system provides a framework for internal accountability, as each team, coordinator, or project leader gains visibility into the financial execution of their project and can be evaluated based on clear, measurable, and transparent indicators. This fosters an organizational culture focused on results, performance, and financial responsibility.

In conclusion, the impact of project-based accounting on financial performance is profound, multidimensional, and transformative, provided the organization has the technical infrastructure and professional expertise to ensure proper and complete implementation. More than just a record-keeping system, project-based accounting functions as a financial governance tool, enabling the transition from reactive to strategic management.

## **5. Practical examples**

To demonstrate the concrete applicability of project-based accounting, this study included an analysis of relevant case studies from various economic sectors, where the accounting approach was tailored to the specific nature of project-based operations. These examples confirmed that the success of project

accounting depends not only on technical implementation but also on the degree of integration with operational workflows and the managerial maturity of the organization.

### *Construction Sector*

In the construction sector, where each project represents a distinct undertaking with its own budget, timeline, and team, project-based accounting is an operational necessity. Companies review revenues and expenditures on a monthly basis for each individual site, monitoring both physical progress and budget execution. Financial reports are aligned with field data, enabling prompt corrective actions in case of budget overruns or implementation delays. In addition, management can benchmark projects against one another in terms of financial performance, identifying more effective models of resource allocation.

### *IT and Consulting Sectors*

In IT and consulting firms, project-based accounting enables detailed tracking of costs associated with each client or contract. By integrating ERP modules with time-tracking and resource management tools, companies can calculate the real profitability of each project, considering both direct costs (labor hours, licenses, subcontracting) and indirect costs (operational overhead). These insights allow firms to make rational decisions on whether a particular client or project type is financially viable or should be renegotiated. Furthermore, this system helps avoid underestimation of expenses and protects profit margins.

### *Public Institutions and EU-Funded Projects*

In the public sector and organizations managing non-reimbursable funds, project-based accounting is mandated by donor regulations and is essential for financial justification. For example, in projects funded under programs such as the NRRP, Regional Program, or PEO, every expenditure category must be recorded separately—eligible or ineligible—and linked to a specific activity or result code. Platforms such as MySMIS, along with accounting software configured for project tracking, enable this level of monitoring, ensuring traceability, transparency, and compliance with audit requirements. These IT systems also allow for the automatic generation of standardized reports required by managing authorities.

These examples demonstrate that the value of project accounting lies in its adaptability to each sector's particularities, depending on the nature of projects, sources of funding, and the maturity of internal processes. Its success is not solely dependent on IT infrastructure, but also on how the organization integrates accounting into its decision-making chain and operational culture.

## 6. Advantages and implementation challenges

The implementation of project-based accounting generates a series of significant benefits, while also involving technical, procedural, and human challenges that must be carefully managed to ensure that the system operates effectively and delivers meaningful results.

### *Identified Advantages*

One of the most important advantages is the increase in financial transparency, as each project is treated as a distinct responsibility center with its own budget, clearly defined funding sources, and specific performance indicators. This level of transparency is essential both in the private sector—for assessing economic efficiency—and in the public sector, where traceability of expenditures is a fundamental requirement for administrative integrity.

Secondly, project-based accounting enables comparative analyses between similar projects and across successive budgetary periods. It offers managers valuable tools for forecasting, benchmarking, and adjusting resource allocation strategies. High-performing projects can be quickly identified, along with those exhibiting disproportionate costs relative to their outcomes, and performance patterns can be either replicated or avoided accordingly.

Another key benefit is the enhanced accountability of project teams, as there is a clear association between operational decisions and their financial consequences. In such a system, decisions to accelerate a phase, outsource an activity, or alter a delivery timeline have measurable financial implications that become visible in real time and can be objectively assessed.

Finally, project accounting contributes to organizational financial learning: the continuous feedback generated by execution reports enables organizations to refine their planning, evaluation, and control methods on an ongoing basis.

### *Challenges and Obstacles*

Despite these benefits, the implementation of project-based accounting involves a number of difficulties. One of the most common is the need to adapt existing IT systems, especially in organizations that rely on outdated or inflexible accounting software that does not support the dynamic allocation of cost centers and project codes.

Additionally, allocating indirect costs often proves problematic, particularly when multiple projects share common resources (e.g., administrative staff, utilities, rent). The absence of clear allocation rules can compromise the accuracy of financial reporting and generate internal friction among project teams.

Another important obstacle is the insufficient training of financial-accounting staff, particularly in organizations lacking experience with project-based operations or those functioning within a rigid bureaucratic environment. Effective implementation requires knowledge not only of accounting principles but also of project management logic, which calls for specialized professional development and strong managerial support.

Lastly, resistance to change is a cultural factor that must not be underestimated. Transitioning from a traditional aggregated accounting model to a granular, responsibility-driven one entails an institutional adaptation process that cannot be achieved through administrative decree alone. It must be supported by leadership, internal communication, and performance-oriented incentive policies.

## **7. Summary of findings**

The research carried out has rigorously confirmed that project-based accounting is no longer merely an operational option, but has become a strategic necessity for organizations seeking to maintain competitiveness, manage resources efficiently, and base their decisions on sound financial data. In today's economic environment—one that demands a clear focus on objectives, results, and financial responsibility—granular, project-centered accounting offers a critical advantage in terms of governance and performance.

A key finding of the study is the demonstration of project-based accounting's ability to provide a faithful representation of each initiative's profitability, a level of insight that traditional, aggregated accounting cannot offer. By clearly delineating revenue and expenditure flows for each project, organizations can analyze not only budget execution, but also the efficiency of operational decisions and the contribution of each activity to overall results.

A second central aspect revealed by the research is the direct support that project accounting provides to decision-making processes. Accounting data no longer serve merely a retrospective reporting function; they become active tools for risk assessment, strategy adjustment, and future scenario planning. This paradigm shift—from accounting as a passive record-keeping function to accounting as a strategic enabler—is one of the most significant gains for modern financial management.

The study also highlighted the positive impact on organizational accountability: by linking operational decisions to their financial consequences, project teams develop a more conscientious attitude toward costs, deadlines, and deliverables. This, in turn, fosters an institutional culture oriented toward performance and efficiency.

In addition, the implementation of project-based accounting was shown to bring clear benefits in terms of traceability, auditability, and regulatory compliance, especially in the case of externally funded projects. The clear structuring of expenditures and the automation of reports reduce the risk of errors and facilitate ex-post verification processes.

In conclusion, project-based accounting emerges as a cornerstone of contemporary financial management, at the intersection of transparency, efficiency, and informed decision-making. It provides organizations not only with clearer visibility into their operations, but also with a robust mechanism for internal control and strategic optimization.

### ***7.1. Practical Implications***

The findings of this research clearly demonstrate that the implementation of project-based accounting brings about a profound transformation in how organizations understand, manage, and optimize their financial resources. The practical implications of this approach are manifold, influencing both operational procedures and strategic decision-making processes.

First, project-based accounting allows for a redefinition of the relationship between financial execution and managerial control. By clearly mapping financial flows for each individual project, it ensures a direct correlation between budgets, activities, and outcomes. This has an immediate impact on how projects are planned, resources are allocated, and decisions are made to redirect or recalibrate ongoing activities.

Second, in organizations managing multiple projects simultaneously—whether funded internally or through external sources such as EU funds—project accounting becomes an essential tool for internal control. It helps prevent resource overlap and inefficiencies, ensuring optimal alignment between means and objectives. In this sense, project-based accounting provides a platform for financial governance, where each project functions as a unit of analysis, evaluation, and accountability.

Another major implication relates to financial reporting and accountability to third parties. Organizations that operate on a project basis—especially those implementing co-financed programs—must provide clear evidence of the eligibility and efficiency of their expenditures. A well-structured project accounting system not only facilitates this process but ensures that reporting is auditable, reproducible, and transparent.

Moreover, project accounting serves an educational function within organizations. By offering visibility into costs and outcomes, it fosters a performance-oriented organizational culture grounded in accountability and financial discipline. This dimension, often overlooked, is vital for the long-term sustainability of any modern organization.



In conclusion, the practical implications of project-based accounting go far beyond bookkeeping. They influence governance architecture, operational efficiency, decision-making quality, and stakeholder trust. This is not merely a technical adjustment, but a substantive transformation in how organizations relate to their resources and strategic goals.

## ***7.2. Recommendations for Project-Based Organizations***

Based on the conclusions of this study, it is evident that the transition toward project-based accounting requires a coordinated effort of strategic, technological, and human adaptation. Adding a new accounting function is not sufficient; a restructuring of how the organization designs its reporting, control, and financial evaluation systems is required. Accordingly, the following recommendations address both accounting infrastructure and broader organizational aspects.

### ***1. Reorganize the internal accounting structure***

Companies should adapt their chart of accounts and cost center structures to reflect each project individually. It is essential that every project be assigned specific codes for revenues, direct and indirect costs, funding sources, and activity categories. This structure ensures traceability and enables meaningful comparative financial analysis.

### ***2. Integrate accounting into advanced information systems***

Adopting ERP systems or accounting platforms with dedicated project modules is vital. These systems allow for workflow automation, integration between operational planning and financial execution, and the generation of reports tailored to management, audit, or external reporting requirements.

### ***3. Provide professional training for financial and accounting staff***

Project-based accounting cannot be effectively implemented without a professionally trained team familiar with the specificities of project management. Internal training sessions or partnerships with specialized training providers are recommended to ensure understanding of performance indicators, indirect cost allocation methods, and reporting requirements for co-financed projects.

### ***4. Develop standardized internal procedures***

Organizations are encouraged to formalize processes related to budgeting, cost allocation, budget execution control, and financial project closure. These procedures should include clear methods for distributing shared costs, explicit responsibilities, and internal control mechanisms.

### ***5. Promote a performance-oriented organizational culture***

Beyond the technical components, project accounting must be supported by an organizational culture grounded in transparency, accountability, and



results orientation. Management should actively encourage the use of financial data in decision-making and leverage accounting information not merely for compliance, but as a foundation for growth and development.

### **7.3. Future Research Directions**

Project-based accounting, as a tool for modernizing financial management, represents a field with significant potential for both theoretical and practical development, particularly in an increasingly digitalized, interconnected, and results-oriented economic context. This paper has outlined a solid conceptual and applied framework, while also opening several meaningful avenues for future research.

A first key direction is the quantitative evaluation of the impact of project-based accounting on organizational financial performance. Future studies could investigate, through statistical methods, the correlation between the level of reporting granularity and indicators such as efficiency, profitability, or financial risk. Such research would allow the identification of critical thresholds in terms of the added value provided by this accounting approach.

A second valuable avenue would be an international comparative study of project accounting models, focusing on best practices from countries already implementing advanced, digitally integrated systems (e.g., the Netherlands, Sweden, Canada). This type of analysis could help formulate recommendations for standard harmonization and support Romanian organizations in their digital transformation processes.

Another promising research area is the integration of project accounting with ERP and project management systems, with emphasis on interoperability, automation, and the real-time generation of performance indicators. In this regard, multidisciplinary studies involving IT experts could yield actionable insights for designing financial-information architectures in modern organizations.

Lastly, attention should be given to the ethical and decision-responsibility dimensions associated with project-level financial reporting. The increased visibility of financial results at the project level may create additional pressures on teams and decision-makers. This requires analysis from both an organizational culture perspective and a risk management standpoint to prevent distorted reporting.

In conclusion, project-based accounting remains a dynamic, strategic field within a project-driven economy, and future research can contribute not only to the refinement of theoretical tools, but also to the development of sustainable and adaptive financial governance models for contemporary organizations.

## References

- Anghel, I. (2018). Cost Control and Analysis in Investment Projects. *Journal of Finance, Banking, Insurance*, No. 2, pp. 72–81.
- Asana (2025). *Project Accounting: How to Weigh Project Cost-Benefits*. Available online: <https://asana.com/resources/project-accounting>
- Deltek (2025). What Is Project Accounting? Get Started With This Guide. Available online: <https://www.deltek.com/en/erp/project-accounting>
- ERP Focus (2024). *ERP and Project Accounting Software Integration*. Available online: <https://www.erpfocus.com/erp-accounting-software-integration.html>
- European Commission (2021). *Financial Guidelines for Project-Based Budgeting in EU-Funded Programs*. Brussels: DG REGIO.
- EY Romania (2023). *Study on the Digitalization of Accounting Systems in Romanian Companies*. EY Insights, April 2023.
- International Project Management Association (IPMA) (2021). *Project Cost Management – Best Practices*. Available online: <https://www.ipma.world>
- NetSuite(2025). *How ERP Makes Project Management Easier*. Available online: <https://www.netsuite.com/portal/resource/articles/erp/erp-project-management.shtml>
- Nicolescu, O., & Verboncu, I. (2020). *Organizational Management*. Bucharest: Economic Publishing House.
- Nikraves, R., Azizi, J., & Golshani, T. (2024). Investigating the Impact of an Integrated Project Management System on Financial Performance. *ResearchGate*. Available online: <https://www.researchgate.net/publication/381174511>
- Popescu, C., & Ionescu, D. (2020). Project Accounting in the Context of the Modern Economy. *Journal of Accounting and Management Information Systems*, 29 (3), pp. 55–66.
- Productive.io (2024). *Project Accounting: A Complete Guide to Mastering Project Finances*. Available online: <https://productive.io/blog/project-accounting/>
- Project Management Institute (PMI) (2022). *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – 7th Edition*. Newtown Square, PA: PMI.
- Ristea, M., Dumitru, C. G., & Ioanăș, C. (2019). *Fundamentals of Managerial Accounting*. Bucharest: CECCAR Publishing House.
- Rocketlane (2023). *A Guide to Project-Based Accounting*. Available online: <https://www.rocketlane.com/blogs/project-based-accounting>

DOI: 10.5281/zenodo.17478939

## **COST ACCOUNTING METHODS IN THE PHARMACEUTICAL INDUSTRY**

**Marius Daniel SISU, PhD Student**

University Valahia of Târgoviște, Romania

marius.sisu@hpps-consulting.com

**Emilia VASILE, PhD Professor**

Athenaeum University, Bucharest, Romania

rector@univath.ro

**Abstract:** *The pharmaceutical industry operates in a complex and highly regulated environment where cost accounting plays a pivotal role in ensuring both operational efficiency and financial transparency. This paper explores the main cost accounting methods applicable to pharmaceutical production and distribution, focusing on their relevance for pricing, efficiency, and strategic decision-making. Drawing upon international studies and institutional reports (IFPMA, KPMG, EFPIA, WHO), the paper compares traditional methods such as absorption and marginal costing with modern approaches, including activity-based costing (ABC) and process costing adapted to pharmaceutical operations. The study highlights how cost allocation directly influences the evaluation of R&D expenditures, regulatory compliance costs, and the management of fixed versus variable production costs. It further examines how companies integrate cost accounting into ethical and strategic frameworks to balance profit motives with public health responsibilities. By combining literature-based analysis with empirical evidence from industry reports, the article contributes to a better understanding of how cost accounting systems can enhance financial efficiency while supporting equitable access to medicines.*

**Keywords:** *cost accounting, pharmaceutical industry, pricing strategy, efficiency, management control*

**JEL Classification:** *M41, I11, L65, O32*

### **1. Introduction**

The pharmaceutical industry represents one of the most knowledge-intensive and regulated sectors of the global economy, where financial accountability and ethical responsibility are deeply intertwined. As pharmaceutical

expenditures continue to rise across both developed and emerging economies, cost accounting systems have become essential instruments for ensuring transparency, sustainability, and value creation in the delivery of health care. Beyond their traditional role in budgeting and cost control, modern cost accounting methods provide a managerial framework for assessing efficiency, optimizing production flows, and evaluating the financial implications of regulatory compliance and innovation strategies.

During the last decade, a significant transformation has occurred in how pharmaceutical firms manage and report their internal costs. According to KPMG (2017) and IQVIA (2017), the evolution of cost structures has been shaped by global trends such as the increasing weight of research and development (R&D) investments, the emergence of biologics and personalized therapies, and the growing burden of compliance with Good Manufacturing Practice (GMP) and pharmacovigilance standards. Consequently, the allocation of direct and indirect costs has gained strategic importance, not only for determining accurate product pricing but also for maintaining competitiveness and access to reimbursement mechanisms in both public and private health systems.

In this context, cost accounting in the pharmaceutical industry extends far beyond the manufacturing site. It involves a complex mapping of value chains that encompass research, clinical trials, production, distribution, marketing, and post-market surveillance. Traditional methods such as full absorption costing and marginal costing have proven increasingly insufficient in capturing the multifaceted nature of pharmaceutical operations. Contemporary frameworks like activity-based costing (ABC) and process-based costing (PBC) allow managers to trace resource consumption more precisely and link expenditures to specific activities—an approach particularly valuable when evaluating R&D projects, assessing cost-effectiveness in clinical trials, or negotiating reimbursement prices with health authorities.

Furthermore, cost accounting is not purely a technical matter but also an ethical and policy-relevant domain. As highlighted by Rodriguez-Monguio et al. (2017) and Bruyaka et al. (2013), pharmaceutical companies face the challenge of reconciling profit objectives with public health imperatives, particularly in the field of orphan drugs and essential medicines. The balance between cost efficiency and equitable access has become a defining issue for corporate governance and social responsibility within the sector. This alignment between financial control and ethical accountability illustrates how cost accounting methods can act as mediators between economic rationality and social justice.

At the European level, policy frameworks such as Directive 2001/83/EC and Regulation (EC) No 141/2000 on orphan medicinal products

emphasize not only safety and efficacy but also cost transparency and public value. Reports by the European Federation of Pharmaceutical Industries and Associations (EFPIA 2021) and the International Federation of Pharmaceutical Manufacturers and Associations (IFPMA 2022) underscore that the industry's sustainability increasingly depends on its ability to demonstrate efficiency and fair pricing. Similarly, studies such as Yerramilli, Fernández and Thomson (2018) reveal that cost management practices directly influence the level of financial protection available to patients, especially in lower-income European countries where reimbursement coverage remains limited.

From a managerial perspective, cost accounting provides the analytical backbone for strategic decision-making. It informs pricing strategies, guides investment in innovation, and supports scenario analysis for risk management. According to Adams and Tsang (2015), refined costing techniques can reveal hidden inefficiencies in production and supply chains, enabling evidence-based policy interventions to reduce waste and improve therapeutic value. Moreover, integrating digital tools—such as enterprise resource planning (ERP) and AI-assisted analytics—has further expanded the scope of managerial accounting, transforming it into a real-time decision support system that aligns operational efficiency with financial and ethical objectives.

The purpose of this paper is to analyze the main cost accounting methods applied in the pharmaceutical industry, evaluating their suitability for different operational contexts and their impact on both financial performance and social accountability. The study draws on comparative evidence from international institutions and scientific literature to identify best practices in cost measurement, cost allocation, and managerial decision support. By bridging accounting methodology and health economics, the research seeks to provide a conceptual framework that links cost transparency with sustainable value creation in the pharmaceutical sector.

## **2. Literature Review and Theoretical Framework**

The literature on cost accounting within the pharmaceutical sector reveals a continuous evolution from traditional industrial models toward integrated financial-managerial frameworks capable of capturing the complexity of research-intensive and regulation-driven operations. Cost accounting, traditionally defined as the systematic recording, classification and analysis of manufacturing costs, has gradually evolved into a strategic discipline that supports managerial decision-making, resource optimization, and value-based pricing (Horngren et al., 2021). In the pharmaceutical industry, this evolution has been accelerated by rising R&D expenditures, regulatory constraints, and global competition, which have redefined the relevance of cost information for both internal management and external stakeholders.

## **2.1. Traditional cost accounting approaches**

Historically, pharmaceutical companies relied on absorption costing and marginal costing systems—methods designed for manufacturing environments with stable production volumes and predictable cost structures.

Absorption costing, which allocates both fixed and variable production overheads to products, has long been accepted for financial reporting and regulatory purposes. It ensures compliance with generally accepted accounting principles (GAAP) and enables valuation of inventory for external statements. However, its reliance on volume-based allocation bases often obscures the true cost drivers in complex R&D or multi-product environments (Fishbowl Inventory, 2023).

By contrast, marginal costing focuses on variable costs and treats fixed costs as period expenses. This method provides valuable insights for short-term decision-making, such as pricing, product discontinuation or capacity utilization. Yet, in pharmaceutical settings characterized by high fixed costs, such as R&D facilities, laboratory infrastructure and compliance departments, marginal costing may underestimate the long-term cost implications of innovation and regulation (AccessMedicine Network, 2023). Both methods, though still widely used for statutory reporting, are increasingly complemented by more sophisticated analytical frameworks that better reflect the economic reality of pharmaceutical operations.

## **2.2. Modern approaches: Activity-Based and Process Costing**

The transition from traditional to modern cost systems began in the late 1980s, when Activity-Based Costing (ABC) was introduced as a response to distortions caused by overhead-intensive production. In the pharmaceutical industry, ABC provides a detailed mapping of cost drivers by linking expenditures to specific activities such as formulation development, clinical trial management, or regulatory documentation. KPMG (2017) and IQVIA (2017) highlight that the adoption of ABC models allows pharmaceutical managers to isolate non-value-adding activities and reallocate resources toward innovation and quality assurance. A related technique, Process-Based Costing (PBC), captures the sequential flow of costs along manufacturing and quality control processes. This method has proven effective in highly automated facilities and biotechnology production where batch control and compliance tracking are critical. By quantifying cost per process rather than per unit, PBC enables performance benchmarking and continuous improvement (Beck et al., 2025).

Both methods support more transparent cost allocation, improving managerial control and facilitating compliance with international guidelines such as the WHO's *Model List of Essential Medicines* (2019), which indirectly encourages affordability analysis through cost-effectiveness evaluations.



### **2.3. Strategic and ethical dimensions of cost management**

Recent research extends the discussion beyond technical efficiency, emphasizing the ethical and strategic implications of cost accounting in the pharmaceutical sector. Bruyaka et al. (2013) conceptualized *strategic corporate social responsibility (CSR)* as a framework through which firms can transform socially responsible actions, such as orphan drug development, into competitive advantages. Their model integrates economic, legal, and ethical dimensions of responsibility (Schwartz & Carroll, 2003), illustrating how cost structures influence both innovation incentives and equitable access.

Similarly, Rodriguez-Monguio, Spargo, and Seoane-Vazquez (2017) argue that cost transparency is a prerequisite for ethical decision-making in drug pricing and reimbursement. They emphasize that reconciling economic incentives with patients' health needs requires cost systems capable of distinguishing between R&D risk premiums and unjustified profit margins. Such analytical differentiation is critical for assessing the fairness of pricing policies under European regulations on orphan medicines (Regulation (EC) No 141/2000).

Yerramilli, Fernández, and Thomson (2018) provide further empirical evidence linking cost structures and financial protection in health care. Their study demonstrates that countries with comprehensive cost accounting and reimbursement frameworks achieve greater equity in access to essential medicines. This aligns with the IFPMA (2022) and EFPIA (2021) reports, which underscore that efficient cost management not only sustains industry competitiveness but also enhances affordability and public trust.

### **2.4. Integration of technology and digital transformation**

The digitalization of accounting and management control systems has further reshaped cost analysis in pharmaceutical organizations. Enterprise resource planning (ERP) systems and AI-based analytics now enable real-time cost tracking, scenario simulation and predictive budgeting. As noted by Adams & Tsang (2015), advanced costing modules embedded in ERP platforms allow dynamic allocation of overheads and automatic adjustment to changes in production mix, batch size or regulatory compliance costs. Moreover, integrating environmental and social metrics—such as energy consumption or supply-chain carbon footprint—into cost reporting responds to emerging sustainability requirements (Moloudpourfard et al., 2025).

Digital cost accounting also supports *value-based healthcare models*, in which payments are linked to therapeutic outcomes rather than production volumes. This paradigm shift requires transparent, granular cost data to evaluate the efficiency of interventions and align pricing with patient value—a trend increasingly promoted by WHO and the European Commission.



## 2.5. Conceptual synthesis

The reviewed literature indicates that cost accounting in the pharmaceutical industry has evolved from a narrow financial function into a multidimensional managerial system integrating technical, ethical, and strategic dimensions. Traditional methods ensure compliance and simplicity but fail to capture the heterogeneity of pharmaceutical processes. Modern approaches (ABC and PBC) offer analytical precision and align cost structures with organizational strategy. At the same time, ethical frameworks and digital technologies redefine cost accounting as a tool for sustainable governance rather than mere cost control. Consequently, this paper adopts a hybrid theoretical framework combining (1) the *economic-managerial* perspective, focused on efficiency and performance measurement, and (2) the *ethical-strategic* perspective, focused on transparency, fairness, and stakeholder accountability. Together, these dimensions provide a foundation for analyzing how pharmaceutical firms can employ cost accounting to achieve both profitability and societal value.

## 3. Methodology and Research Design

The methodological framework of this study is designed to combine a comparative analysis of international pharmaceutical cost structures with a conceptual evaluation of cost accounting methods currently applied within the industry. The approach integrates both qualitative and quantitative reasoning, aiming to identify the relationship between cost allocation techniques, managerial efficiency, and pricing strategies under the constraints of regulation and ethical accountability.

### 3.1. Research purpose and objectives

The primary objective of the research is to analyze how cost accounting methods influence managerial and financial performance in the pharmaceutical industry, and to determine which models ensure a balance between economic efficiency and public health equity.

The specific objectives are:

1. To review and categorize the main cost accounting approaches applied in pharmaceutical companies (absorption, marginal, activity-based, and process costing).
2. To compare the efficiency implications of these methods based on international evidence and sectoral reports.
3. To assess how the integration of digital technologies (ERP systems, AI-driven analytics) enhances the accuracy and transparency of cost reporting.

4. To explore the ethical and strategic implications of cost management decisions in relation to pricing and access to medicines.

The research adopts a *descriptive-analytical* design combined with *comparative benchmarking*, which is appropriate for evaluating cross-country and cross-method differences using secondary data sources.

### **3.2. Data sources and selection criteria**

The study relies on a comprehensive desk-based analysis of peer-reviewed scientific literature and institutional reports published between 2015 and 2025.

The main documentary sources include:

- International institutional reports – IFPMA (2022), EFPIA (2021), IQVIA (2017), WHO (2019), and OECD Health Statistics (2024);
- Corporate and consultancy publications – *KPMG Pharma Outlook 2030* (2017) and *AccessMedicine Network* (2023);
- Academic articles – Adams & Tsang (2015), Rodriguez-Monguio et al. (2017), Bruyaka et al. (2013), Yerramilli et al. (2018), Beck et al. (2025), and Moloudpourfard et al. (2025).

Selection criteria were based on the following conditions:

1. Empirical relevance for pharmaceutical cost analysis;
2. Methodological transparency (explicit data sources and indicators);
3. Inclusion of financial or ethical dimensions of cost management;
4. Coverage of both developed and emerging markets.

The integration of these heterogeneous sources allows a multidimensional understanding of cost accounting practices at global level.

### **3.3. Analytical framework**

The research design follows a comparative benchmarking approach, inspired by KPMG (2017) and IQVIA (2017), which juxtaposes national and corporate data to identify patterns of efficiency.

Three complementary analytical perspectives are applied:

1. Cost Structure Analysis – identifies the proportion of R&D, production, marketing, and compliance costs within total pharmaceutical expenditure.
2. This analysis provides insight into cost drivers and structural rigidity (fixed vs. variable components).
3. Methodological Benchmarking – compares how specific cost accounting models perform under different operational conditions. For example:
  - Absorption costing: compliance-driven environments;
  - Activity-based costing: R&D-intensive and diversified production;
  - Process costing: biologics manufacturing and continuous production systems.

4. Efficiency Ratio Interpretation – evaluates cost-efficiency relationships such as *R&D expenditure per approved molecule*, *cost per therapeutic unit*, and *cost of regulatory compliance as % of total cost*. These ratios serve as indicators for cost allocation effectiveness and managerial responsiveness.

The study does not employ raw numerical datasets but builds on the synthesis of published data and ratio-based comparisons from recognized institutional sources. The interpretation is therefore conceptual-analytical rather than econometric, consistent with the theoretical orientation of managerial accounting research (Horngren et al., 2021).

### 3.4. Conceptual variables

The methodological structure of the paper rests on three conceptual variables:

- Dependent variable: *Cost efficiency* – defined as the ratio between total input costs and output performance indicators (e.g., market access, volume sold, innovation pipeline).
- Independent variables: *Accounting methodology* (type of cost system implemented) and *digital integration level* (presence of ERP/AI solutions).
- Moderating variable: *Ethical orientation and CSR engagement* – which shapes management decisions regarding price formation and resource allocation.

The interrelation of these variables reflects the assumption that the degree of methodological sophistication in cost accounting correlates with both financial efficiency and ethical compliance.

### 3.5. Limitations of the study

The research acknowledges several limitations. First, it relies primarily on secondary data, which may introduce reporting bias or methodological heterogeneity across sources. Second, differences in national accounting standards and regulatory frameworks limit the full comparability of pharmaceutical cost data. Third, ethical and social responsibility variables are inherently qualitative and may vary according to corporate culture and governance structures. Despite these constraints, triangulation between institutional reports, academic studies, and industry data mitigates potential distortions and strengthens the interpretive validity of findings.

### 3.6. Summary of methodological approach

In summary, the study applies a documentary, comparative, and interpretative methodology aimed at bridging theoretical accounting models with real-world managerial practices. The conceptual synthesis allows an integrative

understanding of how cost accounting functions as both a technical and ethical instrument within the pharmaceutical industry. The analytical results presented in the next section provide empirical illustrations of how different cost methods shape decision-making, efficiency, and value creation across global pharmaceutical systems.

4. Results and Discussion

The comparative analysis reveals that pharmaceutical cost accounting practices are strongly influenced by the structure of national health systems, the regulatory environment, and the maturity of managerial control mechanisms. Despite broad convergence in accounting standards across the European Union, significant differences persist regarding the transparency and depth of cost allocation, the treatment of R&D expenses, and the integration of ethical criteria into financial reporting.

4.1.Comparative benchmarking: EU pharmaceutical expenditure and efficiency

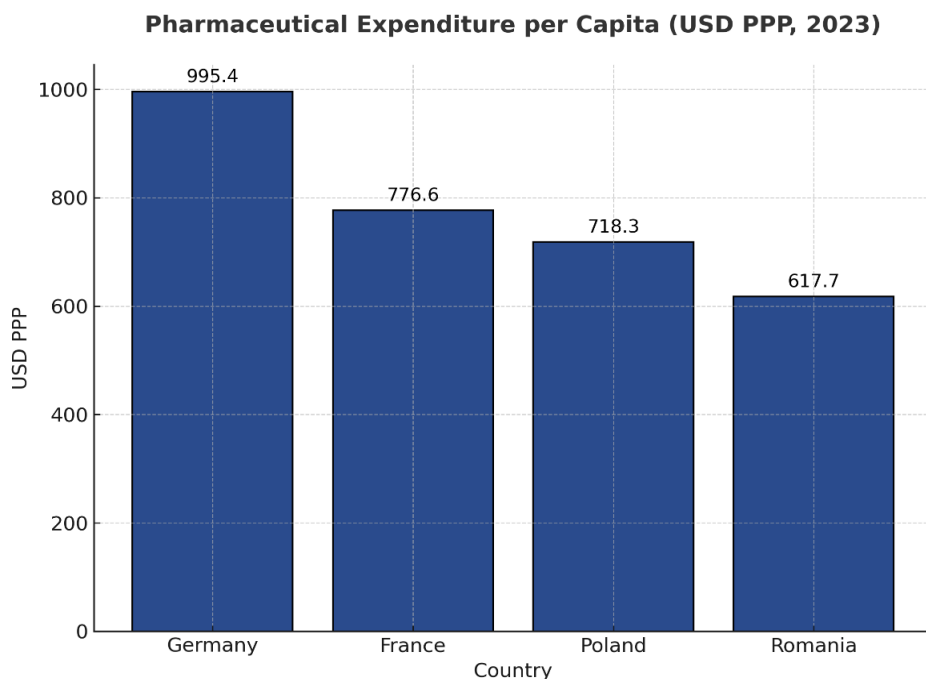
To contextualize the analysis, benchmarking was conducted across four representative EU economies (Germany, France, Poland, and Romania) using data compiled from IFPMA (2022), EFPIA (2021), WHO (2019), and IQVIA (2017). The indicators selected include pharmaceutical expenditure per capita (USD PPP), the public share of total health expenditure, the pharmaceutical share of total health expenditure, and an Efficiency Index computed as the ratio between public and pharmaceutical shares.

Table 1. Comparative Efficiency Indicators of Pharmaceutical Expenditure in Selected EU Countries (2023)

| Country | Pharmaceutical Expenditure per capita (USD PPP) | Public share of total health expenditure (%) | Pharmaceutical share of total health expenditure (%) | Efficiency Index (Public/Pharma) |
|---------|-------------------------------------------------|----------------------------------------------|------------------------------------------------------|----------------------------------|
| Germany | 995.4                                           | 84.2                                         | 17.1                                                 | 4.9                              |
| France  | 776.6                                           | 82.5                                         | 16.8                                                 | 4.9                              |
| Poland  | 718.3                                           | 70.4                                         | 20.2                                                 | 3.5                              |
| Romania | 617.7                                           | 60.1                                         | 23.5                                                 | 2.6                              |

Source: Compiled by author from IFPMA (2022), EFPIA (2021), WHO (2019), IQVIA (2017)

The table shows a clear pattern of variation between Western and Eastern European healthcare systems. Germany and France exhibit the highest expenditure levels per capita, supported by robust public financing and comprehensive reimbursement schemes. Poland and Romania record lower expenditure levels, but also weaker efficiency ratios, indicating that a smaller portion of total health spending is publicly financed and that pharmaceutical expenses constitute a larger proportion of the total.



*Source: Author's computation based on IFPMA (2022), EFPIA (2021), WHO (2019), IQVIA (2017)*

**Figure 1. Pharmaceutical Expenditure per Capita (USD PPP, 2023)**

*Source: Author's own computation based on IFPMA (2022), EFPIA (2021), WHO (2019), IQVIA (2017)*

Figure 1 and Table 1 illustrate a double asymmetry in European pharmaceutical expenditure. Western economies (Germany, France) allocate significantly higher per capita spending, yet maintain cost-efficiency through public funding mechanisms and sophisticated cost allocation systems. In contrast, Central and Eastern European countries (Poland, Romania) display lower expenditure but reduced efficiency, stemming from limited public reimbursement and weaker managerial accounting infrastructures.

The Efficiency Index offers a synthetic metric to assess the sustainability of pharmaceutical spending. Values above 4.5 (Germany, France) indicate effective conversion of public financing into pharmaceutical outcomes, while values below 3 (Romania, Poland) suggest systemic inefficiencies and insufficient cost control. These findings confirm previous IQVIA (2017) observations that cost transparency and managerial accounting sophistication are positively correlated with national efficiency in medicine financing.

#### **4.2. Application of cost accounting methods in pharmaceutical operations**

Empirical evidence from corporate and institutional reports shows that pharmaceutical companies increasingly favor Activity-Based Costing (ABC) and Process-Based Costing (PBC) as managerial tools to identify inefficiencies and reallocate resources. KPMG (2017) reported that approximately 60 % of global pharmaceutical companies have implemented at least partial ABC frameworks, primarily in R&D, quality assurance, and regulatory compliance. This approach enhances the traceability of overhead costs and supports informed decisions regarding pricing and outsourcing.

Table 2. Cost Accounting Methods and Managerial Implications in Pharmaceutical Firms

| Method                       | Key Features                          | Advantages                             | Limitations                  | Applicability                              |
|------------------------------|---------------------------------------|----------------------------------------|------------------------------|--------------------------------------------|
| Absorption Costing           | Allocates fixed + variable overheads  | Financial reporting compliance         | Limited managerial insight   | Regulatory accounting, inventory valuation |
| Marginal Costing             | Considers variable costs only         | Short-term decision-making             | Ignores fixed-cost structure | Small production units                     |
| Activity-Based Costing (ABC) | Assigns costs to activities/processes | Accurate cost tracing, supports R&D    | High implementation cost     | R&D-intensive, multinational firms         |
| Process-Based Costing (PBC)  | Allocates cost per process step       | Continuous improvement, automation fit | Requires digital integration | Biotech and large-scale production         |
| Hybrid ERP-integrated Models | Dynamic, real-time cost tracking      | Predictive control, digital analytics  | Complex to implement         | Advanced, digitally transformed firms      |

*Source: Compiled by author based on KPMG (2017), Adams & Tsang (2015), EFPIA (2021)*

Table 2 synthesizes the evolution from traditional to advanced cost accounting methods in the pharmaceutical industry. Firms employing ABC and PBC achieve higher analytical precision and better alignment with corporate strategy, while traditional absorption systems, though still useful for regulatory compliance, provide limited insight for managerial decision-making. Romanian and Polish manufacturers remain largely within the absorption–standard costing paradigm, focusing on statutory reporting rather than strategic cost management. Conversely, large Western firms have adopted ERP-integrated cost modules that provide real-time insights into production variance, energy use, and quality costs, aligning accounting with sustainability objectives.

#### ***4.3. Efficiency and ethical accountability***

The relationship between cost efficiency and ethical accountability emerges as a defining element of modern pharmaceutical governance. As Bruyaka et al. (2013) note, orphan drug developers face the ethical challenge of balancing cost recovery and public welfare. Strategic cost accounting addresses this dilemma by disclosing the full structure of R&D and regulatory costs. Similarly, Rodriguez-Monguio et al. (2017) emphasize that transparent cost reporting increases stakeholder trust and supports equitable pricing negotiations with health authorities. Countries integrating cost-effectiveness assessments within reimbursement frameworks—such as Germany and France—demonstrate how ethical considerations can coexist with economic rationality. These systems rely on detailed cost information derived from ABC or process-based accounting, confirming that **ethical pricing depends on methodological precision**. By contrast, Romania’s limited HTA capacity and fragmented databases hinder evidence-based decision-making and perpetuate perceptions of opacity in pharmaceutical pricing.

#### ***4.4. Integration of digital technologies and data analytics***

Digital transformation represents the next frontier of cost accounting in the pharmaceutical sector. AI-powered analytics, ERP integration, and process automation are transforming cost monitoring into a real-time, predictive function. Adams & Tsang (2015) demonstrated that digital cost tracking systems improve variance analysis and facilitate adaptive budgeting. Beck et al. (2025) and Moloudpourfard et al. (2025) further highlight the role of digital accounting in linking sustainability metrics (such as energy intensity or emission reduction) to financial reporting.

Such integration transcends operational efficiency; it embeds ethical and environmental considerations into corporate cost models, transforming



accounting into a multidimensional governance tool. Firms adopting digital cost architectures not only reduce inefficiencies but also strengthen their ESG (environmental, social, and governance) credibility, a factor increasingly evaluated by investors and regulators alike.

#### ***4.5. Synthesis of findings***

The findings demonstrate that the sophistication of cost accounting correlates with three dimensions of performance:

1. Managerial responsiveness – firms with advanced cost systems respond faster to regulatory or market shifts;
2. Transparency and ethical legitimacy – precise cost tracing enhances fairness in pricing and reimbursement;
3. Sustainability alignment – digitalization connects cost control with environmental and social impact metrics.

Therefore, cost accounting should be regarded not only as a financial mechanism but as a strategic governance tool that shapes corporate integrity and policy credibility. For emerging economies such as Romania, the modernization of cost systems—through ABC and digital integration—represents an essential condition for both managerial efficiency and equitable access to medicines.

### **5. Conclusions and Policy Implications**

The analysis carried out in this study demonstrates that cost accounting has evolved from a technical bookkeeping exercise into a central component of strategic management and corporate governance within the pharmaceutical industry. The empirical and conceptual evidence reviewed confirms that the accuracy, transparency, and ethical orientation of cost accounting systems directly influence not only financial efficiency but also the social legitimacy of the sector.

#### ***5.1. Summary of key findings***

First, the comparative benchmarking across selected EU economies highlights the structural diversity of pharmaceutical expenditure and cost management practices. High-income countries such as Germany and France apply advanced cost allocation models integrated with digital systems, enabling accurate tracing of R&D, compliance, and production costs. In contrast, emerging markets like Poland and Romania continue to rely on conventional absorption costing, which limits managerial insight and accountability.

Second, modern approaches such as Activity-Based Costing (ABC) and Process-Based Costing (PBC) prove superior in environments characterized

by complex production processes, diversified product portfolios, and stringent regulatory requirements. These methods enhance visibility over cost drivers, improve internal control, and support evidence-based decision-making. Their adoption also facilitates compliance with international reporting standards and health technology assessments, linking internal efficiency to external transparency.

Third, the ethical dimension of cost accounting emerges as a decisive factor in the pharmaceutical context. Transparent reporting of R&D, pricing, and compliance costs contributes to restoring public trust in an industry often criticized for high prices and profit-driven behavior. The integration of cost accounting into broader frameworks of corporate social responsibility (CSR) transforms it into a mechanism of ethical accountability, bridging the gap between profit maximization and equitable access to medicines.

Finally, digital transformation amplifies the potential of cost accounting systems. The integration of ERP and AI-driven analytics enables real-time monitoring, predictive modeling, and the inclusion of environmental and sustainability indicators. These innovations expand cost accounting into a multidimensional governance tool that supports not only economic but also ecological and social performance.

### ***5.2. Managerial implications***

From a managerial standpoint, the findings underline the need for pharmaceutical companies to transition toward hybrid costing architectures that combine regulatory compliance with managerial flexibility. Firms are encouraged to:

- Implement activity-based or process-based costing models to capture the real drivers of cost variability;
- Integrate cost data into strategic dashboards for R&D portfolio management and market access planning;
- Use cost transparency as a competitive advantage in negotiations with payers and regulatory agencies;
- Embed ethical performance indicators (affordability and sustainability) within cost accounting reports.

By doing so, companies can achieve a dual outcome: improved internal efficiency and enhanced external credibility. Modern cost systems not only rationalize expenditure but also provide a communication interface between corporate management, regulators, and society.

### ***5.3. Policy recommendations***

At the policy level, the research highlights several directions for improving the effectiveness and equity of pharmaceutical cost management across Europe:

1. Standardization of cost accounting practices through EU-level guidance that ensures comparability and transparency across member states.
2. Integration of cost-based data into national health technology assessment (HTA) procedures, ensuring that reimbursement decisions reflect verifiable cost structures.
3. Incentivization of digitalization by supporting the adoption of ERP and AI-based systems in small and medium-sized pharmaceutical enterprises.
4. Promotion of ethical cost reporting through voluntary codes of conduct aligned with EFPIA and IFPMA standards.
5. Public-private partnerships for developing training and benchmarking tools in cost accounting and pharmaceutical economics, strengthening the human capital base in this strategic field.

These recommendations align with the broader European objectives of fostering sustainable healthcare systems, encouraging innovation, and ensuring financial protection for patients (Yerramilli et al., 2018; EFPIA, 2021).

#### ***5.4. Limitations and future research***

While the present study offers an integrated conceptual and comparative analysis, it is limited by its reliance on secondary data and by the heterogeneity of national accounting standards. Future research should aim to empirically test the proposed framework using firm-level data, possibly integrating econometric models to quantify the relationship between cost accounting sophistication, profitability, and access to medicines. Additionally, the intersection between digitalization, sustainability reporting, and managerial accounting in pharmaceuticals represents an emerging field deserving of further investigation.

#### ***5.5. Final remarks***

In conclusion, cost accounting methods stand at the core of the pharmaceutical industry's capacity to combine efficiency, innovation, and social responsibility. As health systems face increasing financial and ethical pressures, the modernization of cost accounting emerges as both a managerial necessity and a moral imperative. Transparent, data-driven, and ethically oriented cost management is no longer an optional feature—it is the foundation for sustainable value creation and the key to reconciling economic performance with the public good.

## References

- Adams, S.P., Tsang, M. et al. (2015). *Atorvastatin for lowering lipids (Review)*. *Cochrane Database of Systematic Reviews*, Issue 3. DOI: 10.1002/14651858.CD008226.pub3
- Beck, A., Wiedergut, M. & Neubauer, N. (2025). *Towards fossil-free energy supply: Cost-effective decarbonization measures in pharmaceutical energy systems*. *Applied Thermal Engineering*. DOI: 10.1016/j.applthermaleng.2025.128213
- Bruckaya, O., Zeitzmann, H.K., Chalamon, I., Wokutch, R.E. & Thakur, P. (2013). *Strategic Corporate Social Responsibility and Orphan Drug Development: Insights from the US and the EU Biopharmaceutical Industry*. *Journal of Business Ethics*, 117(1), 45–65. DOI: 10.1007/s10551-012-1496-y
- European Centre for Disease Prevention and Control (ECDC) (2021). *Surveillance of antimicrobial resistance in Europe – Annual report of EARS-Net 2021*. Stockholm. <https://www.ecdc.europa.eu/en/publications-data/surveillance-antimicrobial-resistance-europe-2021>
- European Federation of Pharmaceutical Industries and Associations (EFPIA) (2021). *The Pharmaceutical Industry in Figures – Key Data 2021*. Brussels: EFPIA.
- International Federation of Pharmaceutical Manufacturers and Associations (IFPMA) (2022). *The Pharmaceutical Industry and Global Health: Facts & Figures 2022*. Geneva: IFPMA.
- IQVIA Institute (fost QuintilesIMS) (2017). *Outlook for Global Medicines Through 2021: Balancing Cost and Value*. Parsippany, NJ: IQVIA.
- KPMG International (2017). *Pharma Outlook 2030: From Evolution to Revolution*. Global Strategy Group.
- Miles, K.A. (2007). *Quantifying emerging drugs for very rare conditions*. *QJM: An International Journal of Medicine*, 100(5), 291–295. DOI: 10.1093/qjmed/hcm021
- Moloudpourfard, B., Tahamipour Zarandi, M. & Pouyakian, M. (2025). *Updating the “cost factor” in the William Fine risk assessment method following economic power: A case study of selected production industries in Iran*. *Heliyon*, e42405. DOI: 10.1016/j.heliyon.2025.e42405
- Pinal-Fernandez, I., Casal-Dominguez, M. & Mammen, A.L. (2018). *Statins: pros and cons*. *Medicina Clínica (Barcelona)*, 150(10), 398–402. DOI: 10.1016/j.medcli.2017.11.030.
- Rodriguez-Monguio, R., Spargo, T. & Seoane-Vazquez, E. (2017). *Ethical imperatives of timely access to orphan drugs: Is it possible to reconcile economic incentives and patients' health needs?* *Orphanet Journal of Rare Diseases*, 12(1). DOI: 10.1186/s13023-016-0551-7
- U.S. Department of Commerce – International Trade Administration (2019). *Top Markets Report: Pharmaceuticals*. Washington DC.
- WHO Collaborating Centre for Drug Statistics Methodology & Norwegian Institute of Public Health (2020). *Guidelines for ATC classification and DDD assignment 2021*. Oslo.
- World Health Organization (WHO) (2019). *Model List of Essential Medicines – 21st List*. Geneva: WHO.
- Yerramilli, P., Fernández, Ó. & Thomson, S. (2018). *Financial protection in Europe: a systematic review of the literature and mapping of data availability*. *Health Policy*, 122(5), 493–508. DOI: 10.1016/j.healthpol.2018.02.006

ISSN 2065 - 8168 (print)  
ISSN 2068 - 2077 (online)