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# Eastern European Journal of Regional Studies

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## EUROPEANIZATION AND REFORMATION OF HIGHER EDUCATION SECTOR IN THE EASTERN PARTNERSHIP COUNTRIES THROUGH BOLOGNA PROCESS IN PURSUIT OF THE EUROPEAN INTEGRATION

Iryna SIKORSKA<sup>1</sup>

**Abstract.** *This article examines the critical role of higher education reforms in the Eastern Partnership (EaP) countries since their independence as they endeavor to align their systems with European standards and norms, ultimately seeking closer integration with the European Union (EU). The EaP countries, comprising Armenia, Azerbaijan, Belarus, Georgia, Moldova, and Ukraine, have embarked on ambitious journeys of transformation in their higher education sectors to foster economic development, enhance academic excellence, and strengthen regional cooperation. The article employs a comprehensive approach, encompassing both policy analysis and empirical insights to shed light on the multifaceted nature of higher education reforms across the region. It delves into the various challenges and opportunities faced by the EaP countries in their pursuit of European integration through higher education reforms. The key themes explored include the alignment of the national higher education reforms with the Bologna Declaration guidelines including the promotion of internationalization and quality assurance mechanisms emphasizing the importance of cross-border collaboration and knowledge exchange. It critically assesses the progress made so far, highlighting successes and identifying persistent obstacles. Moreover, it examines the role of international organizations and the EU programs in supporting these reforms. The analysis highlights the importance of higher education reforms in the EaP region not only as an instrument for achieving European integration but also as a catalyst for broader societal and economic transformations. The research data collected refer to the period of 1991-2020.*

**Keywords:** *EaP countries, higher education, national reform, Europeanization of higher education, internationalization process*

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### Introduction

In 1991, after collapse of the USSR the former Soviet Republics had to adjust to new reality and to overcome the soviet legacies in all sectors of economic and social life including higher education sector. The system transformation which took place in the countries of Eastern Partnership (Armenia, Azerbaijan, Belarus, Georgia, Moldova, Ukraine) brought many revolutionary political, economic, social and cultural changes in all areas of life in the region. This also applied to the sphere of higher education (HE) which was clearly manifested through the reformation policies and modernization initiatives. The HE

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reformation was marked by the European vector and recognized by scholarship and policymakers as ‘Europeanization of higher education’ (Dakowska 2015, Gornitzka 2006, Maassen and Musselin, 2009, Scott 2012, Vukasovic, 2013). In this research I employ the definition of ‘Europeanization of higher education, proposed by Klemencic (2013, p. 120) who defines Europeanisation as a policy adaptation and examines ‘to what extent national policy developments reflect the European recommendations on institutional diversification’.

The EaP countries’ HE reforms have been well presented in the reports of the Education Agency of the European Commission, the EaP countries’ national education policies, reports of the Erasmus+ programme and numerous national and international researches. However, a better understanding of the Europeanization of HE in the EaP countries and its impact on societies remains vital.

The focus of this research is to study the HE reformation in the EaP countries within the period of 1991-2020 with a particular attention towards a national policy genealogy that allows to track the process of the Europeanization of the HE systems in national context of each of the EaP country, as well as to explore the role the EU policy in creating a more democratic societies and eliminating post-colonial legacies and promoting European values in the region.

Methodologically research is guided by empirical analysis using the methods of qualitative content analysis. Data were collected from a wide range of secondary sources, media coverage, relevant academic literature, as well as of the European Commission resources related to Erasmus+ reports on the EaP countries.

## 1. Overcoming soviet legacy in HE

At the very outset the EaP countries have struggled to integrate higher education institutions (HEIs) into EHEA since receiving their independence status in 1990s. Firstly, to a certain extent the Europeanization of HE was considered as a process that was closely linked to the countries’ attempt to break through the Soviet past and legacy in various fields including the field of education. Silova et al. (2007) argued that the former Soviet Republics the period since independence in 1991 has been characterized by an acute sense of drift or crisis in educational policy, as various internal actors and external or multilateral institutions struggled to create ‘new’ and autonomous educational systems out of what had been a tightly integrated and highly standardized system in the Soviet Period” (ibid, 2007 p. 164-165). The trajectory that is both similar and different to developments shared by all post-Soviet states (Huisman et al. 2007), facing a shared communist past, bringing back to life pre-Soviet institutions and achievements and looking for the ways forward. Thus, the EaP countries inherited the HE systems which were characterized by a rigid administrative vertical. Excessive centralization did not allow universities to determine independently the administrative and financial policies. Under such conditions to implement the HE reforms was quite difficult. Besides, initially there was no clear state policy on the HE reforms, though the EaP governments tried to retain its managerial function, relying on a number of

superstitions and restrictions. As a result of such a pseudo-state approach, HEIs could not respond to the demands of labor market, local communities, and did not have the opportunity to be involved as partners in solving the problems of the societal development. In many cases they were deprived of the opportunity to change curricula in accordance with the requirements of the competitive environment due to inefficiency, or simply the absence of mechanisms for self-governance, autonomy, and planning of their own development.

Soviet traditions were deeply ingrained in the academic culture of these countries over decades. This long history made it difficult to simply abandon these practices and replace them with new ones. Universities and academic institutions tend to be conservative and resistant to change. Reforming the HE system required financial resources for curriculum development, faculty training, infrastructure upgrades, and other necessary changes. These resources were often limited, hindering rapid reform efforts. The use of the Russian language in academic and scientific discourse was widespread in the Soviet era. Changing the language of instruction and publication in the peer-reviewed journals was a complex and contentious process, that could interrupt establishing research networks and international collaborations. Political instability and changes in government leadership can disrupt reform efforts and result in inconsistent policies. Despite these challenges, the EaP states have made significant efforts to modernize their HE systems, adapt to European standards, and reduce the influence of Soviet traditions.

According to the documents and researches, almost all the new nations adopted a similar package of reforms, many of them neo-liberal in nature (Giroux, 2006, Huisman 2012, Margison, 2006) that aimed to bring new agenda to their HE systems. This would be achieved through the establishment of a non-state sector, the introduction of tuition fees in the public sector, national standardized tests for admission exams to higher education, decentralization of the governance and-although not in all countries-loans for students and performance-based funding. (Smolentseva, 2012). Henceforth, the reforms would have an impact on the economic, political and cultural structures of the countries by increasing the importance of the strategy of HE and the importance of human capital for the competitiveness of the countries.

These transformations caused principal changes and innovations in legislation in the education systems reflected in the new laws approved at the beginning of the 21<sup>st</sup> century. The EaP countries' governments had to revise and renew their legislative system that resulted in adapting new laws. For instance, in Armenia, the Law "On Education" was adopted in 1999 followed by the "Strategy of the HE Reforms" (2003) and the Law "On Higher and Postgraduate Professional Education" was adopted in 2004. In Belarus the Law "On Education" was adopted in 1991. In Georgia the Law "On Higher Education" was approved in 2004. In 2002 the Law "On Higher Education" was adopted in Ukraine. The newly adopted laws on HE in EaP countries turned out to be pivotal for their integration into European Higher Education Area (EHEA) and were to play a crucial role in these nations' aspirations for European integration.



## 2. Europeanization of HE through local approaches

Since the beginning of the 21<sup>st</sup> century onwards the EaP countries' national governments began to promote broad and purposeful Europeanization agenda of the reforms of HE systems for they could approach and smoothly join the BP. Some of them eagerly adopted European policy prescriptions, while others preferred a more selective approach. In any case, the BP and integration to the EHEA were noticed, debated, or even integrated in domestic political games (Dakowska and Harmsen, 2015).

Firstly, to a certain extent the Europeanization of HE was considered as a process that was closely linked to the countries' attempt to break through the Soviet past and legacy in various fields including the field of education. Secondly, it was an attraction for the population of the post-Soviet countries that looked at Europe as a proper, much better way of constructing and managing different spheres, and particularly that of education.

Research on the Europeanization of HE systems in the EaP countries indicates that HE in the EaP has shown definite successful attempts of reforming, and advancing the quality of education, and internationalization of teaching and research. So far, quite a lot is known about the content of the HE reforms in an analysis of the political will of reforms and its actors, an explanation for specific patterns of reforms, a strong and convincing assessment of outputs and outcomes of reforms considered economic, political and social conditions, the impact of the process of values, norms and values of citizen of EaP countries.

In 2005 five EaP countries Armenia, Azerbaijan, Georgia, Moldova and Ukraine signed the Bologna Declaration (BD) at the Bergen Conference defining the direction and contours of the reformation process of the HE systems. This event started the new era in the HE sector and also had a major impact on the HE internal and external stakeholders. In accordance with the BD guidelines the major changes were to be connected within the structural reform, i.e. organizing the tertiary education in three cycles, introducing the European Credit Transfer System (ECTS), establishing an internal quality management system at institutional level, and encouraging academic mobility, the international recognition of universities diplomas, competitiveness and integration into EHEA.

In general, joining the BP and implementing the BD was inspiring for the EaP governments as it was foreseen as an instrument for closer integration with the EU when conducting and developing consistent policies and practices. Reformation of the HE sector was also undertaken with the framework of relevant the EU policies and practices.

New era in HE started followed by the necessity to tackle plenty of new tasks, setting up new objectives and agendas, elaborating new strategies and policies aimed at widening access to tertiary education, creation of a national qualifications framework, enhancement of quality assurance, revision of the HE funding mechanisms, recognition and comparability of degrees, student mobility, strengthening the ties between HE sector and the labour market and ensuring effective governance and financial management of HEIs.

It would be fair to say that during the last decades, each of the six EaP countries has gone through the HE reformation process with certain success and failures. Out of the six EaP

countries Belarus's way to joining the Bologna process was featured with many hindrances and drawbacks. In 2005 Belarus only announced the intention to make its HE system similar to the ideas proclaimed in the BD Declaration. In 2012 the first attempt of Belarus to join BP was declined due to the evident drawbacks in academic freedom, institutional autonomy and integration of student community into HEI governance (Karpenko, 2012). In 2013 by the decision of the European Parliament Belarus was exempted from the cohort of the countries forming EHEA, because "the principles and values of the BP, such as academic freedom, institutional autonomy were not sufficient (Pogorelskaya, 2017).

Later on, the Belarusian government undertook certain measures to improve the situation and in 2015 Belarus signed the BD during the Yerevan Ministerial Conference. However, as Gille-Belova (2015) stated the Belarusian officials perceived Bologna process as an opportunity to improve their relations with the EU by cooperating on a politically neutral issue, while other domestic actors such as the Public Bologna Committee saw EHEA accession as an instrument for radically reforming the existing HE system. The analysis of the national reforms in Belarus conducted by local and international researchers demonstrate the governmental attempt to preserve the soviet legacy in HE sector and to correspond to European standards (ibid, 2015). This approach failed, and in 2019 Belarus was exempted from the EHEA.

In other five EaP countries numerous initiatives and actions were undertaken in the HE sector to introduce and facilitate the implementation of the BD guidelines by HEIs. For instance, in Ukraine, during 2005–2007 the important steps in realization of the BP regulations were implemented, like setting up the ministerial Bologna Follow Up working group that was formed in order to enable the recognition and acceptance of the BP by academia and students (Nikolaeva, 2015). In 2008, the amendments to the Law "On Higher Education" in accordance with the Bologna guideline were introduced. The "Action Plan on Quality Assurance for Higher Education" was elaborated. Ukraine became a member of the European Quality Assurance Register. The Diploma Supplement was developed in accordance with the EU HEIs' format.

In Armenia, in 2011 the Law "On Education Development Strategy" was adopted followed by the "State Program for Education Development" (2011–2015). Additionally, the "Armenian Development Strategy for 2014-2025" was adopted. The Strategy identified four priorities for HE development: growth of university graduates' employment, development of human capital, improvement of the social protection system, and institutional modernization of the public administration and governance systems.

In Moldova the national education sector is regulated by the Education Code adopted in 2014, which set the legal framework of legal relations concerning planning, organization, functioning and development of the education system. That very year, the Moldovan government approved the "Education Development Strategy for 2014-2020" or "Education 2020" which set the medium-term tasks and objectives for education development and defined the priority development directions of the education system.

In Azerbaijan, in 2013 the “National Strategy for the Development of Education in the Republic of Azerbaijan” was approved followed by the “State Program on reforms in the higher education system in the Republic of Azerbaijan in 2009-2013” aimed at the integration of the HE of the country to the EHEA, and adjustment of its content to the principles of BD. “Strategy for Education Development in Azerbaijan until 2025”, adopted in 2013 is also an important document seeking to identify purposes, goals, directions, instruments and mechanisms for the development of the education system in the Republic of Azerbaijan (Murshudova, 2011).

The key ideas of HE reforms and further development of education and science in Georgia were clearly underlined in two strategic documents: “Strategic Development of Higher Education and Science in Georgia” and “Unified Strategy for Education and Science for 2017-2021” of the Ministry of Education and Science.

The newly adopted laws and other legislative documents demonstrated the EaP countries’ governments political will to address definite domestic problems in the field of education in general, diminishing the Soviet legacy in the HE sector and to approach to the EHEA.

These legal reforms reflected a commitment to improving the quality and effectiveness of education systems across the EaP countries. The governments in these countries recognized that a strong and well-functioning educational infrastructure is vital for the development of their societies, economies, and overall well-being.

The specific nature of these legislative changes can vary across the countries, but they often addressed a range of fundamental concerns in HE, like reforming curriculum and teaching methods to meet the demands of the labour market and enhancing the quality of education. Additionally, the new laws signified a willingness to align educational systems with European standards and best practices, thereby improving the recognition of qualifications and facilitating the mobility of students, researchers, and professionals on the global stage. Such internationalization efforts often signal a commitment to fostering cross-border collaborations and partnerships in the field of education.

### **3. Internationalization dimension**

The analysis of the national policies across the region demonstrates that Europeanization of HE in the EaP countries has been deeply embedded in internationalization of higher education (IHE) including its conceptualization, dimensions, strategy of implementation, advantages and limits, etc. Murshudova (2011) points out that internationalization of academic environment and education process has gradually become a key question at the agenda of the HEIs. International outreach creates a foundation for up-to-date research and development in the transitional post-Soviet economies and builds regional multi-level collaborations. It was foreseen that integration of the HE systems of the EaP counties into EHEA would strengthen the positions of the HEIs at the national and international labor market ensuring the quality of HE according to the European

standards. The EaP countries have gradually become aware of the imperative to internationalize their education and research processes since the increasing pressure on behalf of the local governments and urgent necessity to modernize the HE systems according to the European standards.

Despite of the adoption of the common ideology of the IHE, the approaches to the internationalization of education and research in each of the six EaP countries are rather distinct. According to Maringe and Foskett (2010) regional variation in approaches to internationalization is not surprising, given the many variations across regions in historical, political, economic, cultural, and other contextual characteristics.

In Armenia, for instance there is an exceptional development of transnational HE. There are several kinds of transnational education providers in Armenia like in no other country of the region: interstate institutions, franchises, joint/ double degree providers, branch campuses, independent institutions, and virtual education programs (Marinosyan, 2015).

In Azerbaijan there has been ‘State Youth Student Programme’ launched which has financed the education of about 5,000 young people abroad (mainly in the UK, France and Germany). The President of the Republic of Azerbaijan signed decrees on the “State Program for the Education of Azerbaijani Youth in Foreign Countries” dated October 19, 2006. The ‘Presidential Program’ provides a unique opportunity for the most talented students from Azerbaijan to get HE (bachelor, master and PhD) in the leading universities all over the world. The objective of the State Program is to facilitate establishment a competitive economic system in the country and a supply of qualified specialists across the various fields. Over the years, thousands scholarships have been awarded to Azerbaijani students to study abroad. These countries - UK, Turkey, Germany, Canada and the Netherlands were among top destination countries for study (Mammadova and Valiyev, 2020).

In Georgia, the legal framework addresses problems of quality assurance and internationalization. The internationalization indicators became a part of accreditation procedures and the promotion of student mobility (Lezhava, 2016). In Moldova, the reform of the governance of higher education institutions paused the advance of the Bologna process implementation (Curia et al, 2012). In Belarus, the compliance of the Bologna principles with the priorities of the state, the increase in the international ratings of national universities, the growth of the competitiveness of HEIs in the international arena was always important (Mozheyko, 2017).

Rumyantseva and Logvynenko (2018) argue that in Ukraine the key drivers of the transformations were fascination with developments in the neighbouring EU and the need to overcome or incorporate Soviet legacies, as suggest. The authors claim that reform was guided by three rationales: nation and state building, comparison and critique, and catch-up Europeanization. But despite the local differences and approaches, all countries pay considerable attention to improving quality assurance of education and mobility (Huisman and Westerheijden, 2010).

Unfortunately, the normative base for the IHE development lagged behind the initiatives and activities of HEIs across the region. They HEIs across the region were

engaged in international activities despite the lack of the formal strategies at national and institutional levels as they wanted to internationalize curricula, open international degree programs, to encourage students to study abroad and attract foreign students to their campuses. Along with that there was a strong need to define what was meant by internationalization in the national contexts, which would allow to get past the rhetoric and to figure out how to develop proper action plan. The analysis conducted in each of the countries showed quite similar problems related to the development of the IHE:

- lack of a comprehensive development strategy promoting internationalization
- insufficient commitment of behalf of the HEIs leadership
- lack of the qualified staff for operational tasks of the IHE
- lack of financial resources to implement efficient internationalization process.

Quality assurance turned out to be one of the most challenging issues for the HE systems in all the EaP countries. The principal trend of the HE systems reform was to make align with European Standards for Quality Assurance which required establishing external independent agencies on quality assurance as a new governmental and public tool to hold all HEIs accountable for their operations and outcomes. Hence, there were established the external agencies on quality assurance in accordance with the existing model of such organization in the European countries.

For instance, in Armenia establishment of National Center for Professional Education Quality Assurance (NCQA) happened in 2009 with the financial support of the World Bank (Dobbins and Khachatryan, 2015). In Georgia the National Center for Education Quality Enhancement (NCEQE) initiated a HE quality assurance reform in 2017 to upgrade the quality assurance and accreditation standards and procedures. All the Georgian universities have quality assurance units complied of several specialists mainly responsible for meeting the accreditation standards set by the National Center (Javakhishvili, et. al 2010). In Azerbaijan the Education Quality Assurance Agency was established in December 2019 by reorganizing the former Accreditation and Nostrification Department of the Ministry of Education into the newly public legal entity. In Moldova, the National Agency for Quality Assurance in Professional Education (ANACIP) was founded in 2014, and its activity is regulated by the Education Code. In 2015, ANACIP became an associate member of the European Association for Quality Assurance in Higher Education (ENQA). The same year, the Republic of Moldova became a governmental member of the European Quality Assurance Register (EQAR) (Cojocari, 2011). The created agencies have provided an external and independent evaluation of HEIs' functioning which enhances their credibility and reputation both domestically and internationally. They help protect the interests of students and their families by ensuring that HEIs meet certain quality standards. The initiative to create the National Agencies for Quality Assurance was quite innovative for all the EaP countries and requires a lot of efforts on behalf of all the stakeholders to sustain.

Another hallmark of the concurrence with the European standards in HE was introduction of the national qualification framework as a systematic way to organize and describe qualifications within an education and training system, providing a common framework for understanding and comparing qualifications. In each EaP country the establishing process was not easy, it took long time and was to some extent politicized. For instance, the Decree on a National Qualifications Framework for Lifelong Learning of the Republic of Azerbaijan (AzQF) was adopted in July 2018 and was aligned with the European Qualifications Framework for lifelong learning. In Ukraine National Qualification Framework was adopted in 2011 thanks to the support and cooperation with European institutions. It was aimed to promote progress towards recognition of qualifications and competences, ensuring transparency of qualifications, lifelong learning and encouraging coordination and transparency at all levels of education and training.

The created NQF allows EaP countries to align their qualifications with international standards, making it easier for their graduates to have their qualifications recognized domestically and abroad. It can contribute to the development of a more transparent, flexible, and responsive education and training system in EaP countries. However, the successful implementation of an NQF requires careful planning, stakeholder engagement, and coordination among relevant institutions and agencies.

Ten years (2005-2015) of the intense HE reforms in the EaP countries resulted in enormous, mostly positive changes in the HE sector, however there still remained areas for improvement which were outlined at the Ministerial Conference in Yerevan in 2015 and specified to enhancing the quality and relevance of learning and teaching; fostering the employability of graduates throughout their working lives; making the systems more inclusive; further implementing the agreed structural reforms.

As it was mentioned earlier Europeanization of HE in the EaP countries is strongly imbedded into internationalization strategy and is connected with the BP. The latter boosted the incorporation of the Bologna guidelines into the national agendas according to their own national specificities. That is why implementation of the main provisions of the BP inevitably involved national approaches to the organization of education, the content of education, traditions in the training of future specialists. Still, it could be taken into account, that the policy instruments used to steer the Bologna implementation are soft law mechanisms that foster the introduction of reforms at national level, although they also create coordination frailties that are difficult to overcome (Veiga and Amaral, 2007).

Since 2005, the mechanisms of IHE were crystalized by BD which five countries signed. The introduction of the BP was a certain shift towards integration into EHEA and to the European HE standards. In HEIs academic mobility was enlarged, double degree programs appeared, more international students considered obtaining university diploma in the HEIs in the region, international academic cooperation intensified through signed agreement of cooperation. It is critical to mention that implementing the BP guidelines were accompanied by the intention of the EaP governments and academic communities to

preserve their own traditions, heritage and experience in the HE sector. This call was strongly articulated not only by academia but policy makers and wider public.

However, numerous research on implementation of BP in the HE across the region indicate numerous difficulties on its way. For instance, according to Gharibyan (2017) in Armenia there was weak national regulatory framework and the lack of quality assurance standards and criteria to monitor partnerships appropriately. In Moldova, the inefficient reform of universities' governance paused the advance of the Bologna process implementation (Bischof and Tofan, (2012). In Georgia, the legal framework addresses problems of quality assurance and internationalization (Javahishvili et al, 2010). The implementation in Azerbaijan of the Bologna process was, from the beginning, a long and controversial process (Baghirov and Gurbanova, 2017).

Implementation of BD in Belarus is a particular case. Titarenko (2019) indicates that in Belarusian HEIs Bachelor's degrees do not exist: graduates from the 4-year education are called specialists – similar to the previous stage of the 5-year education.

In each country academic communities were divided into advocates and opponents of the BP. The opponents of implementing BP stressed upon the following:

- it was a top-down structural reform, without initial discussion in the HE sector;
- the introduction of the institutional autonomy was underestimated and reluctantly valued by the academia;
- teaching staff reluctantly engaged in the process of the reform due to their enormous teaching load;
- the Bologna reform required innovative teaching methods which required training of the teaching staff and extra working load;
- the key BP instruments were difficult to incorporate into HE system. It required immense training of teaching staff and personnel;
- though the academic mobility immediately became popular among the academia and students, the recognition of the study abroad results was a big issue;
- students were not accustomed to such amount of individual work, instead they used to work collectively. They had no skills for independent work. The main objective of teaching was to provide students with as much information as possible which they in turn were expected to reproduce.

Lots of resistance to implementation ECTS was observed in each country especially due to the lack of uniform requirements for the implementation of the European system for assessing students' knowledge in EaP countries.

There were also challenges related to the increased opportunities of study abroad programs connected to the intellectual emigration, the so called "brain drain". The EaP countries for years experienced the brain drain, where skilled academics and professionals leave for better opportunities abroad. This drain of human capital can impact the quality of HE and slow down the pace of Europeanization efforts (Sikorska, 2017).

Several editions of the so-called "Black Book of the Bologna Process" (2005, 2012, 2018) created by students from the BP participating countries eloquently emphasized the problems and shortcomings of the changes and challenges they had to tackle with during the education process transformation.

However, despite of all the difficulties of reformation of HE systems during the last decades of BP in five EaP countries the HE systems has demonstrated adaptivity to the external environment and internal changes and a certain progress in achieving the BD goals. Just to name a few:

1. Adaptation of curricula to the Bologna model requirements in accordance with national and international references.
2. The improvement of education programs was explicit in regard to the:
  - 2.1. Development of different types of competencies (generic and specific)
  - 2.2. Better articulation between study course units
  - 2.3. Increase of interdisciplinarity and multidisciplinary
  - 2.4. Student workload adjustment (contact and independent work hours).
3. Promoting the change in students' habits and work strategies, towards more proactive, autonomous and competency-oriented methods.
4. Implementation of a set of diverse initiatives to implement, coordinate and monitor the Bologna process.
5. Improvement of the pedagogic monitoring activities, including the introduction of a new middle-semester evaluation, and the adjustment and application of an existent final evaluation to both 1st and 2nd cycle programs.
6. Reinforcement of responsibility for both students and teachers in the new learning process focused on the competencies development.
7. Effort to improve the student-teacher proximity, by promoting the practice of lab and tutorial classes, weekly-assigned accompaniment sessions, and pedagogical meetings.
8. A change in students' habits and work strategies, towards more proactive, autonomous and competency-oriented methods was promoted.
9. Improve and increase institutional services and resources that support teaching and learning process (Yuryeva, 2011).

In general, through years the implementation of BD principles in each of the EaP countries has been accompanied with different success. For instance, Jabbarzade (2020) in her comparative research of the results of BP in Azerbaijan and Georgia argues that: "...participation in the Bologna process, cooperation with the international organizations and western countries helped them to develop the HE system. However, the integration to the EHEA did not bring dramatic changes to the existing HE system of these two countries and students were not provided with enough information regarding the implementation of the Bologna principles". The HE transformations and, more broadly, economic, and social ones, appeared as laboratories of reformist innovations and experiments in the context of democratization processes in the EaP countries. Dobbins and Knill, (2009) mention that these transformations were facilitated by their considerable openness towards international



assistance and advice during the period of transition and afterwards. It would be fair to mention about international assistance to the EaP countries in their HE reforms. In general the post-Soviet countries transformations were largely supported by the international funds and programs, like the World Bank, OECD, HE reforms also have been immensely sponsored by the pan European agencies and multilateral organizations like Council of Europe, European Commission also private foundations and national agencies like DAAD.

The international assistance has been organized through the European Commission Programmes like Erasmus+ through the defined and approved by each country national priorities and could include: curriculum development, reform institutional governance, university management, knowledge transfer, to support infrastructure development and academic staff. The national priorities varied through years and countries.

According to the numerous reviews, the programmes demonstrate the enormous positive impacts on the beneficiary organizations and countries in general. The budget for Eastern Partnership makes up over 15% of the entire international mobility budget and so far has enabled the establishment of 3 393 projects for bilateral partnerships that plan to organize mobility for over 43 000 students, researchers, and staff (EU-Eastern Partnership cooperation through Erasmus+, 2021).

However, there were critical reviews that the International Aid Programmes should have more differentiated approach to each country. For instance, Smolentseva et al (2018) argue that international assistance agents underestimated the power of traditional institutional structures and inherited professional practices from the Soviet system, and the need to work with them, instead of trying to “develop” the systems as they did in educational programmes in other regions. That said, specific regional issues have given a particular label on the regional initiatives, which explains why different countries treat differently the Bologna key instruments.

Even though there has been a huge support of the EU programs to support the EaP countries academic and student mobility, the use of the EU mobility budgets and schemes varies enormously across the region. It depends on the number of the places available for each beneficiary country and consequently for each HEI. The barriers for participation in academic mobility have remain the same for decades – poor level of knowledge of English, financial restrains and psychological barriers. A significant obstacle for the region’s HEIs to participate in the Erasmus mobility schemes is also the limited number of foreign language programs and courses on academic offer which prevents to receive incoming students from abroad.

Speaking about the Erasmus mobility there is still unbalance between the incoming and outgoing number of students in all the EaP countries. The countries still remain unprepared for hosting Erasmus students neither in legislation (visa procedures for instance) nor in accommodation conditions. The HEIs in most cases underestimate the importance of changing the academic culture to host the international students, the teaching staff is reported to have lack of professional skills to teach international students.

Summarizing the stated above, it can be stated that the EaP countries have been contributed aspired for closer integration with the EU in the field of HE despite of the international relations of each EaP country with the EU. The amplitude of the changes largely depended on the political context of each EaP country and the incentives offered by the EU or international donors. In the EaP area, the motivation for joining BP was used either to accelerate European integration or for the benefit from the advantages of intergovernmental cooperation in the field of HE (maximizing opportunities for mobility, participating in EU initiatives etc.) without attempting to join the EU. After the EaP countries became part of the BP, there was no direct and explicit pressure from the EU regarding reforms implementation. In consequence, there was no approach based on global progress indicators but only on interventions financed through EU funds.

## Conclusions

In conclusion, it should be emphasized that, the EaP countries have undergone significant changes and reforms in their HE systems from 1991 to 2020. This period witnessed the transition from a legacy of centralized, Soviet-style education systems to more diversified, modern, and internationally oriented HEIs. The reforms have been driven by a combination of internal and external factors, including political shifts, economic challenges, and the aspiration to align with the European HE standards. In general, the reforms were marked by the European vector and recognized by scholarship and policymakers as ‘Europeanization of higher education’.

Throughout the reformation process, that was certain common themes and challenges in HE systems emerged across the region. These include the HEIs’ efforts to enhance the quality of education, promote academic mobility, and ensure the relevance of the HE to the national labor markets. The introduction of the BD principles, the growth of internationalization, and the development of quality assurance mechanisms have been key pillars of reform in these countries.

The EaP countries’ governments sought to bridge the gap between the post-soviet and European HE systems, making degrees more comparable and increasing the mobility of students and scholars. Obviously, they used references to the EHEA to boost domestic changes that should occur.

The HE reforms were reflected in the updated legislation and normative base. The new laws and sub-laws were approved in each EaP country. These laws were elaborated in accordance with the new political situation, societal demands and in accordance with the needs of structural reform and modernization of HE. The newly adopted laws and other legislative documents in the Eastern Partnership (EaP) countries represent a significant milestone in the political landscape of these nations. These legal measures showcase the determination and political will of their respective governments to tackle specific and pressing domestic challenges within the realm of education.

The EaP countries established national quality assurance systems and accreditation agencies in line with the European standards. These agencies ensured that HEIs and their educational programs could meet the defined quality criteria and are the subject to external evaluation.

It is clear that the EaP countries have made remarkable progress in reforming their HE systems, despite the complex and diverse contexts in which they operate. The commitment to harmonize with the European standards and the recognition of the crucial role HE plays in fostering economic and social development have been driving forces in these reforms. These reforms are a manifestation of the governments' commitment to addressing domestic challenges and creating a more promising educational landscape for their citizens, ultimately contributing to the socio-economic development and cultural richness of the EaP region.

However, the reform process has not been without obstacles, as the EaP countries faced their unique hurdles, shaped by historical legacies, socio-economic conditions, and national contexts. Issues such as limited financial resources, brain drain, and the need for greater autonomy for universities have posed challenges to these nations in varying degrees. Public participation in the reformation process of HE has been limited across the region. Adoption of the education policies in HE within the defined time period and its structural reformation created many uncertainties among the academic communities in the HEIs who recovered the Soviet legacies in HE. It also caused tension between HE and employers' communities, as the value and status of the degrees, especially at bachelor level, have been unclear. On the other hand, the idea of joining European academic community and build up partnership with European institutions and benefiting from these partnerships became appealing for the academia in all the EaP countries.

In general, the HE transformations and, more broadly, economic, and social ones, appeared as laboratories of reformist innovations and experiments in the context of democratization processes in the EaP countries. The experience of these nations in reforming their HE systems during the period 1991-2020 stands as a testament to the transformative power of education in shaping societies, economies, and the aspirations of individuals. It could be fairly noted, that the EaP countries have demonstrated their determination to adapt to the demands of a changing world while preserving their unique cultural and historical legacies.

As these countries continue their journeys toward more competitive, innovative, and inclusive HE systems, it is crucial to build on the successes of the past decades while addressing the remaining and new challenges. Sustained investments in education, the nurturing of research and innovation, and the promotion of academic freedom are vital elements for the continued transformation of EaP countries HE systems. For further research it will be crucial to keep tracing the evolution of the HE policies in each of the EaP countries as well as monitoring if they are advantageous to tackle the local and global challenges.

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## WHO ARE THE KEY PLAYERS IN ENERGY POLICY IN POLAND? THE ROLE OF INTEREST GROUPS IN ENERGY TRANSITION

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**Abstract:** *The paper presents an analysis of the role of interest groups in Poland's energy policy in the context of the EU climate and energy policy. The main aim of the analysis is to try to answer the question of who shapes the Polish energy policy, which stakeholders have the greatest impact on, who are the key players, and what kind of interest intermediation system has developed in the energy sector. Poland's energy mix is dominated by coal, which results from the ownership structure in the energy sector, strong influence of conventional (coal) energy companies and centralization of energy policy. The interests of coal energy companies are protected by the government both in Poland and at the EU level. The research puts forward a thesis that Polish energy policy is co-shaped by conventional energy companies, which leads to their monopolistic position and the formation of a neocorporatist model with elements of statism, and the process of illiberal backlash and creeping authoritarianism further strengthens their role. Privileging the interests of the state-owned energy companies hampers the process of energy transition in Poland, which is contrary to the EU's climate and energy policy.*

**Keywords:** *energy policy, interest groups, Poland, energy transition, neocorporatism, illiberal backsliding.*

**UDC:** 338.23:620.9(438)

**JEL Code:** L380, Q280, Q480

### Introduction

In many European countries, particularly in Central and Eastern Europe, energy policy is treated as a key element of the national security. Poland as the other EU member states has to adjust its energy policy to priorities of the EU, but currently it is the most hard-line EU energy and climate policy opponent. Coal has always been the basis of the Polish power system. Currently, a great majority of electricity production (80%) is based on conventional fuels, that is hard coal and lignite, and the coal industry provides 91,000 jobs (National Report of the Energy Regulatory Office, 2021, p. 10).

At the EU level, Poland has blocked, resisted and watered down European legislation on energy transition, defending Polish conventional (coal) energy producers' interests. During negotiations on the EU Energy and Climate Package (2008), EU ETS review, the 2030 climate and energy framework, long-term strategy for a climate-neutral

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Europe by 2050, Poland's government represented and protected interests of Polish conventional (coal) energy companies, not consumers' or renewable energy producers'.

The main aim of the paper is to explore the role and influence of interest groups and the character of interest representation in the Polish energy policy, particularly in the context of the EU energy and climate policy. The research aims to explain the influence of interest groups in the process of formulating and implementing energy policy in Poland. The first set of questions regards the role played by economic interests groups in the Polish energy policy. The main question is what kind of interests dominate in energy policy? Who are the key players? Which interest groups are favoured by political institutions? Which conditions determine the character of interest intermediation system in the energy policy in Poland? Some studies (Ruszkowski 2018, Szulecki 2017) show that the process of policy making in this sector is characterized by regulatory capture and government are designing energy policy that benefits state-owned energy companies. This is not surprising since the energy sector is dominated by the large energy players – state-owned companies. In such situation interests of the "biggest four" are treated as the interest of the state (Szulecki 2017, p.21; Kurczewska 2011, p. 354). Since the public opinion in Poland on climate changes has changed and many ecological associations have become active, we can expect that decision makers will take into consideration ecological interests as well as energy producers' interests. It seems to be obvious after the EU's announcement in 2019 of the European Green Deal.

The second part of the questions concerns interests representation strategies of Polish energy producers at the EU level in the process of formulating the EU energy and climate policy. In many cases we can observe deep cooperation of Poland's government and the coal energy producers that implies neocorporatist traditions (Kurczewska 2011). What kind of strategies of interest representation do Polish conventional energy producers employ at the EU level if the EU interest intermediation system is described as pluralist or elite (or chameleon) pluralist (Cohen 2007; Cohen and Katsaitis 2013)? Do they adjust their national interest representation strategies to requirements of the European lobbying arena?

The third part of the questions concerns the role of interest groups in the times of illiberal backlash and creeping authoritarianism in Poland, when the conservative Law and Justice party took over. Do the concentration and renationalization of companies in the energy sector affect interest representation strategies? It can be assumed that the centralization of power leads to the strengthening of the role of the state conventional energy corporations in the Polish energy policy.

Based on the analysis of the selected legislative processes at national and EU levels (e.g., the Renewable Energy Sources Act, Act on Wind Energy Investments, regulation on the Emissions Trading System) three hypothesis will be verified.

The article is divided into several sections. The first one discusses the current research on interest groups and lobbying in energy policy, as well as presents a theoretical framework of research and a methodological approach. Next, the specificity of the energy policy in Poland was characterized and the dominant role of state-owned energy companies

in this policy was indicated. The next section provides an analysis of renewable energy promotion policies in Poland treated as a threat and an opportunity for state-owned energy companies. Then, strategies of interests representation of Polish conventional energy companies at the EU level were analysed, indicating the neocorporatistic nature of these strategies, and specific features of lobbying of these companies regarding the EU's energy and climate policy were distinguished. Particular attention was paid to the analysis of the privileged position and growing dominance of state-owned companies in energy policy in the times of illiberal backlash and creeping authoritarianism in Poland. The article concludes policy implications.

### ***1. Research on interest groups in energy policy, theoretical framework and methodological approach***

The energy policy of Poland or the other EU countries is quite popular with political science researchers. Polish energy policy is analysed mainly in terms of its effectiveness and the state's energy security and its independence from imports of energy sources. The issues of the influence of interest groups in the process of policy formation are very rarely addressed.

As energy policies in CEE countries are subject to accelerated and often painful adaptation to the EU requirements, many studies try to explain the process of their Europeanization (Ancygier 2013; Jankowska & Ancygier 2017; Szulecki *et al.* 2016, Pach-Gurgul 2016)). The studies focus on the process of evolution of Polish renewable energy sources policy (RES) and emphasize the logics of Polish political and organizational fields which influence energy policy, combining political, economic and cultural factors, as well as the EU pressure (Szulecki 2017).

The energy policy in Poland is treated by the authorities as a strategic one, which aims to ensure national security. The problem of excessive securitization of energy policy is also analysed (Szulecki 2020, Lis 2018). Securitization appears to be a mechanism used to protect the interests of the main actors of this policy: the state energy companies. The national security argument is instrumental, and the close relations and dependencies between the government and energy companies lead to 'the symbiosis between the State, those currently in power, a growing circle of elites which includes former government members and opposition politicians, and state-run energy companies – a deeply entrenched coalition which is very difficult to move' (Szulecki 2018, p. 100).

By far the largest part of the studies focuses on the analysis of renewable energy in the electricity sector (Ceglarz & Ancygier 2015; Ancygier 2013; Jankowska 2010), or energy efficiency, mainly due to difficulties in adapting national policies to the EU requirements. The EU law has been crucial in pushing for stronger RES support policies, while the instable domestic political field explains 'the soap opera of renewable energy policy legislation: drafts, new plans, amendments and legal instability' (Szulecki 2017, p. 2). However, this situation results mainly from the structure of the energy sector in Poland and political context.

Using the path-dependency theory, political and economic conditions of the development of the Polish energy sector are analysed and the factors that shaped it are indicated (Jankowska & Ancygier, 2017). The conditions and influence of stakeholders in energy policy-making are analysed to a lesser extent. Yes, there are studies on impact of organized interests in the energy sector in Hungary and the Czech Republic (Horváthová & Dobbins, 2019), in which, on the basis of a comparative analysis of the energy policies concerning the use of nuclear energy in these countries, the authors indicate that policy-making in energy sector is generally conducted in state-industrial circles, where pro-nuclear actors play a key role, while the influence of anti-nuclear advocates is limited. In general, both democracies are open to civil society input, but the possibility of influence in energy policy is more conducive to well organized interests (Horváthová & Dobbins, 2019). Comparative quantitative studies of interest groups in selected sectoral policies in the Czech Republic, Hungary, Poland and Slovenia (Dobbins & Riedel, 2021) show some trends and growing influence of stakeholders, but without an insightful and analytical explanation of the role of interest groups in energy policy at different stages of the political process.

Taking into account the results of the research presented above, as well as using the theories of interest groups and lobbying, the analysis aims at explaining the role and influence of interest groups in Poland's energy policy and their political and economic conditions. It can be assumed that the possibilities of influence in a given sector's policy are determined by the interests intermediation system (neo-corporatist, pluralist, statist) in a given country. In the systems of most CEE countries, one can find features of neocorporatism (or state-neocorporatism). Also in Poland, there are elements that prove neocorporatism, which is defined as a cooperative relationship between an interest group and the government for the purpose of maintaining a fixed procedure of developing and implementing policies. Streeck and Kenworthy (2005) describe neocorporatism as a system of relationships between the organization of group interests in established intermediary associations (the structural aspect of neocorporatism) and the political coordination between interest associations and the state (the functional aspect) (Streeck and Kenworthy, 2005, p. 448). In the Polish energy policy, the key actors in the decision-making process are the government and state-owned energy companies, which are linked by networks of connections and mutual dependencies. Therefore, a hypothesis is made in the research:

*H1: The networks of links and dependencies between the government and state-owned conventional energy concerns lead to a privileged position for coal energy producers, which indicates the neocorporatist interest intermediation system. Polish energy policy is co-shaped by coal energy producers, which leads to a halt in the energy transformation process.*

Polish energy policy must take into account the objectives of the EU climate and energy policy. If interest groups, including state-owned energy companies, want to contribute to shaping energy policy, they must also defend their interests at EU level. Comparative studies of lobbying strategies (Kohler-Koch *et al.*, 2013; pp. 25-26) show that business interests groups adapt their national strategies of interest representation to the

requirements of the European lobbying arena, which is characterized as pluralist (Streeck & Schmitter 1991), elite pluralist (Coen, 2007), semi-pluralist (Eising, 2007) or chameleon pluralist (Coen & Katsaitis, 2013). As there is no tradition of pluralism in the Polish energy sector, it can be assumed that the strategies for representing the interests of energy concerns at the EU level are not being modified and still assume close relations with the government.

*H2: Representation of the interests of the Polish energy sector at the EU level is based on close cooperation with the government and has a neocorporatist character despite the fact that the EU interest intermediation system is pluralistic.*

Taking into account external factors, the political context also influences the representation of interests in energy policy. This is particularly evident during the political changes and the takeover of power by conservative right-wing parties. In many European countries far-right parties tend to show evidence of rejection of climate science, opposition to decarbonization in general, support for gas and coal technologies, and opposition to some types of policy favourable to renewable energy and energy efficiency (Hess & Renner, 2019). So one can assume that:

*H3: The takeover of power in Poland by the conservative Law and Justice party and the process of illiberal backsliding and creeping authoritarianism strengthen the influence of state conventional energy corporations in energy policy.*

In the studies one uses the method of qualitative analysis of particular policy outcomes, legislation process in chosen cases, relations between main stakeholders (including decision-makers and various interest groups) and traces the influence of internal (domestic, political and economic) and external (the EU policies and regulations) factors. The research is conducted in the perspective of interest group theory and lobbying, as well as the theory of interest intermediation system (corporatism, pluralism, statism).

## **2. The Poland's energy policy and role of state conventional energy companies**

The power system in Poland is created by the National Power System, which includes the power producers subsystem (power plants and combined heat and power plants), transmission grid and distribution network. Polish energy sector is based on fossil fuels, electricity is produced mainly from hard coal and lignite. Currently, 80% of electricity is produced from coal.

After the fall of communism, changes were introduced in the energy sector, although its development is still path-dependent (Jankowska & Ancygier, 2017). Privatization and consolidation of capital groups were followed by partial renationalization. State-owned companies were established and currently 82% of electricity is generated by professional conventional power plants. As a result of the consolidation of the power industry, four large companies of the State Treasury were established: PGE, TAURON, ENEA and ENERGA.

The plan of creating almost an oligopoly of the state energy groups was not accidental. It was assumed that large groups would have the economic potential needed for large investments. The government expects companies to build new power plants, which

will ensure the country's energy security and at the same time support the failing mines. The Polish energy sector in the EU is distinguished by the fact that Poland is the largest producer and consumer of hard coal, has the largest centralized heating system, and is a transit country for oil and natural gas between the Russian Federation and Germany.

Although the Polish energy policy has been subject to a process of both horizontal and vertical Europeanisation since 2000 (Jankowska & Ancygier, 2017), it is reactive in nature. The strategy papers prepared by governments are only a response to the requirements of the EU. There is no single coherent and far-reaching strategy for the development of the energy sector, which results in a high level of uncertainty in planning and no possibility to predict its development. Although ideas to diversify energy sources (e.g., shale gas, a nuclear power plant) have emerged over the last three decades, coal is still the primary and dominant source of electricity generation. The reluctance of the government and energy producers to transform the energy sector means that Poland will not meet its obligations towards the EU set for 2030, will not meet its national targets concerning the share of RES in energy production (the 15% target), the level of energy efficiency, and emission reductions in non-ETS sectors. This is not so much a result of negligence of the state policy, but rather an effect of the interests of privileged groups in this sector, i.e., conventional energy companies. The long-term consequence will be the serious difficulties in achieving the EU climate policy goals set for 2030 and 2050, which will multiply the costs of the energy transformation in the country or even hamper it (Bukowski, 2019). The problem concerns the power sector, where in a result of pressure and offensive lobbying of energy concerns and the coal sector, the government blocked the development of onshore wind energy.

At the end of 2019, the European Commission presented a new European Green Deal strategy, which assumes that the Union will achieve climate neutrality by 2050 through decarbonization and energy transformation. The Polish government has already declared that it will not give up on coal, which is completely contrary to EU policy. Even the latest government proposals presented in the plan of "Energy Policy of Poland 2040" assume a 56% share of coal in the energy mix by 2030. The visible passive attitude of the Polish government towards the reduction of GHG emissions exposes Poland to disproportionately high operating costs in the EU in 2030 and 2040.

At present, as a result of the process of concentration in the power industry, three largest producers (which were part of the groups: PGE Polska Grupa Energetyczna S.A., ENEA S.A., TAURON Polska Energia S.A.) still had in total almost 2/3 of the installed capacity and were responsible for about 67% of domestic electricity production (National Report of PER, 2021, p. 10). The largest producers of electricity are four state-owned companies:

- PGE – has a 41% market share and manages several dozen power plants and combined heat and power plants (including the largest power plant in Bełchatów).

- Enea – 16 % market share, distributor of energy in western Poland.
- Tauron Polska Energia – 8% market share, owner of 8 power plants and coal-fired cogeneration plants.
- Energa – 2% share in the market.

The distribution network is also dominated by the four largest distribution operators: Enea, Energa, PGE and Tauron. All four companies are members of the Electricity Committee, which is the main consultative partner for the government in energy policy. The main shareholder of the companies is the State Treasury (58% of shares for PGE; 52% of shares for Enea and Energa; 30% of shares for Tauron). However, the vast majority of power plants and combined heat and power plants are characterized by low efficiency and quite high emissivity, many of them have been in operation for over 40 years.

The consolidation of the sector and renationalization have led to less institutionalized forms of links and dependencies between the energy sector, the government and political elites. Initially, conflicts were attempted to be resolved through social dialog and tripartite agreements between government, trade unions and employers. However, over time, formal and non-formalized networks and dependencies began to play an increasingly important role.

In Poland, there is no single coherent interest intermediation system with the characteristics of neocorporatism, however, in some sectors, e.g., in the energy sector, one can distinguish such elements that prove the tradition of neocorporatism. One of the basic features of neocorporatism is the existence of a monopoly on the representation of interests and formalized procedures for their aggregation (Grote & Schmitter 2003, pp. 285-286). In the Polish energy sector, it is the state-owned energy concerns and coal companies as the employers and trade unions from this sector that have a monopoly on interests representation. Only these interest groups are granted with the right to express their views on energy policy in specially appointed committees. Other actors, e.g., environmental organizations are not considered as consultation partners. It is the creation of the "policy monopoly" (Jankowska & Ancygier, 2017).

### ***3. Energy from renewable resources as a threat and an opportunity for state-owned energy companies***

Poland has been obliged to regulate the production of energy from renewable sources by Directive 2009/28/EC, which assumes that by 2020 the EU will achieve a 20% share of renewable energy in total energy consumption (15% in Poland). The EU Member States were required to adopt the relevant laws by December 2010. However, Poland has not fulfilled this obligation and the European Commission has requested the government to do so. Under the pressure from conventional energy companies, the government continued to delay the preparation of regulations. After two years, the Commission complained to the EU Court of Justice about the non-implementation of the EU law. After 5 years of struggle with the European Commission, the RES Act was passed in 2015, but the whole process of its adoption, as well as disputes and conflicts related to it, point to the dominant role of the

interests of conventional (coal) energy companies and almost their symbiosis with the interests of the ruling party.

The government did not intend to introduce any changes to the energy policy, especially in the field of RES development. It applied a strategy of delays, stalling and unrealized investments. It planned the development of shale gas power, invested in new coal units, and planned nuclear power plant. Energy from RES was treated as too expensive and uncertain. The government forced by the EU to promote RES has introduced a system of green certificates in line with the interests of coal power companies, which supported the method of co-combustion of coal with other raw materials. It allocated EUR 4 billion for this purpose. The system supported the production of energy from coal, which slowed down the development of renewable energy.

After the long and fierce battle in 2015 in the Parliament (night voting, random amendment, political conflicts) the law was adopted and it was beneficial for the prosumer energy sector. However, the adoption of the act did not end the battle. A few months later, the law was amended and a number of bureaucratic barriers (penalties, controls, limits) were introduced, which make investments in RES installations unprofitable. By 2022, the law has been amended over a dozen times, but always in line with the interests of state energy companies.

The analysis of the process of adopting the RES Act shows that each government (regardless of which party exercises power) primarily pursues the interests of conventional energy companies, treating them as an interest of the state. Both the actions and arguments of the government indicate extremely close relations and dependencies between government and energy companies.

Wind energy has been developing in Poland since 2011 and the costs of wind energy production have been falling. Wind farms became the investment opportunity for domestic and foreign companies, regional governments, small and medium-sized enterprises, and they were slowly becoming competition for conventional (coal) power generation. As a result of pressure from state energy companies, the ruling Law and Justice party decided in 2016 to introduce regulations which completely hindered the development of onshore wind energy. The Act on Wind Energy Investments was passed, which aimed to eliminate onshore wind energy.

However, in 2019, there was a sharp turn in the promotion of wind energy in Poland, as energy concerns realized that the construction of offshore wind farms is an opportunity to produce cheap energy and meet the obligation to increase the share of RES in the energy mix. Under pressure from PGE, among others, the government has prepared a draft law on promoting energy generation in offshore wind farms, which enables companies to invest in wind farms in the Baltic Sea and provides financial support from the state budget. Other companies are also interested in offshore investments: Energa, Enea, Tauron. Although offshore wind power is a much more expensive source of energy than onshore, the government is promoting it. As a result, state-owned companies will still

be able to maintain their monopolistic position on the energy market and prevent the development of alternative prosumer energy.

#### ***4. Strategies of representation of conventional energy interests at the EU level – neocorporatism versus elite pluralism***

There is a general agreement among researchers that the EU's interests intermediation system has evolved over the last decades and now has many pluralistic features (Streeck & Schmitter, 1991; Eising 2007; Coen & Katsaitis, 2013), and that the relationship between the EU institutions and interest groups is subject to advanced institutionalisation (Mazey & Richardson, 2015; Richardson & Coen, 2009; Kurczewska, 2011). Schmitter and Streeck (1991) pointed to the process of transition from "national corporatism" to "transnational pluralism". They point out that, in this case, pluralism means that "the system is fragmented, less hierarchically integrated and more internally competitive" (Schmitter & Streeck, 1999, p.136).

Moreover, the structure and functioning of the EU institutions promotes and stimulates pluralistic patterns of interest aggregation. R. Eising (2007), when examining European business organizations, concluded that the emerging EU interest intermediation system is an elite pluralism. D. Coen, S. Mazey and J. Richardson also argue that the system should be described as pluralistic or elite (or chameleon) pluralistic (Coen & Katsaitis, 2013; Mazey & Richardson, 2015).

Representation of interests before EU institutions requires adaptation of national strategies to the specific requirements of the European interests intermediation system. Studies (Kohler-Koch *et al.*, 2013) show that there are different models for adapting national strategies to the requirements of the European lobbying arena. For interest groups from new member states of the EU this is a challenge because they need to adapt their "national logic of influence" to the new, as yet unrecognized conditions in the European arena. Poland lacks a tradition of pluralism in interest representation, so Polish stakeholders may encounter difficulties in effective advocacy at the EU level. There may be a clash of national traditions of neocorporatism with the pluralistic (or elite pluralistic) interests intermediation system of the EU. Thus, the question arises as to how the privileged state-owned conventional energy companies in Poland represent their interests before the EU institutions. The analysis of the lobbying strategy of Polish conventional energy companies on the EU climate and energy package, the EU winter package and other regulations show the complexity of this problem and the dominant role of the "big four" in creating Poland's position in the EU negotiations.

#### ***5. Lobbying of Polish energy companies regarding the EU's energy and climate policy***

The propositions of new regulations within the EU's energy-climate package were a serious challenge for Poland, particularly on the EU Greenhouse Gas Emission Trading System (EU-ETS). Polish energy sector is dependent on coal, which is why the government had to take its specificity into account. The most controversial were the plans to introduce as of 2013 auction trade of CO<sup>2</sup> emission permits. The largest energy



companies in Poland undertook intensive lobbying to oblige the government to consider their interests in the Poland's position in the EU-level negotiations. The Green Effort Group (G6) was established in order to advocate their interests. This organisation was founded by four energy companies: PGE, Tauron, Enea and Energa and played a key role in determining the position of Poland at the EU level. Close relations between the Group G6 and the Poland's government during negotiations on the EU's energy-climate package indicate the neocorporatist character of energy policy in Poland. Despite the lack of formal institutionalisation, Group G6 participated in determining the position of Poland in the Council and in the European Parliament. The interests of coal energy companies were regarded to constitute strategic interests of Poland. The EU's energy-climate package was perceived as a serious threat to the Polish economy and society, since its implementation will hinder the development of the energy sector, and shall result in increase of energy prices. Even the public debate in Poland was dominated by a catastrophic vision of the results of implementation of the package. Some neocorporatist traditions in Poland as well as the unusually privileged position of the energy sector determined the aims and shape of Poland's position concerning the EU climate policy.

Poland was the main opponent of the introduction of full payment as of 2013 and became the leader of a group of nine less developed EU Member States (including Czech, Slovakia, Bulgaria, Romania), which demanded the introduction of transitory periods for their economies. The Council took into account the demands of Poland not wanting to risk the entire package to be vetoed and agreed to a compromise. In the end, the provisions of the EU's energy-climate package were made less severe (Kurczewska, 2011). The example of the influence of state energy companies during the negotiations of the EU's climate and energy package is no exception. Also on other issues related to the EU energy and climate policy, companies together with the government conducted intensive lobbying towards EU institutions to defend the interests of coal-fired energy.

In 2018, in line with the expectations of coal energy sector, a power market was introduced in Poland, whose mechanisms provided energy companies with a stable future and EUR 1 billion in support. At the same time, the EU adopted the "Clean energy for all Europeans" package (winter package), which limited the possibility of using the power market by sources emitting more than 550 kg of CO<sub>2</sub> per MWh of energy. This means that the coal power industry in Poland will not be able to benefit from the power market. The package assumes decarbonisation of the energy sector in the Union, which has provoked strong opposition from the Polish government and conventional energy companies. In December 2018, during the negotiations in the Council on the Winter Package, the Polish Minister fought for the interests of the coal-fired power industry and tried to "dismantle the unagreed elements of the Package" (Wiśniewski, 2018, p.1.). Eventually, a solution beneficial to energy concerns was won and Poland will be able to use the mechanism of the power market for coal-fired power units which won the auctions until 2019, regardless of the stage of implementation (the so-called grandfathering clause). The minister managed to "defend Polish coal in Brussels", which was treated as a defence of national interest.

In many other matters concerning energy and climate in the EU, the government, but also Polish MPs in the European Parliament, represented only interests of conventional energy, ignoring the expectations of other stakeholders (ecological, regional, consumers). Comparative surveys of CEE countries show that Poland was the biggest opponent and the most vetoed country during voting in the Council on matters concerning EU climate and energy policy (Ćetković & Buzogány, 2019). Defending the interests of the conventional energy sector, the Polish government during 17 votes in the Council in the period 2013-2018 voted 10 times against the EU regulations, including the following: GHG emissions (7 times veto), Air pollution (2 times) and Renewable Energy (1 time) (Ćetković & Buzogány, 2019, p.130). In the GHG emissions reduction and ETS reform cases, Poland was alone and did not manage to block the voting in the Council. It tried to form coalitions with Hungary, Romania and Bulgaria, but failed to form a blocking minority (Ćetković & Buzogány, 2019, p. 130).

Taking into account the analysis of the lobbying on the climate and energy package and winter package, it can be concluded that the strategies for interests representing of conventional (coal) energy companies at the EU level are based on close cooperation with the government. The ambitious objectives of the EU climate policy are seen as a threat, hence the increased activity to mitigate, change or delay them. National patterns of neocorporatism in the interests representation in the Polish energy sector are of little use in the European pluralist lobbying arena. The EU's interests intermediation system is dominated by competition and rivalry between stakeholders, there are no privileged groups. Therefore, Polish energy companies choose the "national route", seeing the government as the main advocate and spokesperson of their interests at the EU level. As it turns out, this strategy has been effective so far, as the interests of this sector have been recognized as Poland's interest, which entitles the government to fiercely defend them during negotiations in the Council.

#### ***6. Representation of interests in energy policy in the times of illiberal backlash and creeping authoritarianism in Poland***

With the takeover of power in Poland in 2015 by the conservative Law and Justice party (PiS), a progressive process of democratic and illiberal backsliding and creeping authoritarianism in various fields is visible, which is manifested in undermining the universality of democracy and in 'erosion of liberal-democratic norms, replacing them with new counter norms that emphasize state security, civilizational diversity, and traditional values' (Fomina & Kucharczyk. 2016, p. 58), as well as in the pursuit of the authorities to win control over strategic political and economic resources (Scheiring, 2018).

The energy policy clearly shows an increase in the ruling party's control over the energy sector development and often "manual control". In many cases it is the Law and Justice leaders, not the prime minister or minister, who decide on specific energy issues. State-owned energy companies are subject to total control through individual political decisions of the ruling party regarding investments (e.g., the decision to build a 1,000 MW coal-fired power unit in the Ostrołęka power plant, whose economic viability is being

questioned by all experts), as well as through extremely frequent changes of their presidents and management boards. The energy market is also controlled, energy prices are regulated by the Energy Regulatory Office, but in 2018 the government made a political decision to "freeze" them for individual consumers. The top-down interventions of the ruling party in the energy policy, such as: inhibiting the development of onshore wind and prosumer power, favouring coal power, enabling the development of offshore power, but only for state energy concerns, testify to the centralization and concentration of power. Since 2017, the energy sector is being renationalized. The government has 'clawed back control of many foreign-owned power and heating assets to ensure the country's energy security. The biggest deals include PGE buying power and heating assets from France's EDF and Enea' (Reuters 2018, p.1.). This is accompanied by a narrative highlighting economic patriotism and the need to ensure energy security for Poland.

The process of institutionalization of dependence and links between state energy companies and ruling political parties has been visible since the 1990s, but it has been advancing since 2015 when the Law and Justice gained power. As an example, the power industry took over the collapsing mines, e.g., in 2016 energy companies took over a 51% controlling stake in the Polish Mining Group, among others, Energa, PGE and Enea, paying PLN 300-500 million each. Institutionalization concerns not only formalized legal and ownership dependencies, but also informal links between senior officials of relevant ministries, boards and supervisory boards of companies, politicians from the ruling party responsible for a given sector in parliamentary committees and local party leaders (Ruszkowski 2018, p. 28). Quite often, a "revolving door" mechanism is visible, i.e., politicians go to business and back, and a "carousel of positions", which makes the company's management almost entirely dependent on the politicians appointing them, e.g., in Energa in the period 2015-2022 the president was changed 11 times, while in the remaining three energy companies 5-10 times.

Centralization of power and top-down control in energy policy can be understood 'not so much as populism, but as a combination of economic nationalism – subordinating the economy to national interests and to the imperative of protecting national identity – and conservatism, reorienting economic policies to serve the traditional family and undo the perceived wrongdoings of post-communist elites, in particular, privatization' (Blum & Varga, 2019, p. 2). K. Blum and M. Varga call this core conservative developmental statism.

Not only in Poland, but also in other CEE countries (e.g., Hungary) there is a trend of increasing statism in the energy sectors associated with the illiberal turn, which is motivated by the protection of domestic energy companies and provision of cheaper energy (Ćetković & Buzogány, 2019). Striving to protect the national energy model and centralization of decisions also translate into Poland's position in the EU institutions. The position of the Law and Justice party government protecting coal-based energy is completely contrary to the priorities of the EU's climate policy, which causes Poland to become increasingly isolated and lonely in the European arena. At the European Council in December 2019, Poland

declared that it would not support climate neutrality by 2050, which was in line with the interests of coal energy companies, mines and mining trade unions.

## Conclusions and policy implications

The main aim of the article was to analyse the role and influence of interest groups in Poland's energy policy in the context of the EU climate and energy policy. The analysis was aimed at answering the question of who shapes Polish energy policy, which stakeholders have the greatest influence, what system of interest intermediation has been formed in the energy sector, whether the interests of these groups are consistent with EU climate policy priorities and whether they favour the energy transformation. The research carried out allows for several conclusions to be drawn.

First of all, the analysis shows that state-owned conventional (coal) energy companies have privileged access to the law-making process in Polish energy policy. The most important legal regulations concerning energy policy in Poland take into account their expectations and interests. It can therefore be assumed that they are the result of close cooperation between energy companies and the government. This is facilitated not only by the ownership structure of these companies, but also by the network of political and economic dependencies that have been formed for many decades.

The analysis of several cases important for the energy sector: the Act on the Promotion of RES, the Distance Act or the draft Act on Offshore Wind Energy indicate a dominant role of the interests of coal energy concerns. Regardless of which political party exercises power, the coal power industry enjoys special considerations and their demands are taken into account in legal regulations. The monopoly of state concerns on the representation of interests in the energy sector and their extremely privileged position indicate neocorporatist traditions, which confirms the hypothesis (H1) put forward in the research. Due to the dominant role of the state in this policy, it may be assumed that this neocorporatist model also contains features of statism or state-corporatism.

However, the consolidation and renationalization of the sector leading to the centralization of power and the creation of a 'policy monopoly' (Jankowska & Ancygier, 2017) lead to the formation of a network of dependencies and links between corporations and the government and political elites. Sometimes these take on the character of a pathology of power (e.g., "revolving door", "carousel of positions") as well as an oligopoly in the energy sector. Privileging the interests of the coal sector in the energy policy leads to a halt in the development of RES or prosumer energy, and thus blocks the energy transition in Poland.

Secondly, the interests of the Polish energy sector are also represented at the EU level. Although the EU's interests intermediation system is pluralistic in nature, energy companies continue to use national patterns of neocorporatism, following the "national route" and working closely with the government. The interests of conventional energy companies have been considered to be the same as the "Polish reason of the State", so the government defends the coal-fired power industry by vetoing decisions most often during

negotiations in the Council. The analysis of two cases of the EU climate and energy package and winter package not only confirms the hypothesis of a neocorporatist pattern of interests representation of Polish concerns at the EU level (H2), but also indicates the effectiveness of this strategy. In several cases the strategy of delaying, "diluting" and blocking the energy transformation has been successful. However, there is a problem with the Europeanization of Polish energy policy and interest representation. Due to different interests (defence of coal), Polish corporations encounter difficulties in establishing networks of cooperation with other stakeholders in Brussels, so the process of Europeanization of their advocacy strategy is not advanced. The European Green Deal assuming the creation of a zero-emission economy is a challenge for the Polish energy sector, but energy concerns are not afraid of the development of RES. Their aim is to maintain their monopolistic position and privileges in the sector, even if they will be forced to produce energy from RES.

Thirdly, the process of illiberal backlash and creeping authoritarianism in Poland is manifested in the energy policy in greater centralization of power and control of the sector, renationalization of energy companies and "manual control". The boundaries between the economy and politics are increasingly blurred. The examples given above, often of a political rather than an economic nature (e.g., the decision to expand the Ostrołęka power plant, to take over unprofitable mines, to "freeze" energy prices) show the mechanisms of intervention by the political elite and the ruling party, which makes it possible to verify the last hypothesis (H3). The strategy of power consolidation uses a narrative emphasizing economic patriotism and state security. This is accompanied by the exchange of ruling elites in the sector ("revolving door" and "carousel" mechanism).

To sum up, it can be concluded that the Polish energy policy is co-shaped by state-owned coal energy companies. The lack of a single coherent far-reaching energy development strategy in Poland allows for making different decisions and frequent changes of plans. The legal regulations enforced by the EU are not coincidentally consistent with the expectations and interests of conventional energy concerns, creating favourable conditions for them. Strategies of mitigation, delay and blocking the development of renewable energy are an effective method for companies to maintain their monopolistic position in the sector.

It would certainly be interesting to analyze the role of interest groups and lobbying in energy policy in other CEE countries, especially in those where state-owned companies have considerable influence and where the process of illiberal backlash and creeping authoritarianism is observed. Qualitative research of energy policies in several countries, e.g. Hungary, Slovakia, the Czech Republic, Bulgaria, Romania, would allow for a comparative analysis of the role and impact of state-owned enterprises on this policy, their strategies of representing interests and the methods used, it would show the differences and similarities between them, which may be derived from systemic, political and economic conditions.

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## DRIVERS AND IMPACTS OF INFLATION: A LOOK AT ENERGY PRICES, EXCHANGE RATE VOLATILITY, AND STOCK MARKETS

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**Abstract:** *In the last decade the world has experienced a number of global crises which triggered economic downturns. Impacts from the global financial crisis, the global COVID pandemic, and Russia's invasion of Ukraine trigger instability in financial markets. This paper explores similarities and differences between these crises based on inflation and its energy-related components. A Vector Autoregressive (VAR) model is used to analyze both EU-level trends, as well as data for Romania. The findings indicate idiosyncratic shifts in the relationships between variables. The changes are often specific to individual shocks and the policy context. How policy makers respond to these shocks will also impact the fiscal space, the borrowing costs of countries, and the cost of servicing debt, which risks a return to the type of austerity policies that slowed down the post-financial crisis recovery. There is a need for more detailed research and investigations in policy responses designed to respond to ongoing events.*

**Keywords:** *economic crises, energy prices, exchange rate volatility and stock markets.*

**UDC:** 338.124.4:[620.9+336.02](498)

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### Introduction

In less than two decades, the European Union (and the global economy, have been hit by two major economic crises. Following the Global Financial Crisis (GFC) that started in 2008, the EU economy shrunk by 4.2 percent in 2009 and only reached its pre-crisis output level by 2014 (International Monetary Fund, 2023). In 2020, an initial shock triggered by the onset of the Covid-19 pandemic was followed by a one-year decline in real GDP of 5.6 percent. A strong initial policy response and generous stimulus measures supported a rapid recovery and output levels recovered above their pre-Covid levels by 2022 (International Monetary Fund, 2023). However, the crisis that started with the onset of the pandemic continues to reverberate through the economy, as the impacts persist and there are signs of a renewed slowdown and risks of another recession. This is due to additional shocks, such as Russia's invasion of Ukraine in 2022, and the economic repercussions and instability that it triggered. This ongoing economic context has been dubbed the "polycrisis" (PC), with developments that continue to impact the supply of goods and commodities globally, exacerbate capital market and exchange rate volatility, and present threats to global financial stability (Tooze, 2022).

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The EU, with a prior dependence on Russian gas, has to navigate an energy crisis and is coming out of a winter throughout which energy prices reached record highs. The energy shock came at a time when supply-chain bottlenecks from the pandemic were already creating inflationary pressure, with overall inflation persisting within the EU and globally. After over a decade of low and even negative interest rates in advanced economies, central banks are responding to higher inflation through rapid and aggressive monetary tightening. Debates within policy and academic circles reflect growing concerns and questions over the effectiveness of this approach, as well as the possible negative consequences to the economic and financial stability of continued interest rate hikes and monetary tightening (Grubb, 2022; European Central Bank, 2023a; de Mendoca & Garcia, 2023; Weber et al., 2022).

The response of EU institutions and its member states to the initial pandemic shock distinguishes itself positively from how the response to the GFC unfolded. Studies highlight a more firm and rapid response in support of financial stability and stimulus policy following the onset of the pandemic (Quaglia & Verdun, 2022). The EU set up a facility for the issuance of joint debt instruments in support of recovery programs, as well as projects to accelerate the energy transition and support energy independence (European Commission, 2023b). These efforts however risk being hampered by a slowdown or recession caused by excessive monetary tightening and by the increased cost of capital and investment, a concern echoed by European Central Bank (ECB) officials (European Central Bank, 2023a).

It is within this context that this paper aims to explore and better understand the similarities and differences between how select macroeconomic variables interact. The paper looks at variables such as inflation, represented by the harmonized consumer price index and its energy-related component, the harmonized consumer price index for energy and the relationship to exchange rates, as well as the return of the stock market. The macroeconomic variables represent energy price related variables that are directly or indirectly influenced by the events. Through constructing a Vector Autoregressive (VAR) model, the analysis focuses on both EU-level trends, as well as data for Romania, as a case study for a non-euro area EU member, in order to identify whether EU-wide trends are reflected at the country-level, especially for members at the EU periphery.

The findings identify idiosyncratic shifts in the relationships between variables. The changes are often specific to individual shocks and the policy context. This reinforces concerns and questions over the current policy response and whether a singular policy tool, in this case rapid monetary tightening and increases in interest rates, is an appropriate policy for tackling inflation.

These moves are expected to continue despite the acknowledgment from within the institutions that the consequences of this move are alarming while the causes of inflation remain unaddressed (European Central Bank, 2023a). It is also important to note that the increase in the policy rate means an increase in the interest rates paid by governments on their debt as the yields on their bonds have moved with the policy rate (Eurostat, 2023).

In a context where dependence on energy imports and a shock to energy prices was undoubtedly a significant factor in the onset of inflationary pressures, the relationship

between higher interest rates and investments toward a green energy transition suggests the current policy response does not address and might even increase the vulnerabilities let to the energy price shock.

## 1. Literature review

In the aftermath of the POLYCRISIS shocks, persistent inflation has been a problem globally, as well as for the EU, where the overall inflation rate reached 9.3 percent in 2022 and is expected to average 6.3 percent in 2023 (International Monetary Fund, 2023). The response to inflation from the ECB is a continued increase in interest rates, which have increased from close to zero to over 4 percent in less than one year (Eurostat, 2023). This move has also brought up interest rates and yields overall, increasing borrowing costs for governments and their costs of servicing debts. High inflation is a problem that advanced economies last encountered in the 1980s (International Monetary Fund, 2023).

The response of the ECB, to increase interest rates follows the old-time established playbooks of central banks, which aim to reduce economic activity and dampen demand with higher unemployment through higher interest rates (Ireland, 2010). Not all members of the EU are part of the euro area and subject to the policy decisions of the ECB, however, given their open capital accounts countries outside of the euro area must follow the ECB and increase interest rates as well in order to avoid large capital outflows (de Paula et al., 2017).

This type of response is aimed at the issue of a possible wage-price-spiral-led inflationary episode. There is mounting evidence to counteract the idea that wages are currently the main driver of inflation in the eurozone. While a debate over what the largest drivers of inflation are continues, there is general agreement, including from ECB and International Monetary Fund (IMF) research that rules out wages, and identifying energy prices, import prices, as well as increased mark-up and profits as the main drivers of inflation (European Central Bank, 2023b; Giri, 2022; Hansen et al., 2023; Weber et al., 2022). Similar methods and impact analysis of macroeconomic variables in the region have been used by Aursulesei 2020, Benea-Popușoi 2021, and Diavor, M., 2021.

Previous research from the ECB has shown that energy price increases rapidly pass through to other prices and the non-energy components of inflation (European Central Bank, 2016). The spill-over effects of Russia's invasion of Ukraine brought to the forefront the EU's energy dependence on Russian gas and underscored the urgency of a transition to green energy which also weans the EU off dependence on gas imports, and the European Commission has put forth a plan and proposal for each member state to make large scale investments towards this transition (European Commission, 2023a).

The countries that are EU members are far from a monolith, with distinct economies. Countries outside of the euro area, which are predominantly Eastern European countries at the periphery face additional concerns due to capital flow and exchange rate volatility. The EU overall is currently a net importer of energy but certain members, such as Romania are large energy producers and less dependent on imports (Eurostat, 2023). These differences highlight how the context of each member state is distinct, and the specific characteristics of

each economy further suggest that distinct types of shocks would not have the same impact, as well as how specific policies would result in different impacts depending on the context.

## 2. Data and Methodology

We build a dataset using the following databases: Eurostat, European Central Bank, and Refinitiv. The data downloaded is compiled into a new dataset, which includes monthly data for a number of indicators. The variables included show the annual changes in inflation, both overall, as well as for energy and excluding energy, exchange rate fluctuations, and the changes in representative stock market indices. The dataset starts in January 2008, to capture the impact of the GFC and continues until the most recent available data at the time of this analysis, using monthly data for all variables. The analysis is carried out by dividing the data into three periods: GFC - the global financial crisis and its aftermath from January 2008 until December 2012; PC - the polycrisis triggered by Covid, Russia's war in Ukraine and beyond from February 2020 until June 2023. The period in between crises, from January 2013 until January 2020 is labeled NC - the non-crisis period - and used as a reference point. The NC dataset includes the largest number of observations and allows for an indicative analysis of how variables interact outside of the crises. For each of the variables and timeframes, the data set includes series for the EU, comprising its current 27 members, as well as for Romania. The series of variables that show the totals for all EU countries are contrasted with data for Romania specifically in order to examine the relationship between inflation, exchange rate, and stock market volatility between the EU overall, and an Eastern European member of the union still outside the eurozone. The list and description of variables are shown in Table 1.

**Table 1. Variables in the model**

Variable	Description
hicp_all_eu	Harmonized Index of Consumer Prices (HIPC), annual rate of change, monthly series, all items, EU 27
hicp_all_ro	HIPC, annual rate of change, monthly series, all items, Romania
hicp_e_eu	HIPC, annual rate of change, monthly series, energy, EU27
hicp_e_ro	HIPC, annual rate of change, monthly series, energy, Romania
hicp_excle_eu	HIPC, annual rate of change, monthly series, excluding energy, EU27
hicp_excle_ro	HIPC, annual rate of change, monthly series, excluding energy, Romania
xr_eur_leu	Euro to Leu exchange rate, monthly average
xr_eur_us	Euro to USD exchange rate, monthly average
em_bet_ro	BET Romanian Stock Market Index
em_stoxx_euro	Euro STOXX 50 Index, composed of 50 blue-chip stocks from 11 countries in the Eurozone

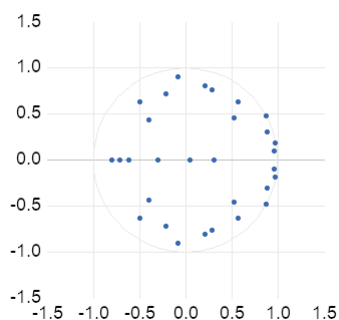
*Source: Author's compilation*

We construct a Vector Autoregressive (VAR) model for each period in EViews which we use as the basis for further analysis. For each period we test the stability of the model and proceed with further tests. The variables in the model are not stationary but following (Sims, 1989; Watson, 1994) we proceed to test for cointegration using the Johansen test for cointegration using both the trace and eigenvalue test. Results from EViews find that the variables are cointegrated and thus the VAR model is stable regardless of variables meeting the stationary condition. As we are looking to examine the

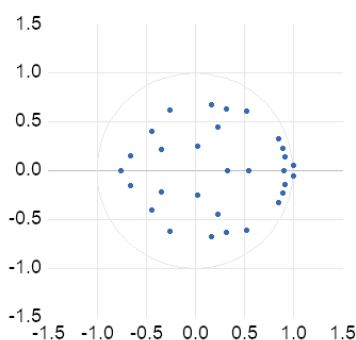
relationships between variables and how they shift during specific periods, we proceed to not differentiate the variables to avoid the loss of information (Sims, 1989).

The selected variables present a strong cointegration relationship for the entire period examined, confirmed through performing the Johansen cointegration test, as well as a test performed for each of the shorter timeframes examined through VAR models (Johansen, 1991). The inverse roots of the AR characteristic model for each period are shown in Figure 1, and confirm the stability of the chosen model for each period, with all points within the circle (Lütkepohl, 1991).

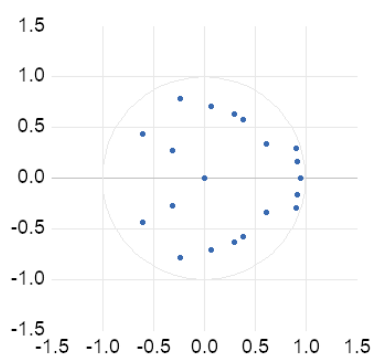
Inverse Roots of AR Characteristic Polynomial



Inverse Roots of AR Characteristic Polynomial



Inverse Roots of AR Characteristic Polynomial



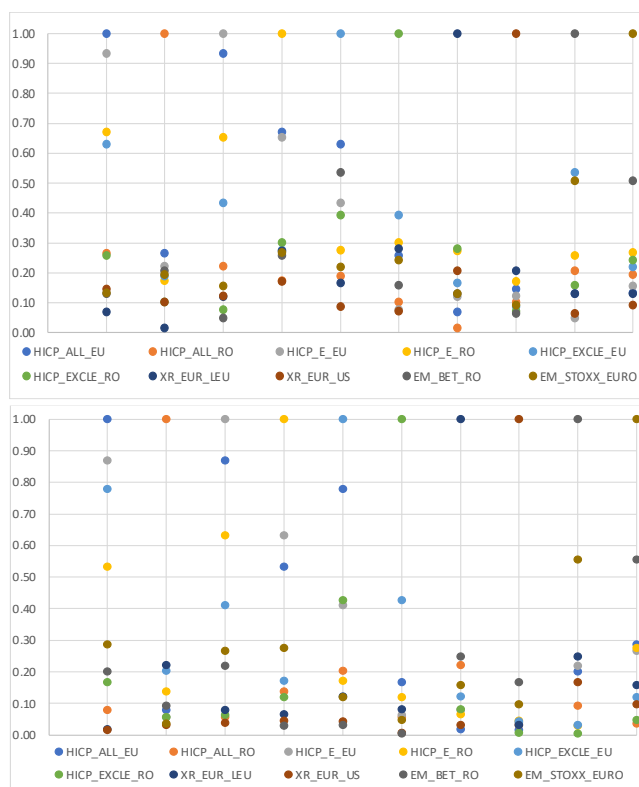
**Figure 1. Inverse Roots of Characteristic AR Polynomial (top to bottom: GFC, non-crisis, polycrisis)**

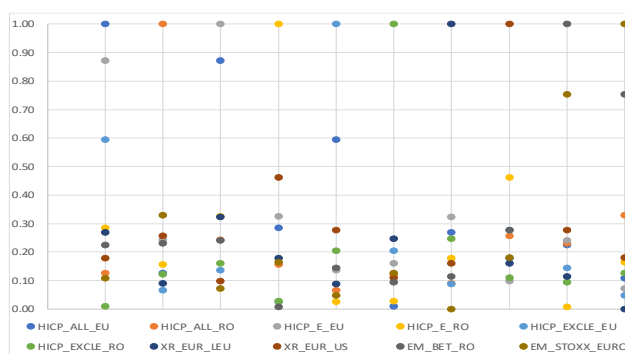
*Source: Author's calculation*

The VAR model is then used to perform a series of tests to examine the shifts in the relationships between the selected variables in each of the three periods examined. The results are presented to highlight the similarities and changes between the crisis and non-crisis periods, as well as between the two crises in this timeframe. For each period we obtain the correlation matrix and covariance matrix, examine pairwise Granger causality relationships, as well as test the impulse response functions to energy price and exchange rate shocks. The following section provides an overview of the results and discusses their possible implications.

### 3. The Model and Finding

The results from the model show that many of the relationships between variables shift in the crisis periods. Furthermore, relationships between variables at the EU level are not always consistent with those observed for Romania, which highlights the need for more granular analysis and the different contexts of countries within the EU. The components of inflation included in the sample are more volatility during the POLYCRISIS which included an energy shock price, than for example during the GFC. Overall, in the examined sample, the POLYCRISIS exhibits the most changes in relationships and volatility in the indicators. Figure 2 illustrated the correlation matrix for each period, showing the absolute values of the relationships. The correlation is weaker in the past period examined. However, since this is an ongoing crisis, it should be noted that these relationships could stabilize and revert to their historical norm as the crisis unfolds.





**Figure 2. Correlation matrix, absolute values (top to bottom: GFC, non-crisis, Covid).**

Source: Author's calculation

The pairwise Granger causality tests that identify causality relationships between variables show significant shifts for the different periods. The pairs for which the null hypothesis of no causality can be rejected with a 0.05 confidence level are unique in each period. Looking at inflation and its decomposed element as the possible dependent variables, the relationships with a causality relationship in at least one period, as well as the reported p-values for each period, are shown in Table 2.

**Table 2. Variables with at least one pairwise Granger causality relationship**

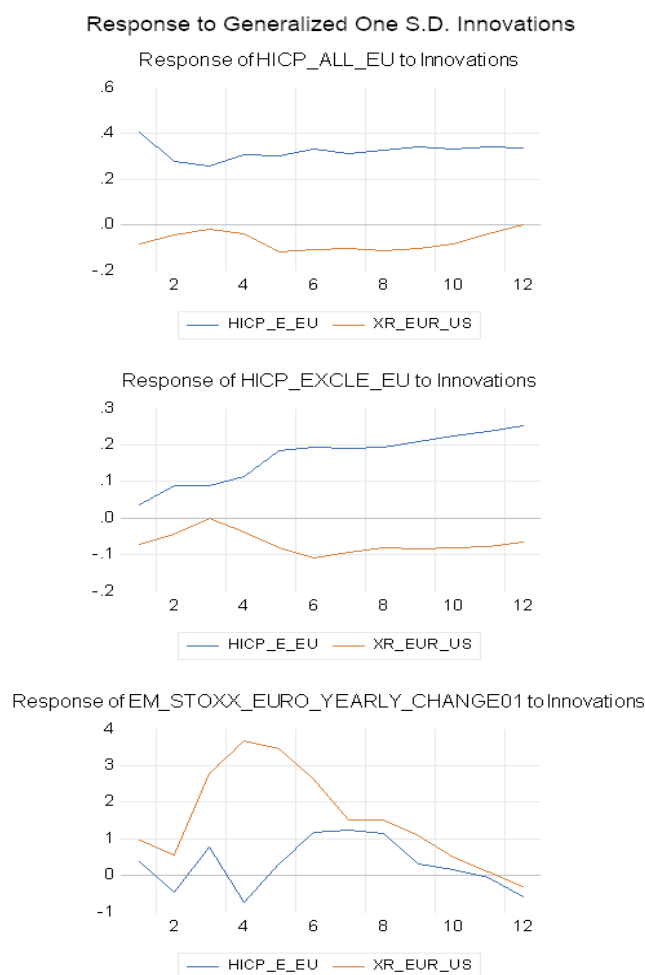
Dependent variable	Variables	GFC	NC	POLYCRISIS
HICP_ALL_EU	HICP_E_EU	0.046	0.138	0.962
	HICP_EXCLE_RO	0.024	0.774	0.737
HICP_ALL_RO	HICP_ALL_EU	0.658	0.459	0.003
	HICP_E_EU	0.333	0.548	0.003
	HICP_EXCLE_EU	0.046	0.095	0.005
HICP_E_EU	EM_BET_RO	0.806	0.030	0.711
	HICP_ALL_RO	0.405	0.025	0.104
	HICP_E_RO	0.038	0.141	0.208
HICP_E_RO	HICP_EXCLE_RO	0.012	0.604	0.353
	HICP_ALL_EU	0.446	0.003	0.666
	HICP_ALL_RO	0.301	0.004	0.183
HICP_EXCLE_EU	HICP_E_EU	0.925	0.010	0.842
	HICP_EXCLE_EU	0.265	0.001	0.931
	HICP_EXCLE_RO	0.005	0.121	0.021
	EM_BET_RO	0.596	0.004	0.481
	EM_STOXX_EURO	0.241	0.000	0.923
HICP_EXCLE_RO	HICP_EXCLE_RO	0.039	0.063	0.094
	XR_EUR_US	0.229	0.013	0.927
	EM_BET_RO	0.043	0.207	0.531
HICP_EXCLE_RO	EM_STOXX_EURO	0.005	0.447	0.877
	XR_EUR_LEU	0.393	0.886	0.007
	XR_EUR_US	0.075	0.472	0.014
	EM_BET_RO	0.581	0.546	0.008
	EM_STOXX_EURO	0.686	0.020	0.005

Source: Author's compilation

The pairwise Granger tests identify multiple causality relationships between the energy price index in the EU and in Romania and other variables. In the case of Romania's energy only price index, causality is identified with the price index that excludes energy, suggesting second order contagion for all other prices through this polycrisis period. A similar relationship is not identified within the same confidence interval for the EU overall, however, as noted

priorly, data for this period is still limited and the relationship should be examined further at a later date. Indicators for Romania have a larger number of identified relationships as the dependent variables, which is not a surprising result, as developments within the EU are more likely to drive those in a smaller Eastern Europe member than vice versa.

The impact of two types of shocks – energy price and exchange rate on inflation and stock markets are examined through impulse response (IR) functions for each period. A similar pattern is observed: the impact of the shocks shifts depending on the period, as well as when looking at EU and Romania data. In the case of Romania, exchange rate shocks are consistently more impactful for inflation and stock market shifts, a result consistent with Romania’s overall position in global capital markets. Given space limitation, we present the more pronounced responses to the IR functions for both the EU and Romania for the polycrisis period, which is also of relevance to current policy discussions. These results are shown in Figures 3 and 4.

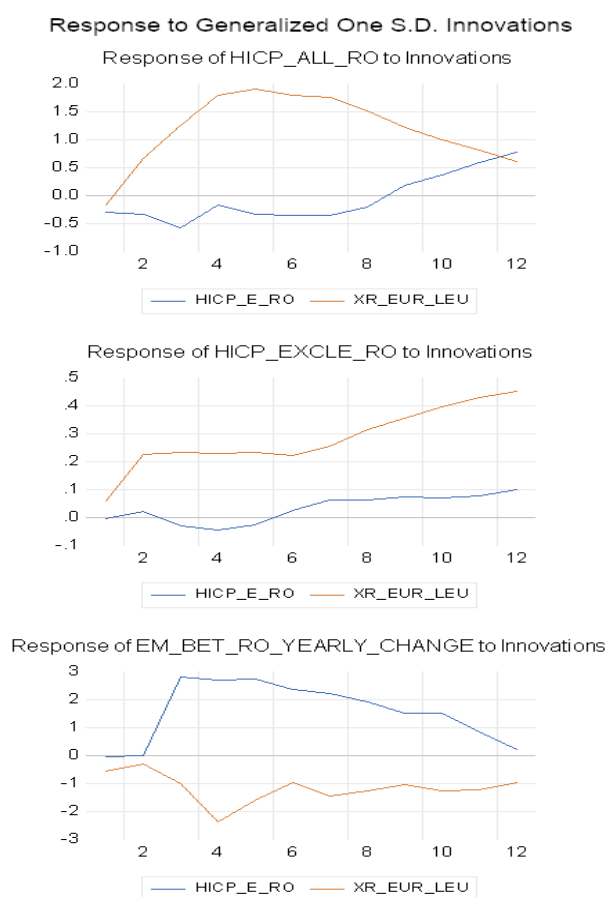


**Figure 3. Impulse response function to generalized shock for energy price index and exchange rate, POLYCRISIS**

Source: Author’s calculation



Looking at the POLYCRISIS period, for the EU, exchange rate shocks for the euro vis-à-vis the US dollar, its main trading currency outside the euro, have a limited impact on inflation. The exchange shock leading to a pronounced positive reaction from capital markets that continues for several periods is a result unique to the polycrisis period. During the GFC a similar exchange rate shock had a negative impact on the stock index. In the case of the EU, exchange rate shocks for all periods and the energy price shocks during the GFC and in the non-crisis period tend to revert to the previous trend within a few periods. During the polycrisis period, the energy price shocks signal a persisting impact on inflation, with a stronger initial impact on the overall price index, and then a second-order impact on the price index which excludes direct energy prices. The persistence of the shocks on inflation in this period could be related to the policy responses and tightening of monetary conditions, which are not captured by the model.



**Figure 4. Impulse response function to generalized shock for energy price index and exchange rate, POLYCRISIS**

Source: Author's calculation

In the case of Romania, a shift emerges in the variable with a larger and more persistent impact on inflation and on the stock market. A shock to the exchange rate has a negative albeit small effect on the stock index, which is a departure from the impact of a

similar shock during the period from the GFC and preceding the pandemic. For Romania, in the polycrisis period, the most persistent shock for inflation is due to the exchange rate. Shifts in domestic energy prices have a lesser impact on inflation indicators, leading first to a negative response and in later periods to increases in the overall price index and the price index which excludes energy through second-order effects. This resonates with the finding illustrated in Table 2, which suggests that EU-wide price shifts have a stronger causal relationship with price levels within Romania.

## Conclusions

Continuing monetary tightening and persisting inflation dominate policy discussion in Europe and there is no sign the ECB will slow down on interest hikes. Thus, the monetary policy response will also impact fiscal space, the borrowing costs of countries, and the cost of servicing debt, which risks a return to the type of austerity policies that slowed down the post-financial crisis recovery.

As highlighted in this article, it is important to better understand the drivers of inflation, the interactions of components, and their impacts. The results caution on the risks of looking at EU-wide trends, which are on occasion very different than what is experienced at the country level, as well as way as not recognizing the peculiarities in how variables respond depending on the overall macroeconomic context, with variables responding differently in times of crises, as well as in response to specific shocks. This finding points to the need for more granular research and investigations and policy responses designed to respond to ongoing events.

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## SCIENTIFIC APPROACHES TO DEFINING, REGULATING AND RESEARCHING ENTITY ACCOUNTS RECEIVABLE

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**Abstract.** *In the process of carrying out economic activities, each entity engages with various business partners, governmental bodies, personnel, and others. Consequently, the relationships formed often result in the emergence of receivables, owing to the time delay in meeting financial obligations related to the sale of economic goods or the provision of advances. The main objective of this research is to comprehensively examine the theoretical aspects related to the concept of accounts receivable, including their definition, classification, and regulation. Additionally, it aims to analyze the normative framework at both the national and international levels, considering economic and legal perspectives. Furthermore, this study encompasses an assessment of scientific productivity, the impact of scientific research, trending topics, and other aspects through bibliometric analysis. It's worth noting that the current market conditions underscore the significance of this research topic, where economic agents have the ability to choose their market and business partners. In this context, accounts receivable play a pivotal role in reflecting the economic and financial situation of both parties involved.*

**Keywords:** *receivables, accounts receivables, classification, regulation, bibliographic study, bibliometric analysis*

**UDC:** 657.432:001.818

**JEL Code:** M40, M41

### Introduction

As an independent scientific discipline, accounting focuses its research on an entity's assets, which encompasses the entirety of the economic assets it oversees as well as the rights and obligations it assumes concerning the assets it holds.

From an economic standpoint, an entity is an organizational unit where a blend of technical-production, economic-organizational, administrative, and social activities converge. Moreover, this entity is rooted in economic and social endeavors through which individuals produce tangible goods, undertake projects, provide services, and access them through the market.

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Every entity plays a distinctive role within the circular flow of economy, characterized by the flow of money and economic goods, categorizing them into at least one of three broad groups: producers, suppliers, or buyers.

In the context of economic activities, a complex system of economic and legal relationships, including rights and obligations, is established. Consequently, these relationships give rise to rights and obligations that vary in nature, such as commercial, financial, fiscal, social, and more. In a market economy, each participant's position determines how accounts receivable and debts materialize from these relationships.

All these are patrimonial relations, which reflect the changes in the forms of existence of the patrimony, involving rights, obligations, and responsibilities; therefore, they are part of the accounting object of study (Sajin, 2010, p. 8).

*The relevance of this theme* is inherent in the pervasive presence of accounts receivable within every entity. The main objective of each asset unit is to attain its operational goals through the sale of products, service provision, and/or project execution, with the aim of generating profit. Simultaneously, the significance of investigating accounts receivable also emanates from a pragmatic standpoint, as numerous entities grapple with challenges in recovering outstanding receivables, a predicament that has been exacerbated, particularly during the pandemic period.

*The purpose of the research* is to conduct a qualitative and quantitative analysis of the concept of accounts receivable, employing bibliographic and scientometric methods, with the aim of providing a comprehensive perspective on the extent of research pertaining to this concept at both national and international levels.

In the context of the above, it can be seen that all the relationships of economic agents with third parties are formed and extinguished in an endless chain, each of which has clear terms of maturity, and these relationships in most cases are reciprocal (Grigori, 2021, p. 269).

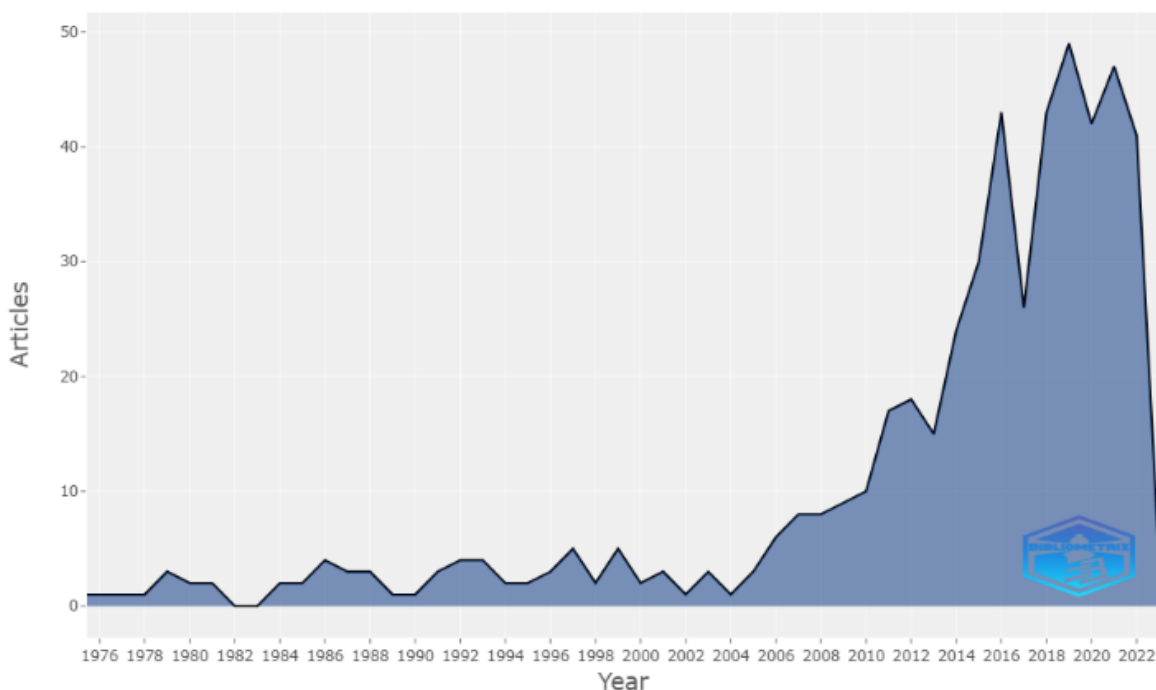
## 1. Data and Methodology

The methodological approach of the research is characterized by a theoretical and practical approach. In the scientific approach, methodological tools from the social sciences and statistical-mathematical techniques were employed. Various research methods, including analysis, comparison, systems thinking, synthesis, induction, deduction, as well as bibliometric and scientometric methods, were utilized to quantify and analyze specialized literature in the context of research on receivables accounting.

Through the Web of Science platform, an overview of the studies associated with accounting and receivables analysis is presented. In the process of identifying the scientific works that study this issue, the following research parameters were set: the identification of the phrase “*receivables*” in the subject of the publication in the period 1956-2023. The results obtained were interpreted using the Biblioshiny visualization tool. Based on the research parameters, 537 scientific works published in 391 sources (journals, books, etc.)

were identified based on 12,055 bibliographic references, with the largest share being occupied by articles – 313 works.

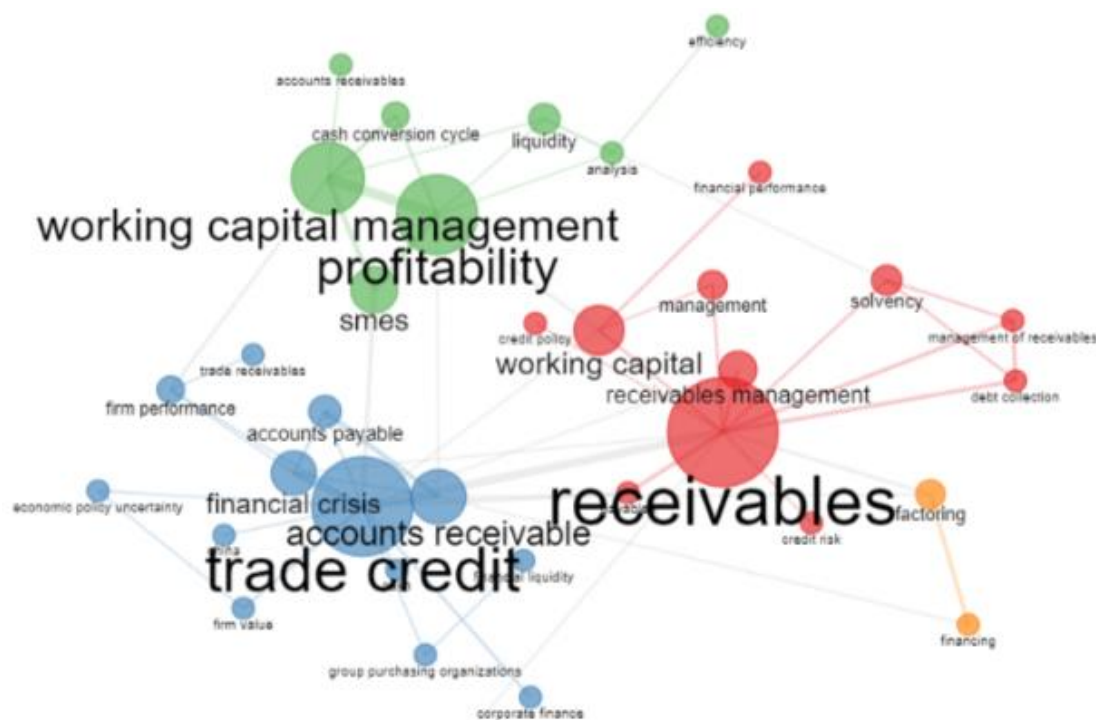
Figure 1 shows the variation in the number of scientific works published in the period 1956-2023, especially since, the most scientific works were published in 2019 (49 publications), 2021 (47 publications), 2016, 2018 (43 publications), 2020 (42 publications), etc. The demographic distribution of publications shows the most productive countries in terms of publication rate during 1956-2023 which are: the United States of America (131 publications), China (103 publications), the Czech Republic (63 publications), Poland (57 publications), etc. As can be seen, most of the scientific works are of recent date, which can also be explained by the pandemic period that contributed to the procrastination of transactions, in this case, payments to suppliers, which directly involve accounts receivable.



**Figure 1. Annual Scientific Production between 1956 and 2023**

Source: developed by the author using the Bibliometrix R toolkit

The factorial analysis based on keywords highlights the most relevant words used by the authors of the scientific papers, which outline the research direction of the papers. So, the researchers give priority to the words (figure 2): „receivables”, „trade credit”, „profitability”, „working capital management”, „accounts receivable”, „working capital”, „insolvency”, „receivables management”, etc.



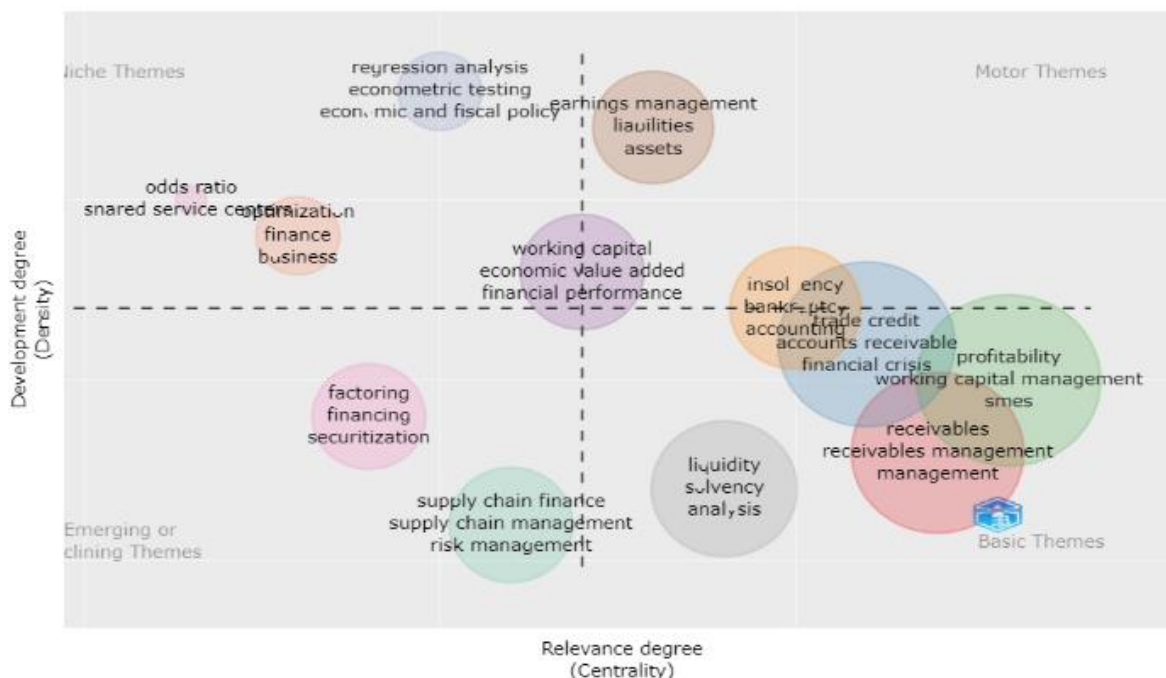
**Figure 2.** Co-occurrence network of words in the period between 1956 and 2023

*Source: developed by the author using the Bibliometrix R toolkit*

Trend topics outline the framework of researchers' interest, therefore, figure 3 summarizes the keywords of the authors of scientific works within a coordinate system according to the degree of relevance (horizontal axis) and the degree of development (vertical axis). So, in the period 1956-2023, the words: „receivables”, „receivables management”, „accounts receivables”, „profitability”, „solvency”, „analysis” etc., are in the basic themes quadrant, which denotes topicality and interest from researchers. Likewise, it can be concluded that during the research period, the words: „factoring”, „supply chain finance”, „risk management” etc. were located in the emerging or declining themes quadrant, with researchers' interest moving towards the current themes quadrant. At the same time, the words can be found in the niche themes quadrant: „regression analysis”, „econometric testing”, *economic and fiscal policy*” etc. which indicates the research of some niche topics on certain types of activity, sizes and typologies of businesses.

Summarizing, the combined and consistent application of research methods contributes to the formation of scientific arguments related to accounting and accounts receivable analysis. In the same vein, it can be noted that from 1956 until 2023, there has been at least one scientific publication in this research direction; likewise, receivables are of interest to researchers in the direction of accounting and their management, which can be seen in keywords networks used and related titles.





**Figure 3. Thematic map regarding the degree of relevance and development of research during the period 1956 and 2023**

Source: developed by the author using the Bibliometrix R toolkit

## 2. Literature review

The economic and legal relationships established to accomplish the entity's objectives result in the emergence of accounts receivable due to delays in meeting financial obligations related to the sale of economic goods or the provision of advances.

Etymologically, the term „creanțe”(rom.) (eng. *Receivable*) is borrowed from French „*créance*”, which in turn was borrowed from Latin „*credentia*”. In this sense, the Etymological Dictionary of the French language provides that the origin, formal and semantic evolution of the term „*créance*” comes from medieval Latin, from the word „*croire*”, called etymon from a linguistic point of view, that is, the word of origin. Therefore, the author of the Etymological Dictionary of the French language, Clédat, L., claims that „the primitive meaning of the verb „*croire*” is „to trust”, which came into French with the meaning of confession of faith, at the same time, nouns were formed: „*crédit*”, „*créditer*”, „*discréditer*”, „*accréditer*”, and the Latin derivative „*credentia*” gave a triple form: „*crédence*”, „*créance*”, „*croyance*”” (Clédat, 1914, p.155). Synthesizing the semantic peculiarities and the economic meaning of the term „*receivable*”, in the course of carrying out the economic activity, the entity manifests an act of faith in relation to the debtor regarding the collection of the consideration under the conditions and terms established in the case of sale with deferred payment.

In the same vein, the explanatory dictionary of the Romanian language defines receivable as „the creditor's right to demand from the debtor to give, do or not do

something” (Coteanu, 2009). Also, the Academic Dictionary comes with a much more exhaustive scientific approach, emphasizing the monetary equivalent, noting that receivable is a „right that the creditor has over a sum of money owed to him, right to demand from the debtor to give, do or not do something” (Coteanu, 2010). The same treatment is attested in the Dictionary of Neologisms (Marcu, 2000), which confirms the authenticity of the explanation given that it is a borrowed word from another language.

After determining the properties of the notion of „*receivable*”, it becomes essential to crystallize the definition from an economic and legal point of view. As a result, according to the National Accounting Standard (hereinafter NAS) „Receivables and financial investments”, receivables represent „rights of the entity arising from past transactions or events and from the settlement of which inflows (increases) of resources embodying economic benefits are expected” (NAS „Receivables and financial investments”, 2013, p. 4).

The bibliographic study in the area of accounting and receivables analysis at the national and international levels contributed to the synthesis of different approaches regarding the definition of accounts receivable. Therefore, the author Mihaila, S. claims that the accounts receivable represent „a component of the assets that represent the right of the entity vis-à-vis other natural and legal entities, which appear as debt to the given entity” (Grigori, 2021, p. 269). Also, a similar approach is attested in the work of researchers Țurcanu, V. and Bajorean, E., who mention that receivables include „the debts of other legal and natural entities towards the given entity; they appear, as a rule, on commercial invoices unpaid by buyers, advances granted due to overpayments of funds in the budget, insurance bodies, employees, etc.” (Țurcanu, 2004, p. 37). Therefore, both approaches support the idea that the accounts receivable constitute a debt of a natural and/or legal entity towards the entity, the latter bringing concrete examples of occurrence.

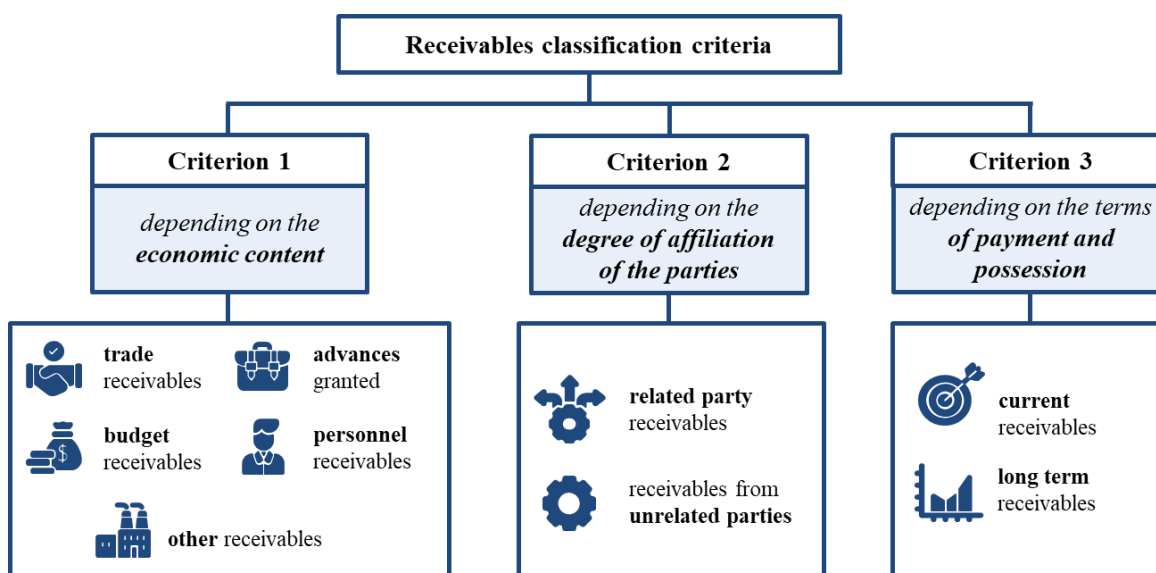
Romanian researchers Mehedinți, I. L. and Negoescu, Gh. emphasize the temporary advancement of economic values, specifying that accounts receivable reflect „the economic values temporarily ascertained by the owner of the assets in relation to other natural and legal entities from whom a value equivalent is to be received” (Mehedinți, 2000, p. 169). Based on the proposed definition, a similar opinion is identified in the work of Professor Bojian, O., which characterizes the receivables as „economic values temporarily advanced by the property owner to other legal or natural entities and for which they will receive the equivalent value” (Bojian, 1997, p. 212).

At the same time, analyzing different approaches regarding the definition of accounts receivable, several authors emphasize the participants of economic transactions, traditionally called debtors and creditors. In this sense, the authors Ristea, M., Dumitru, C. G. and others, mention that „all natural or legal entities who have benefited from the advanced value are generically referred to by the notion of debtors, i.e., persons who in the framework of an economic relationship have received a value and are to give a value equivalent or consideration, both natural and legal entities towards which the unit has monetary obligations, are generically called creditors, therefore, the persons who, within

an economic relationship, have advanced an economic value and are to receive a value equivalent or a consideration” (Ristea, 2009, p.371).

Summarizing the results of the bibliographic study, it can be concluded that the approaches regarding the definition of accounts receivable highlighted above are shared by several authors in their works, such as Nederita, A. (Nederița, 2003, p. 234), Balteș, N. (Balteș, 2014, p. 141), Bojian, O. (Bojian, 1999, p. 145), Deju, M. (Deju, 2011, p. 318), Grosu V. (Grosu, 2022).

Receivables classification has a decisive role in the process of recognizing and evaluating them in accounting, in the process of adopting decisions by the users of financial-accounting information, as well as in the process of drawing up financial statements. Thus, according to the NAS „Receivables and financial investments”, the classification of receivables can be presented as follows (figure 4):



**Figure 4. Accounts receivable classification criteria in domestic entities**

Source: elaborated by the author based on NAS „Receivables and financial investments”, 2013, p. 7

Figure 4 follows the description of each criterion and constituent element. Knowing and applying this information contributes to the efficiency of organizing the analytical and synthetic accounting of receivables, as well as the analysis of financial statements.

**Depending on the economic content**, the accounts receivable are grouped into trade receivables, advances granted, budget receivables, personnel receivable and other accounts receivable (NAS „Receivables and financial investments”, 2013, p. 8, 16).

*Trade receivables* include receivables regarding goods sold, services rendered and works performed. They are recognized and accounted for as soon as the goods are delivered, services are rendered and works are performed (NAS „Receivables and financial investments”, 2013, p. 17-18).

*The advances granted* represent the payments made on account of the subsequent procurement of goods, services, works. Within the long-term and short-term advances, the

advances granted for intangible assets, tangible assets and for stocks are highlighted, which are presented in the financial statements, respectively, in the composition of fixed and current assets regardless of the payment term of the advances (NAS „Receivables and financial investments”, 2013, p. 24).

*The budget receivables* include taxes and fees paid in advance/instalments, amounts paid in addition to the budget, the difference between the value added tax taken into account and calculated, the amount of VAT related to advances received, indirect taxes to be refunded and others in accordance with the legislation in force. These are recognized and accounted as an increase in receivables and a decrease in cash or an increase in current liabilities (NAS „Receivables and financial investments”, 2013, p. 27-28).

*Personnel receivables* include advances granted on the salary account, amounts granted to advance holders, accounts receivable regarding the recovery of material damage and other personnel receivables, these are recognized and accounted as an increase in personnel receivables, income or current liabilities and a decrease in cash (NAS „Receivables and financial investments”, 2013, p. 29-32).

*Other receivables* include receivables regarding the recovery of losses, receivables regarding complaints submitted and recognized, receivables from social and medical insurance bodies (NAS „Receivables and financial investments”, 2013, p. 33), receivables regarding income from the use by third parties of the entity's assets, preliminary receivables, receivables regarding the exit of fixed and current assets, receivables regarding subsidies, financing and receipts with special purpose, related to the public-private partnership (Grigori, 2021, p.270).

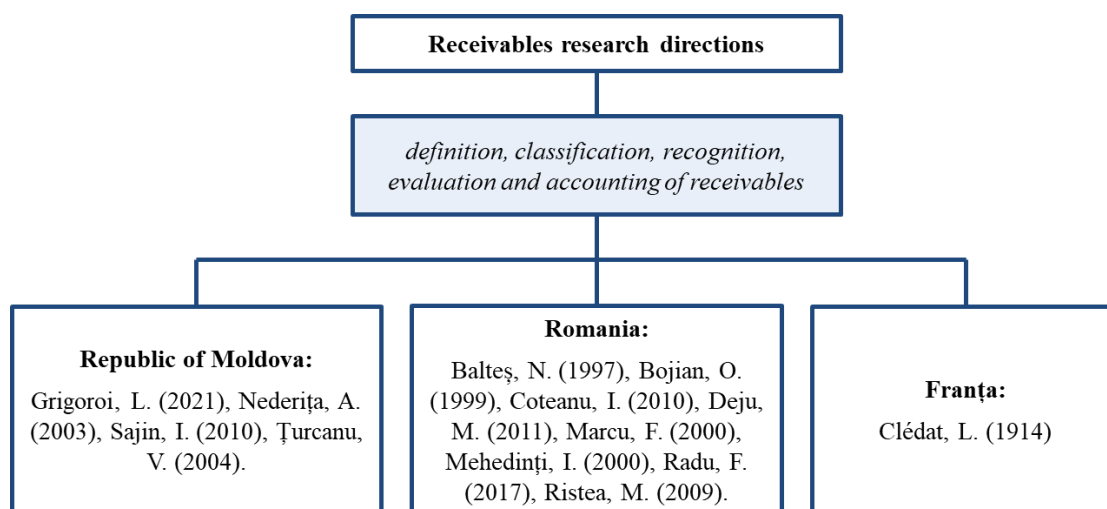
**Depending on the degree of affiliation of the parties**, receivables are divided into *receivables of related and unrelated parties*. Thus, according to NAS „Related parties and civil contracts”, the related parties are „legal or natural entities that have the ability to control or are controlled, have significant influence or are significantly influenced by the other party in financial and operational policies” (NAS „Related parties and civil contracts”, 2013, p. 4). In the composition of the receivables of the related parties, the receivables related to participation interests are highlighted (NAS „Receivables and financial investments”, 2013, p. 9). According to the Law on Accounting and Financial Reporting, the participation interest represents „the rights of an entity within another entity that exceed 20% of the latter's share capital, rights that, by creating a long-term strategic link with it, are intended to contribute to the activity of the entity that owns them” (Law on Accounting and Financial Reporting, 2017, art.3, paragraph (1)). In the other cases, the accounts receivable will be considered as part of unrelated parties.

**Depending on the terms of payment and possession**, receivables are divided into *current and long-term receivables*. Receivables are considered current if the payment term does not exceed 12 months from the reporting date. In the other cases, they are treated as long-term receivables (NAS „Receivables and financial investments”, 2013, p. 10).

Following the research carried out, it can be found that the classification of accounts receivable is characterized by a variety of applied criteria, moreover, professors Sajin, I. and

Nederita, A. are of the opinion that „all these classifications are not complete, and the classification criteria do not correspond to the information users' requirements” (Sajin, 2010, p.26), proposing additional classification criteria such as: record currency (*in national currency and in foreign currency*), degree of maturity fixation (*chargeable and non-chargeable*), the degree of security of collection (*certain and uncertain*), recognition mode (*contingent and non-contingent*), contractual clauses (*convertible and non-convertible*).

In research practice, the mixing of quantitative research and qualitative research is used in order to combine the advantages of the two methods, which encompasses the research methodology. As a result, figure 5 summarizes the bibliographic sources used in the approach to researching the problem of accounts receivable, having as a theoretical foundation one of the three directions of receivables research - receivables accounting.



**Figure 5. Bibliographic study of the relevant literature at national and international levels**

Source: developed by the author

Based on figure 5, it can be concluded that the problem of accounts receivable is widely addressed both at the national and international levels. As a result, we notice that the first direction of research, aimed at the definition, classification, recognition, evaluation and accounting of receivables, has the greatest development in the works of the authors, with the majority of opinions based on the provisions of the normative framework. At the same time, the research in the direction of the economic-financial analysis of receivables resulted in fewer bibliographic sources, which can be explained by the tendency of the authors to present the general analysis of the entity's assets situation, as well as the indirect influence of the business environment that materializes through the decision the management of the entity to carry out the analysis of its financial performance and to identify the directions for improvement or not, considering keeping accounting sufficient. Likewise, the study of the comparative aspects regarding the notion and balance sheet position of receivables at national and international level, allowed the outline of a general opinion regarding the notion of receivables, which hovers over the existence of customer

obligations towards entities and the deduction of positions considered appropriate for disclosure to users of financial-accounting information.

### 3. Review of the normative framework

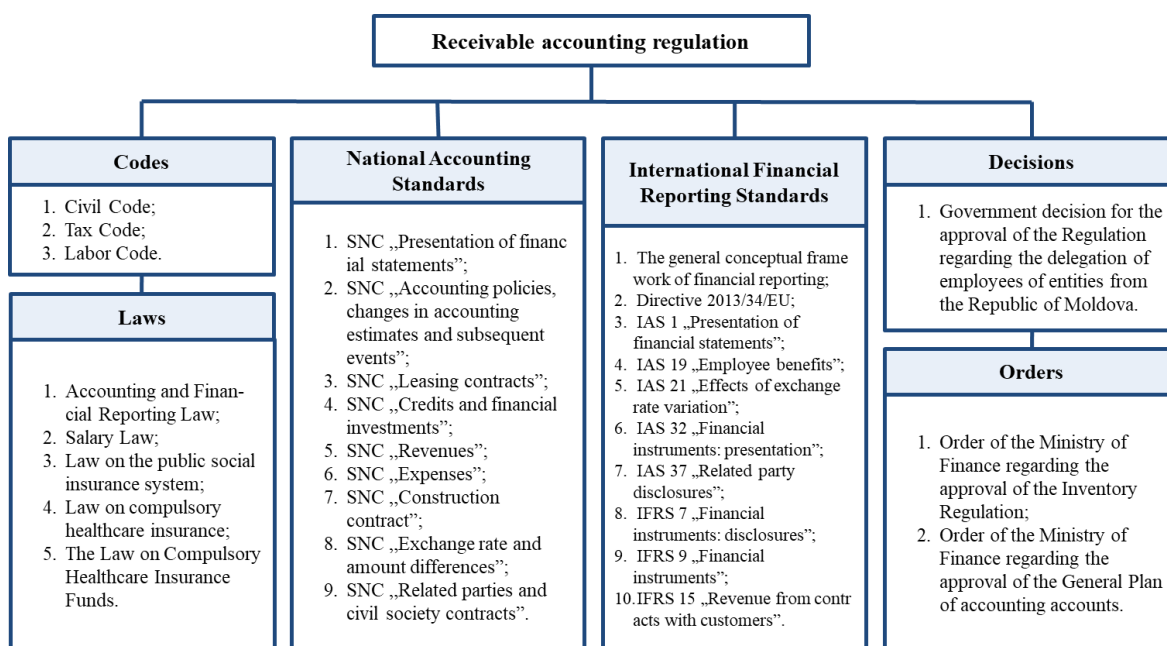
Accounting and its role in social life have continuously evolved, successively going through the stages of recording technique, organization of commercial transactions, control tool, element of evidence in case of litigation, information base for the management of the entity, with an increasing emphasis the higher on the estimation of further developments. All these changes were accompanied by legal regulations that sought to support or guide its development (Radu, 2017, p.13).

According to local scientists Sajin, I. and Nederita, A., „there are no normative acts that would specifically regulate the accounting of receivables, for this reason, in domestic and international accounting practice, a clear delimitation cannot be made between receivables and financial instruments, which present different assertions when preparing financial statements” (Sajin, 2010, p.191-192).

The general criteria regarding the definition, composition, method of recognition and evaluation, method of formation and extinguishment of receivables are regulated by the NAS „Receivables and financial investments”, at the same time, accounts receivable are regulated, indirectly, by a series of normative and legislative acts, such as: codes, laws, standards, decisions and orders, presented in figure 6.

Based on the information presented in figure 6, the repercussions of the main normative acts in relation to the regulation of accounts receivable of domestic entities are reproduced:

- *Tax Code of the Republic of Moldova* (hereafter RM) (Tax code, 1997) represents the most important fiscal legislative act at the national level, which regulates the accounting of receivables from a fiscal point of view, establishes the cases in which the receivables are non-reimbursable [art. 5, paragraph (32)], the cases that allow the deduction of any bad debt [art. 31, para. (1)] and the cases in which the transfer of VAT takes place or the circumstances in which expenses with compromised accounts receivable are not deducted for tax purposes.
- *Law on Accounting and Financial Reporting* (Law on Accounting and financial reporting, 2017) establishes the general principles of organizing and keeping the accounts receivable of domestic entities, of documenting economic operations involving credit sales, of perfecting the accounting registers, of inventorying the receivables, of recording and presenting them in the financial statements, as well as in the explanatory notes.



**Figure 6. Accounts receivable regulation at national and international levels**

Source: developed by the author

- *NAS „Receivables and financial investments”* (NAS „Receivables and financial investments”, 2013) constitutes the main normative act in order to regulate receivables, establishing the unanimous context regarding the classification, recognition, evaluation, accounting and presentation of information regarding accounts receivable and financial investments, likewise, the standard meets practitioners with concrete examples of calculation and accounting.
- *NAS „Differences in currency exchange rate and amount”* (NAS „Differences in currency exchange rate and amount”, 2013) provides for the calculation and accounting of favorable and unfavorable exchange rate differences, the amount differences, presenting the arrangement of the accounting of the differences on the reporting date, obliging the entities to recalculate the monetary elements in foreign currency by applying the official exchange rate of the Moldovan leu on the reporting date [pt. 11].
- *The general chart of accounts* (The general chart of accounts, 2013) regulates the way of recording economic facts regarding receivables in synthetic and analytical accounts, in compliance with the principles, norms and accounting policies of the entity. In order to keep the accounting records of receivables, in the chart of accounts, three receivables accounts are reserved in the class of fixed assets (I), group 16 „Long-term receivables and advances” and ten receivables accounts in the class of current assets (II) , groups 22 „Trade and estimated receivables” and 23 „Other current receivables”.

- *Directive 2013/34/EU* (Directive, 2013) provides for the vertical and horizontal structure (format) of the balance sheet and the position of receivables, which include: trade receivables, amounts to be collected from affiliated enterprises, amounts to be collected from enterprises to which the enterprise is linked by virtue of participation interests, other receivables [p. 46]. Also, Directive 2013/34/EU and the general conceptual framework for financial reporting are at the basis of the development of NASs.
- *International Accounting Standard 32 „Financial instruments: presentation”* (IAS 32, 2008) states that an example of financial assets is accounts receivable [AG3], representing a contractual right to collect cash in the future. In this regard, the standard provides as an example financial leasing, which creates a right of the lessor to receive and an obligation of the lessee to pay, according to a loan agreement, the lessor accounting for its investment in the receivable under a financial leasing contract [AG9].
- *International Financial Reporting Standard 9 „Financial instruments”* (IFRS 9, 2008) stipulates that upon initial recognition, an entity must evaluate trade receivables at their transaction price (as defined in IFRS 15 „Revenue from Contracts with Customers”) [p. 5.1.3]. At the same time, the entity must evaluate a financial asset at: amortized cost, fair value through other elements of comprehensive income or fair value through profit or loss [p. 5.2.1].

Consequently, the analysis of the normative framework allowed the review of the normative acts that regulate the definition, classification, recognition, evaluation and accounting of receivables both at national and international levels, making up the legal component of accounts receivable research.

## Conclusions

Accounts receivable play a significant role within every entity and influence key aspects of effective financial management, performance and financial stability of the entity. In this work, emphasis was placed on the examination of the theoretical aspects regarding the concept of accounts receivable, its presence in specialized literature and scientific works at national and international levels.

Following the research carried out, it can be concluded that accounts receivable enjoy a wide spectrum of definitions in the specialized literature, with some authors emphasizing the participants in economic relations, others focusing on the temporary advancement of economic values, etc. Likewise, it can be observed that the classification of receivables has a broader approach in the specialized literature than the one presented by the normative framework, as the authors are of the opinion that the classification criteria must correspond to the requirements of the information users.

From a bibliographic and bibliometric analysis perspective, accounts receivable represent a contemporary and pertinent subject across various economic dimensions.



Consequently, it is crucial to examine receivables from an economic impact standpoint, as the management of receivables and the risk of default can have far-reaching implications for the overall economy.

Summarizing the bibliographic sources analyzed during the research on accounts receivable, three main research directions have emerged: accounting, analysis, and the international interpretation of receivables. Consequently, the bibliographic and bibliometric study of receivables analysis and international comparative aspects will serve as objectives for future research.

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## CHALLENGES IN THE MANAGEMENT OF SCHOOL DROPOUT IN THE ROMANIAN EDUCATIONAL ENVIRONMENT

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**Abstract:** *At the global level, school dropout represents an important concern of specialized research within the educational issue as a whole, a fact explained by the very high percentage of young people who do not complete their studies. Every school organization tries to own and successfully implement an effective school dropout management system to achieve the expected results, in accordance with the harmonization of the needs, interests, aspirations and expectations of the entire school community, but also of the society in general. This study aims to identify differences in the challenges faced by stakeholders dissatisfied with the dropout management (N=96) and those in the highly satisfied group (N=260). A series of statements were evaluated by the participants and the comparison was accomplished with the help of t-test for independent groups. We confirmed statistically significant differences for all challenges presented.*

**Key words:** *education, prevention, school dropout, school dropout management, strategy*

**UDC:** 005.3:371.543.8(498)

**JEL:** *JEL codes I21, I25, I26, O35*

### Introduction

According to authors K. Alexander, D. Entwisle, C. Horsey (1997), as well as R. Vallerand and S. Senecal (1992), school dropout can be described as a process rather than a single event and is often considered the final result of an extended period of disengagement. While numerous researchers explain differently what constitutes school dropout, it is important to identify both common and individual objectives in this process.

Hence, this present study represents an area of interest for initiating research, considering the multiple causes that may underlie the occurrence of school dropout, from the perspective of the effects it generates.

Additionally, the management of school dropout continuously evolves due to facing various issues and pressures in addressing the ever-dynamic and challenging educational system needs.

From the perspective of the research presented by L. Forti et al (2006), C. Fartușnic (2012), it is deduced that school dropout targets the following causes:

- *Family-related causes:* When families are dysfunctional due to a deficient family structure (single-parent, divorced parents, deceased parents, parents working abroad, step-parent, large number of children, child under the care of grandparents, living as a boarder/hostel student, experiencing diminished socio-economic status), (Tăușan L.,2014), (Desforges, C., et Abouchaar, A.,2003), or

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when parents have low expectations regarding the academic preparedness of their own children (Uncu, V., et Penu, M., 2011), (Corak, M., 2004).

- *Social causes:* Children from different cultural backgrounds who find it challenging to adapt and have a different perspective on the importance of education, considering how teachers perceive students from diverse cultures, as mentioned by C. Desforages et A. Abouchaar.

Additionally, not only limited financial resources but also parents' education levels directly impact the chances of academic success, indicating the phenomenon of the intergenerational transmission of social inequalities (Ivan, C., et al, 2013), Ekstrom R.B., et al, 1986). This includes the lack of tablets/computers/phones for online schooling, especially in the pandemic context.

The level of parental education is a significant predictive factor. Particularly, if the mother has a low level of education, there is a higher probability that the children will also have a lower level of education, making them more likely to drop out of the educational system early. This is due to the parents' limited ability to guide their children within the school environment, specific cultural norms, low valuation of school and studies in general, including professional ones. Thus, the reproduction of low human potential occurs through a mechanism of intergenerational perpetuation of the lack of interest in schooling, predisposing individuals to early departure from the educational system (Cosmovici, A. 1996), (Jurcan, DM, 2011).

According to author D. Colibaba Evuleț low parental expectations regarding their children's achievements, reduced or non-existent supervision in daily activities, strongly correlate with school dropout. To deeply understand the phenomenon of school dropout, it's essential to first analyze the personal causes among students with low achievement rates, inappropriate behavior at school, such as frequent absences, negative relationships with the school, academic frustration, social problems, and frequent school changes over the years.

Other characteristics include self-control disorders, aggressive tendencies, difficulty in delaying gratification, attention and concentration disorders, inappropriate behavior, difficulties in accepting authority, friends with reduced educational aspirations, friends who have dropped out of school, friends exhibiting deviant behavior, from whom negative behaviors and false norms/values can be easily adopted; low motivation and insufficient ambition regarding education in general. Additionally, they often manifest other difficulties such as social withdrawal, high levels of anxiety and depression, feelings of loneliness, isolation, loss of meaning in life, and a sense of inability to influence things (Drăghicescu, L., et al 2008), (Iucu, R., 2001).

An important category/separate set of factors that can influence school dropout are life crises and events, as mentioned by authors D. Blue and J. Cook, p 18., listing: poor health, pregnancy, increased crime, arranged marriage, drug and alcohol abuse, emotional instability, thoughts or attempts of suicide.

In conclusion, the analysis of specialized literature has allowed us to observe other opinions regarding school dropout and its causes.

Reviewing several studies on the phenomenon, author D. Vrabie, p 12. establishes the impact of school-related factors on the increase of student school dropout (unfavorable school climate, school violence, bullying, absenteeism, teacher turnover, their neglect, lack of involvement; lack of motivation and/or interest, homework unrelated to the child's interests, discriminatory treatment of students by teachers, repetition).

Author D. Vrabie considers it necessary to mention that there is not a single cause of school dropout. Therefore, all factors (personal, social, economic, educational, and familial) need to be analyzed.

Based on the Convention on the Rights of the Child adopted by the United Nations General Assembly on November 20, 1989, which stipulates that every child has the right to education and the development of mental and physical abilities to their maximum potential, and also from the analysis of Article 2, paragraph 3 of Law no. 1 of January 5, 2011, in which Romania defines the educational ideal of schools, it's evident that preventing and combating school dropout at both national and international levels has become an absolute priority in education public policies (Strategia Națională pentru Dezvoltare Durabilă a României Orizonturi 2020-2030, București 2008).

In June 2011, the Council of Education adopted a Recommendation on policies to reduce the number of students leaving education and professional training systems early. This recommendation includes three types of measures:

- Preventive measures aimed at addressing primary causes that could ultimately lead to early dropout.
- Intervention measures targeting any difficulties students face by improving the quality of education and professional training and providing specific assistance.
- Compensatory measures that create new opportunities for those who have left the education and professional training system before obtaining qualifications.

An efficient and effective management of school dropout requires selecting the most suitable strategies according to the context in which they operate, ensuring quality education for students at risk of dropping out. Therefore, it is necessary to enhance intervention techniques/methods, develop institutional capacity, stimulate intellectual curiosity, build relational credibility, enhance the quality of personality development, multiply examples of best practices, maintain an authentic balance between cognitive, psychomotor, and affective domains, and respond immediately and efficiently to students' needs.

Two of the reasons why the dropout prevention management of an authentic school rethinks, plans, organizes, reflexively analyzes its own activity, being guided by knowledge, when using various strategies are caused by the obvious change of the student - subject of learning, but also for the fact that there is an immediate need for management and leadership adapted to the demands of the century in which we find ourselves. In developing the study, we also considered the studies on the issue of preventing school dropout regarding:

- the need to establish and cultivate positive, constructive relationships between students and the teaching staff who coordinate the collectives, parents and colleagues, as well as to carry out the systematic monitoring of the students' progress during schooling in a mobilizing, dynamic, inclusive educational environment (Juvonen, J et al.,2019), encouraging in which the importance of education for the future personal and professional success of students is highlighted.
- using strategies that address the full range of school characteristics, including (a) school demographics, environment, disciplinary policies and procedures; (b) classroom environment and instruction; (c) the characteristics, philosophies, attitudes and behaviors of the manager; (d) facility staff characteristics, beliefs, attitudes and behaviours; and (e) student characteristics and behaviors (Christle, C. et al, 2007).

## 1. Methodology

This study aims to compare the perceptions of two distinct groups regarding the challenges associated with school dropout management. One group is composed of respondents who express dissatisfaction with school dropout management, while the other group consists of individuals who state that they are very satisfied.

*Hypothesis:* There are significant differences in the challenges faced by these two groups, in that those dissatisfied with the dropout management will report more frequent encounters with all identified challenges than the highly satisfied group of respondents.

*Data Collection:* Data for this research was collected through an in-house developed questionnaire-based survey. The dimension of interest for this article comprised a set of 17 challenges related to dropout management in schools. These challenges were identified through a thorough review of existing literature on dropout issues and management strategies. Challenges included factors such as lack of regular assessment, communication difficulties, funding issues and other challenges commonly discussed in the discourse of school dropout prevention.

*Sample:* Participants in this study were drawn from educational institutions in Romania. The study included respondents who were actively involved in the educational process, such as principals, teachers, or administrators. Respondents who gave neutral answers to the question "Given the combined efforts of all stakeholders to implement the dropout prevention strategy, to what extent do you consider that dropout management in your school is effective?" were excluded from the analysis because the focus was on extreme levels of satisfaction and dissatisfaction. Participants who expressed dissatisfaction with dropout management formed one group (N=96), while those who reported being very satisfied were included in another group (N=260).

*Data analysis:* To test the hypothesis of significant differences in perceived challenges between the two groups, the t-test for independent samples was used, being appropriate to compare the averages between two independent groups. In addition to the t-test, graphical visualization was used to improve the presentation of results. Bar charts

were used to visually represent the average challenge perceptions for the dissatisfied and satisfied groups. These charts provide a clear comparison of the challenges faced by the two groups and provide a more intuitive understanding of the differences in experience.

## Results

First, the equality of the variances of the two groups of interest was tested using the Levene test. Based on the dispersion results, independent samples t-tests were interpreted to determine whether the observed differences in average perceptions were statistically significant or could have occurred by chance. The significance level for both tests was set at 0.05, indicating a 95% confidence level.

The 17 items, representing the challenges encountered, fall under the question "To what extent do you consider that your school faced the following challenges in the management of school dropouts?" and were evaluated on a 6-point Likert scale (from 1 "To a very small extent" to 6 "To a very large extent"). Table 1 below shows the results of the independent samples t-test.

### *Internal stakeholders do not have the necessary expertise to collect, process and analyze data*

According to Levene's test, the null hypothesis cannot be rejected,  $F=0.67$   $p=0.42$ , and the two compared groups have equivalent variances for the statement "Internal stakeholders do not have the necessary expertise to collect, process and analyze data" on the challenge faced. From the table resulting from the t-test we can see that the difference in means for the statement "Internal stakeholders do not have the necessary expertise to collect, process and analyze data" is  $\Delta M=0.4$ , the mean of the group of those dissatisfied with school dropout management being 3.04 ( $SD=1.44$ ), while the mean of participants very satisfied with management is 2.64 ( $SD=1.47$ ). The confidence interval shows that the true difference between the means is most likely between 0.02 and 0.75. The t-test value is  $t(324)=2.25$ ,  $p=0.02$ , where the obtained significance level is lower than the established critical decision level, thus allowing us to state with a high degree of confidence of at least 95% that the difference between the sample means is statistically significant. Those who consider that the school dropout management is not effective in their educational unit reported that they encounter the challenge "Internal stakeholders do not have the necessary expertise to collect, process and analyze the data" much more frequently than those who declare themselves very satisfied with the school dropout management.

**Table 1. The results of the Levene and t test regarding the comparison between the group of respondents**

	Levene's Test for Equality of Variances		t-test for Equality of Means					
	F	Sig.	t	df	Sig.	ΔM	95% Confidence interval	
							Min	Max
Internal stakeholders do not have the necessary expertise to collect, process and analyze data	0.67	0.42	2.25	324	0.025	0.40	0.05	0.75
The necessary framework is not provided to express opinions, perspectives, examples of good practices on the issue of school dropout	3.37	0.07	6.41	324	0	1.02	0.71	1.34
Roles and responsibilities are arbitrarily assigned to those participating in the implementation of the ESL strategy	1.28	0.26	4.98	324	0	0.89	0.54	1.24
Lack of periodic evaluation of intervention strategies to observe their impact	0.26	0.61	7.16	324	0	1.19	0.87	1.52
Valorizing the progress achieved by students at risk of dropping out	6.68	0.01	2.53	206.03	0.012	0.45	0.10	0.81
A clear vision of full inclusion, based on the idea that all students can learn, is not established at the school level	7.95	0.01	7.22	157.23	0	1.30	0.95	1.66
Insufficient time to identify opportunities to provide the necessary support to the student at risk of dropping out	0.38	0.54	6.26	324	0	1.13	0.77	1.48
Communication difficulties between colleagues/management/community	14.30	0.00	8.78	147.16	0	1.57	1.21	1.92
The existence of opinions and misinterpretations between stakeholders, regarding the responsibilities of the school in identifying causes and implementing strategies	7.72	0.01	5.90	152.39	0	1.02	0.68	1.36
There is no uniform degree of involvement and assumption of responsibility by stakeholders	4.58	0.03	7.42	161.54	0	1.30	0.95	1.65
Failure to complete successful strategies, for objective reasons, such as staff turnover in the school	7.07	0.01	7.29	158.72	0	1.27	0.93	1.62
Lack of understanding from stakeholders that each student at risk of dropping out requires a specific intervention	10.57	0.00	6.83	152.71	0	1.22	0.87	1.57
There are opinions that support the fact that the prevention and reduction of school dropout are the sole responsibility of the schools facing this phenomenon	3.13	0.08	5.96	324	0	1.13	0.76	1.51
The examples of good practices from the Romanian educational environment regarding the reduction of school dropouts are not capitalized in a unitary way	0.42	0.52	7.26	324	0	1.30	0.95	1.66
There is no guiding model to guide schools in implementing and developing effective dropout prevention strategies	0.30	0.59	5.95	324	0	1.17	0.79	1.56
No opportunities were identified to carry out new projects in the school on this issue	1.11	0.29	6.60	324	0	1.19	0.84	1.55
Insufficient funds allocated from the school budget to prevent school dropouts	0.02	0.88	5.09	324	0	1.05	0.65	1.46

Source: developed by the author



***The necessary framework is not provided to express opinions, perspectives, examples of good practices on the issue of school dropout***

According to Levene's test, the null hypothesis cannot be rejected,  $F=3.37$   $p=0.07$ , and the two compared groups have equivalent variances for the challenge "The necessary framework is not provided to express opinions, perspectives, examples of good practices on the issue of abandonment school". From the table resulting from the t-test, we can see that the difference in means for the analyzed challenge statement is  $\Delta M=1.02$ , the mean of the group of those dissatisfied with the school dropout management being 3.15 (SD=1.39), while the mean of the participants very satisfied with the management is 2.12 (SD=1.282). The confidence interval shows that the true difference between the means is most likely between 0.71 and 1.34. The t-test value is  $t(324)=6.41$ ,  $p=0.00$ , where the obtained significance level is lower than the established critical decision level, allowing us to state with a high degree of confidence that the difference between the sample means is statistically significant. People who consider that school dropout management is not effective in their educational unit reported that they encounter the challenge "The necessary framework is not provided to express opinions, perspectives, examples of good practices on the issue of school dropout" much more frequently than those who they say they are very satisfied with the school dropout management.

***Roles and responsibilities are arbitrarily assigned to those participating in the implementation of the school drop-out strategy***

According to Levene's test, the null hypothesis cannot be rejected,  $F=1.27$   $p=0.26$ , and the two compared groups have equivalent variances for the challenge "Roles and responsibilities are arbitrarily assigned to those who participate in the implementation of the school dropout strategy". According to the t-test we can see that the difference in means for the statement tested is  $\Delta M=0.89$ , the mean of the group of those dissatisfied with the management of school dropout being 3.34 (SD=1.38), while the mean of the participants very satisfied with the management is 2.46 (SD=1.5). The confidence interval shows that the true difference between the means is most likely between 0.58 and 1.24. The t-test value is  $t(324)=4.98$ ,  $p=0.00$ , where the obtained significance level is lower than the established critical decision level, allowing us to state with a high degree of confidence that the difference between the sample means is statistically significant. More specifically, people who believe that school dropout management is not effective in their educational unit reported that they encounter the challenge "Roles and responsibilities are arbitrarily assigned to those who participate in the implementation of the school dropout strategy" much more frequently than those who are very satisfied with the school dropout management school.

***Lack of periodic evaluation of intervention strategies to observe their impact***

According to Levene's test, the null hypothesis cannot be rejected,  $F=0.26$   $p=0.61$ , and the two compared groups have equivalent variances for the tested challenge. From the table resulting from the t-test, we can see that the difference in means for the statement "Lack of periodic evaluation of intervention strategies to observe their impact" is  $\Delta M=1.19$ , the mean of the group of those dissatisfied with school dropout management being 3.44 (SD=1.37), while

the mean of participants very satisfied with management is 2.24 (SD=1.37). The confidence interval shows that the true difference between the means is most likely between 0.86 and 1.52. People who consider that school dropout management is not effective in their educational unit reported that they encounter the challenge "Lack of periodic evaluation of intervention strategies to observe their impact" much more frequently than those who declare themselves very satisfied with school dropout management. The t-test value is  $t(324)=7.16$ ,  $p=0.00$ , where the obtained significance level is lower than the established critical decision level, allowing us to state with a high degree of confidence that the difference between the sample means is statistically significant.

#### ***Valuing the progress achieved by students at risk of dropping out***

Following the application of the Lavene test to compare the variances of the group of those who declare themselves dissatisfied with the school dropout management and the group of those who are very satisfied with the challenge tested, we are forced to reject the null hypothesis obtaining a value of  $F=6.68$  at a significance level of  $p=0.01$ , more smaller than the threshold set by  $\alpha=0.05$ , thus concluding that the variances of the two distributions are not equal. From the table resulting from the t-test we can see that the difference in means for the statement "Valuing the progress achieved by students at risk of dropping out" is  $\Delta M=0.45$ , the mean of the group of those dissatisfied with the management of dropping out being 3.3 (SD=1.41), on when the mean of participants very satisfied with management is 2.85 (SD=1.64). The confidence interval shows that the true difference between the means is most likely between 0.1 and 0.81. The t-test value is  $t(206.03)=2.53$ ,  $p=0.01$ , where the level of significance obtained is lower than the critical decision level established, thus allowing us to state with a high degree of confidence of at least 95% that the difference between the sample means is statistically significant. Next, we observe that people who consider that school dropout management is not effective reported that they encounter the challenge "Valuing the progress achieved by students at risk of school dropout" much more frequently than those who declare themselves very satisfied with school dropout management.

#### ***A clear vision of full inclusion based on the idea that all students can learn is not established at the school level***

We are forced to reject the null hypothesis following the application of the Lavene test obtaining a value of  $F=7.954$  at a significance level of  $p=0.005$ , lower than the threshold set by  $\alpha=0.05$ , thus concluding that the variances of the two distributions are not equal. From the table resulting from the t test, we can see that the difference in means for the statement "At the school level, a clear vision of full inclusion, based on the idea that all students can learn" is not established, is  $\Delta M=1.3$ , the mean of the group of those dissatisfied with the management school dropout being 3.3 (SD=1.54), while the mean of participants very satisfied with management is 2 (SD=1.33). The confidence interval shows that the true difference between the means is most likely between 0.95 and 1.66. The t-test value is  $t(157,233)=7.22$ ,  $p=0.00$ , where the obtained significance level is lower than the

established critical decision level, thus allowing us to state with a high degree of confidence that the difference between the sample means is statistical significant. People who believe that school dropout management is not effective in their educational institution reported experiencing the tested challenge much more frequently than those who say they are very satisfied with school dropout management.

***Insufficient time to identify opportunities to provide the necessary support to the student at risk of dropping out***

According to Levene's test, the two compared groups have equivalent variances for the statement "Insufficient time to identify opportunities in order to provide the necessary support to the student at risk of dropping out", with a value of  $F=0.38$   $p=0.54$ . Following the t-test we can see that the difference in means for the analyzed challenge is  $\Delta M=1.13$ , the mean of the group of those dissatisfied with the school dropout management being 3.66 ( $SD=1.52$ ) they encounter this challenge much more often than the participants who declare themselves very satisfied with management ( $M=2.53$ ,  $SD=1.47$ ). The confidence interval shows that the true difference between the means is most likely between 0.77 and 1.48. The t-test value is  $t(324)=6.26$ ,  $p=0$ , where the obtained significance level is lower than the established critical decision level, allowing us to state with a high degree of confidence that the difference between the sample means is statistically significant.

***Communication difficulties between colleagues/management/community***

Following the application of the Lavene test, we are forced to reject the null hypothesis obtaining a value of  $F=14.29$  at a significance level of  $p=0.00$ , lower than the threshold set by  $\alpha=0.05$ , thus concluding that the variances of the two distributions are not equal. From the table resulting from the t-test we can see that the difference in means for the challenge "Communication difficulties between colleagues/leadership/community" is  $\Delta M=1.57$ , the mean of the group of those dissatisfied with the school dropout management being 3.48 ( $SD=1.56$ ), while the mean of participants very satisfied with management is 1.91 ( $SD=1.23$ ). The confidence interval shows that the true difference between the means is most likely between 1.21 and 1.92. The t-test value is  $t(147,159)=8,779$ ,  $p=0$ , where the obtained significance level is lower than the established critical decision level, and the difference between the sample means is statistically significant. People who believe that the management of school dropout is not effective in their educational unit reported that they encounter the challenge "Communication difficulties between colleagues/leadership/community" much more frequently than those who say they are very satisfied with the management of school dropout.

***The existence of opinions and misinterpretations among stakeholders, regarding the responsibilities of the school in identifying causes and implementing strategies***

We are forced to reject the null hypothesis for the Levene test obtaining a value of  $F=7.72$  at a significance level of  $p=0.01$ , thus concluding that the variances of the two distributions are not equal between the two groups tested for the statement "The existence of opinions and misinterpretations between stakeholders, regarding the school's responsibilities in identifying causes and implementing strategies". From the table resulting from the t-test we

can see that the difference in means between the groups is  $\Delta M=1.02$ , the mean of those dissatisfied with the school dropout management being 3.07 (SD=1.49), while the mean of the participants very satisfied with the management is 2.06 (SD =1.24). The confidence interval shows that the true difference between the means is most likely between 0.68 and 1.36. People who consider that school dropout management is not effective in their educational unit reported that they encounter the challenge "Existence of opinions and misinterpretations among stakeholders, regarding the responsibilities of the school in identifying causes and implementing strategies" much more frequently than those who declare very satisfied with dropout management. The t-test value is  $t(152.38)=5.89$ ,  $p=0.00$ , where the obtained significance level is lower than the established critical decision level, thus allowing us to state with at least 95% confidence that the observed difference is statistically significant.

***There is no uniform degree of involvement and assumption of responsibility by stakeholders***

Following the Lavene test for comparing group variances, we are forced to reject the null hypothesis obtaining a value of  $F=4.58$  at a significance level of  $p=0.03$ , lower than the threshold set by  $\alpha=0.05$ , thus concluding that the variances of the two distributions are not equal . From the table resulting from the t-test we can see that the difference in means for the statement "There is no uniform degree of involvement and assumption of responsibility on the part of stakeholders" is  $\Delta M=1.3$ , the mean of the group of those dissatisfied with school dropout management being 3.5 (SD =1.49), while the mean of participants very satisfied with management is 2.2 (SD=1.33). The confidence interval shows that the true difference between the means is most likely between 0.95 and 1.65. The t-test value is  $t(161.54)=7.42$ ,  $p=0.00$ , being able to state with a high degree of confidence that the difference between the sample means is statistically significant. We thus confirm that people who consider that school dropout management is not effective in their educational unit report that they encounter the challenge "There is no uniform degree of involvement and assumption of responsibility by stakeholders" much more frequently than those who declare themselves very satisfied with school dropout management.

***Failure to complete successful strategies, for objective reasons, such as staff turnover in the school***

According to the Lavene test for comparing group variances, we are forced to reject the null hypothesis, obtaining a value of  $F=7.069$  at a significance level of  $p=0.008$ , thus concluding that the variances of the two distributions are not equal. The difference in means for the statement "Non-completion of some successful strategies, for objective reasons, such as staff turnover in the school" is  $\Delta M=1.27$ , the mean of the group of those dissatisfied with school dropout management being 3.39 (SD=1.49), while the mean for participants very satisfied with management is 2.11 (SD=1.3), the latter encountering this challenge much less often. The t-test value is  $t(158,717)=7.286$ ,  $p=0$ , where the obtained significance level is less than the established critical decision level, thus allowing us to

state with a high degree of confidence that the difference between the sample means is statistically significant, this being most likely found in the interval [0.93, 1.62].

***Lack of understanding from stakeholders that each student at risk of dropping out requires a specific intervention***

After applying the Lavene test, we conclude that the variances of the two distributions are not equal for the statement "Lack of understanding on the part of stakeholders of the fact that each student at risk of dropping out of school requires a specific intervention", obtaining a value of  $F=10.57$  at a level of significance  $p=0.01$ , lower than the threshold set by  $\alpha=0.05$ . From the table resulting from the t-test we can see that the difference in means is  $\Delta M=1.22$ , the mean of the group of those dissatisfied with the management of school dropout being 3.31 (SD=1.54), while the mean of the participants very satisfied with the management is 2.1 (SD=1.28). The confidence interval shows that the true difference between the means is most likely between 0.86 and 1.57, with people who believe that school dropout management is not effective in their educational unit reporting that they encounter the challenge "Lack of understanding by stakeholders of the fact that every student at risk of dropping out requires a specific intervention" than those who say they are very satisfied with the management of dropping out. The t-test value is  $t(152.71)=6.83$ ,  $p=0.00$ , being able to state with at least 95% confidence that the difference between the sample means is statistically significant.

***There are opinions that support the fact that the prevention and reduction of school dropout are the sole responsibility of the schools facing this phenomenon***

According to Levene's test, the null hypothesis cannot be rejected,  $F=3.13$   $p=0.08$ , and the two compared groups have equivalent variances for the challenge "There are opinions that support the fact that the prevention and reduction of school dropout are the exclusive responsibility of schools that face with this phenomenon". Following the t-test we can see that the difference in means for the challenge tested is  $\Delta M=1.131$ , those dissatisfied with the management of school dropout encountering this problem much more often ( $M=3.53$ ,  $SD=1.66$ ) than those who declare themselves very satisfied of management ( $M=2.4$ ,  $SD=1.52$ ). The t-test value is  $t(324)=5.96$ ,  $p=0.00$ , where the obtained significance level is lower than the established critical decision level, allowing us to state with a high degree of confidence that the difference between the sample means is statistically significant, and the real difference is found in the interval [0.76, 1.51].

***The examples of good practices from the Romanian educational environment regarding the reduction of school dropouts are not capitalized in a unitary way***

For the challenge "Examples of good practices from the Romanian educational environment regarding the reduction of school dropout are not exploited uniformly" the two compared groups have equivalent variances, with a value of Levene's test  $F=0.42$   $p=0.52$ . From the table resulting from the t-test, we can see that the difference in means is  $\Delta M=1.3$ , the mean of the group of those dissatisfied with the school dropout management being 3.65 (SD=1.52), while the mean of the participants very satisfied with the

management is 2.34 (SD=1.46) . The confidence interval shows that the true difference between the means is most likely between 0.95 and 1.655. The value of the t-test is  $t(324)=7.26$ ,  $p=0.00$ , allowing us to state with a high degree of confidence of at least 95% that the difference between the sample means is statistically significant, the group of those dissatisfied with a management meeting more often with this challenge.

***There is no guiding model to guide schools in implementing and developing effective dropout prevention strategies***

According to Levene's test, the null hypothesis cannot be rejected,  $F=0.295$   $p=0.587$ , and the two compared groups have equivalent variances for the statement "There is no guiding model to guide schools in order to implement and develop effective strategies to prevent school dropout". The t-test results show that the difference in means for this challenge is  $\Delta M=1.173$ , and the true difference between the means lies in the interval [0.79, 1.56] with 95% confidence. People who consider that school dropout management is not effective ( $M=3.73$ ,  $SD=1.58$ ) in their educational unit reported that they encounter the challenge much more frequently "There is no guiding model to guide schools in order to implement and develop effective strategies of school dropout prevention" than those who declare themselves very satisfied with school dropout management ( $M=2.56$ ,  $SD=1.64$ ). The t-test value is  $t(324)=5.95$ ,  $p=0.00$ , where the obtained significance level is lower than the established critical decision level, allowing us to state with a high degree of confidence that the difference between the sample means is statistically significant.

***No opportunities were identified to carry out new projects in the school on this issue***

The two compared groups have equivalent variances for the challenge tested. According to Levene's test,  $F=1.11$   $p=0.29$ . From the table resulting from the t-test we can see that the difference in means for the statement "No opportunities were identified to carry out new projects in the school on this issue" is  $\Delta M=1.19$ , the mean of the group of those dissatisfied with school dropout management being 3.52 ( $DS= 1.535$ ), while the mean of participants very satisfied with management is 2.33 ( $SD=1.464$ ). The confidence interval shows that the true difference between the means is most likely between 0.84 and 1.55. The t-test value is  $t(324)=6.59$ ,  $p=0.00$ , thus we can confirm with a very high degree of confidence that the difference between the sample means is statistically significant.

***Insufficient funds allocated from the school budget to prevent school dropout***

After applying the Levene test, we conclude that the null hypothesis cannot be rejected,  $F=0.023$   $p=0.88$ , and the two compared groups have equivalent variances for the challenge "Insufficient funds allocated from the school budget to prevent school dropout". According to the t-test the difference in means for this challenge is  $\Delta M=1.051$ , and the true difference between the means is found in the interval [0.65, 1.46]. The t-test is  $t(324)=5.09$ ,  $p=0.00$ , where the obtained significance level is lower than the established critical decision level, allowing us to state with a high degree of confidence that the difference between the sample means is statistically significant . Respondents who believe that school dropout management.

is not effective in their educational unit ( $M=4.07$ ,  $SD=1.72$ ) reported that they encounter the challenge "Insufficient funds allocated from the school budget to prevent school dropout" much more frequently than those who declare very satisfied with school dropout management ( $M=3.02$ ,  $SD=1.69$ ).

**Figure 1. School Dropout Management: Very Satisfied vs. Unsatisfied Respondents**



Source: developed by the author

The biggest differences were obtained for the challenge "Communication difficulties between colleagues/leadership/community" ( $\Delta M=1.57$ ), followed by "The examples of good practices from the Romanian educational environment regarding the reduction of school dropout are not exploited in a unitary way" ( $\Delta M=1.3$ ) and the challenge "At the school level, a clear vision of full inclusion is not established, based on the idea that all students can learn" ( $\Delta M=1.3$ ). The smallest differences were observed for the statement "Internal stakeholders do not have the necessary expertise for data collection,

processing and analysis" ( $\Delta M=0.4$ ) and "Valuing the progress achieved by students at risk of dropping out" ( $\Delta M=0.45$ ).

## Conclusion

We confirmed our hypothesis by indeed observing more challenges faced by the group of stakeholders dissatisfied with the management of school dropout. The results were obtained by thorough analysis and we are confident in their significance, though this study is not without limitations. The sample size was satisfactory, but rather modest when it comes to the representation of internal stakeholders in the matter of school dropout management. Another limitation also comes from the population included: school dropout stakeholders only from Romania. Considering this, we cannot generalize our findings beyond the studied country, though we believe that this article is a good starting point for any researcher interested in challenges faced by stakeholders in managing school dropout.

School managers, regardless of the time, in relation to the direct and indirect beneficiaries of education, with the staff of the unit should reveal themselves, first of all, as people, authentic, with emotions, feelings, vulnerabilities, and then, as professionals, who lead and coordinates the efforts of organization members, formulates strategic and operational objectives to combat school dropout.

Through an effective school dropout management, knowledge can be transmitted, analyzed, decided, evaluated, developed and optimized, providing feedback, thus supporting the autonomy and initiative capacity of the staff, through motivation and involvement corresponding to them leading directly to the prevention, reduction/combating of school dropout.

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## MANAGEMENT OF EUROPEAN FUNDS. CASE STUDY: NEAMŢ AND CONSTANŢA COUNTIES, ROMANIA

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**Abstract:** *The present research aims to investigate and evaluate the effectiveness and efficiency of the management of European funds in two distinct counties of Romania: Neamţ County and Constanţa County. European funds represent a significant resource for the economic, social and infrastructural development of the country, and the way in which they are administered and used has a significant impact on regional progress. Our comparative analysis focuses on identifying the significant differences between the two counties regarding the attraction, management and use of European money. The obtained results reveal significant differences in the approach and performance of European funds management between the two counties, highlighting the key factors that influence this process. Our research not only contributes to the understanding of how European funds are managed at the regional level in Romania, but also provides practical recommendations for improving the management of these resources in both counties. The positive impact of European funds on agricultural businesses in the two counties is obvious, contributing to the improvement and modernization of the agricultural sector.*

**Keywords:** *European funds, programs, projects, agriculture, economic development.*

**UDC:** [339.96:005.56]:338.43(498)

**JEL Code:** O00, O10, O13, Q14.

### Introduction

European funds have been and continue to represent a significant source of financing for the member states of the European Union, with the main objective of stimulating economic, social and regional development. The main goal of the European Union is to achieve the convergence of economic performance and economic and social cohesion between member states, according to the provisions included in the second article of the Treaty establishing the European Community (Monfort, 2008). For Romania, these funds have become an essential factor in modernization efforts and convergence with European standards, offering significant opportunities for infrastructure projects, economic development and improving the quality of life. The process of joining the European Union led to significant changes regarding the way of financing the agricultural sector. From periods characterized by instability in agricultural policy and fluctuations in funding

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sources, influenced by electoral cycles (Alexandri & Luca, 2008), we evolved towards the need to implement concrete measures to facilitate integration in 2007 (Giurcă, 2005) and to increasing support to farmers (Hubbard et al., 2014). The concept of developing regional strategies was formulated by Jasińska -Biliszak and Malik (2020). They argue that the evaluation of the effectiveness of regional development management is justified by the application of a set of specific measures, which must be adapted according to the goals of the mission and implemented with maximum efficiency. However, the way these European funds are attracted, managed and used can vary significantly between different regions of the country. This aspect is all the more important as Romania faces complex challenges related to uneven regional development, economic development and public administration. While analyzing the effectiveness of regional development management in Poland and Romania, Ionescu (2018) emphasized a specific aspect, namely that the factor that drives development is the tangible financial support offered by the European Union through operational programs and the EU Strategy. In this context, the analysis and comparative evaluation of the management of European funds at the regional level becomes very important to understand how these resources can be used more effectively for the benefit of local and national communities.

The purpose of this research is to analyze and compare the way European funds are managed in two distinct counties of Romania: Neamț County and Constanța County. This choice of counties is not random, but is due to significant differences in natural resources, economic structure, population size and development needs. The main economic similarity between the counties of Neamț and Constanța is the fact that both counties have a significant potential in terms of the tourism sector. Although there are differences in the types of tourism and the attractions they offer, both counties are known for their tourism resources. Through the comparative analysis of these two counties, we aim to identify successful practices, common challenges and key factors that influence the management of European funds at the regional level.

This research is based on a multidisciplinary approach, combining the analysis of official documents, interviews, statistical analysis and data interpretation to provide a complete picture of the situation. The results of this research should provide significant insights both for local and regional authorities in the two counties, as well as for decision-makers at the national level, with the aim of improving the management and use of European funds throughout Romania.

The differences and similarities between farmers in Romania and those in other European countries in terms of economic aspects and access to European funds reveal a complex picture of the agricultural reality in Eastern and Western Europe. First of all, the agricultural structure in Romania is defined by a significant proportion of small farmers, who carry out activities in subsistence farming and family farming. This structure differs significantly from that of other European countries, where commercial agriculture predominates and where there is

greater diversity in terms of farm size. In many European countries, large farms are more common and private ownership of agricultural land is widespread.

**Table 1. Comparison of Romania and other European countries**

Aspect	Romania	The other European countries
<b>Agricultural structure</b>	- A significant proportion of small farmers.	- They have a more diversified agricultural structure, with a mix of small and large farmers.
	- Subsistence and family farming are still common.	- Commercial agriculture is predominant.
	- Large areas of agricultural land are often leased or co-farmed.	- Large farms are more common and private ownership of agricultural land is widespread.
<b>Access to EU funds</b>	- They had difficulties in fully accessing European funds due to bureaucracy and lack of experience in project management.	- Many European countries have longer experience in accessing and managing European funds.
	- It faces some difficulties in meeting the complex requirements of EU-funded projects.	- They have easier access to technical assistance and consultancy in this regard.
	- Improvements in access to European funds have been observed in recent years.	- Access to European funds is more consolidated and easier to obtain.
<b>Economic performance</b>	- Profitability in Romanian agriculture is sometimes low due to limited investments and low productivity.	- They often have higher productivity and increased profitability.
	- Modernization of agricultural infrastructure and technology is ongoing, but with slower progress.	- Modernization and agricultural technology are more advanced.

*Source: developed by the authors*

Another significant aspect is access to European funds, meaning that Romania had difficulties in fully accessing these funds, mainly due to bureaucracy and lack of experience in managing projects financed by the European Union. These difficulties are not encountered to the same extent in the other European countries, which have a longer experience in accessing and managing European funds. Romanian farmers face challenges in meeting the complex requirements of EU-funded projects, while farmers in other European countries often benefit from more accessible technical assistance and advice. The economic performance in Romanian agriculture is negatively influenced by limited investment and low productivity. In contrast, farmers in other European countries enjoy higher productivity and increased profitability due to faster adoption of advanced agricultural technologies. The modernization of agricultural infrastructure and agricultural technology remains an important focus point for improving the economic performance of Romanian farmers.

Analyzing the data in table 2, we can draw some conclusions:

- Constanța County has a significantly larger population than Neamț County, with approximately 753,331 inhabitants compared to 452,038. However, Neamț County has a smaller territorial area than Constanța County (5,897 km<sup>2</sup> compared to 7,104 km<sup>2</sup>). This suggests that Constanța has a higher population density, with implications for the development of infrastructure and public services.
- Neamț County seems to be more oriented towards the chemical industry, construction materials and metal processing, while Constanța County has a more

significant presence in the construction materials, textile and chemical industry. This difference in industrial structure reflects distinct economic specializations and opportunities for economic development in each county.

- Regarding agriculture, Neamț County has a larger agricultural area than Constanța County, 121,588 hectares compared to 46,675 hectares. However, the types of crops differentiate in the two counties.

**Table 2. Comparison between Neamț and Constanța counties, year 2022**

Aspect	Neamț County	Constanța County
Population, number of people	452038	753331
Area, km <sup>2</sup>	5897	7104
Residence	Piatra Neamț	Constanta
Number of cities	5	9
Tourism	Mountain developed / religious	Marine developed
Industry	Chemicals/ Building materials/ Metalworking	Building materials/ Textiles/ Chemicals
Agriculture	121588 ha agricultural area Maize/cereal grains/sugar beet	46675 ha of agricultural area Wheat/maize/potatoes

*Source: developed by the authors based on the data of INS Neamț and INS Constanța, 2023*

As we delve into the multifaceted landscape of European funds and their impact on Romania, it's imperative to focus on the present and future dynamics, building upon the foundations laid in the past. The allure of European funding opportunities persists, with the present moment offering a renewed sense of hope and potential. In the contemporary context, Romania finds itself poised to harness the full potential of European funds. The European Union, recognizing the nation's commitment to convergence and growth, has earmarked substantial resources to empower Romania's progress. These funds, aligned with ambitious development objectives, aim to fuel economic growth, nurture innovation, and enhance the well-being of Romania's citizens. With the benefit of hindsight, we have learned valuable lessons from past challenges and successes in managing European funds. Romania's increasing expertise in navigating bureaucratic complexities and mastering the intricacies of EU-funded projects positions it favorably for the future. The evolution from unstable policy periods to a commitment to concrete measures speaks to Romania's determination to optimize European funds.

As we peer into the future, we anticipate a transformative landscape. European funds will continue to play a pivotal role in shaping Romania's economic and social fabric. Initiatives designed to foster regional development, bolster agriculture, and enhance public administration will pave the way for a more cohesive and prosperous Romania. The comparative analysis of Neamț County and Constanța County is not just a reflection of their present status but a glimpse into the potential they hold for the future. By identifying

successful practices and understanding common challenges, we equip ourselves with the knowledge to maximize the impact of European funds.

This research, driven by a multidisciplinary approach, will offer fresh insights into the current utilization of European funds while shedding light on the future prospects. The results will serve as a compass, guiding local and regional authorities in the two counties, as well as decision-makers at the national level, towards an enhanced management and utilization of European funds. With these insights, Romania is poised to navigate the evolving European funding landscape and embark on a path of sustained growth, regional development, and an improved quality of life for its citizens.

## 1. Data and Methodology

This study employed a comprehensive research methodology that encompassed various data collection and analysis techniques. The methodology involved the following key methods:

1. **Analysis of Official Documents:** Extensive analysis of a diverse range of official documents was conducted. This included government reports, public policy documents, and regional development strategies related to the management of European funds. These documents provided essential insights into the overarching framework and objectives of European fund management in Romania.
2. **Review of Specific Literature:** A thorough review of existing literature related to European funds and regional development in Romania was undertaken. This step involved examining scholarly articles, research publications, and relevant academic sources to build a strong theoretical foundation for the research.
3. **Interviews with Beneficiaries:** In-depth interviews were conducted with beneficiaries of European funds in Neamț and Constanța counties. These interviews provided a valuable qualitative perspective, offering firsthand accounts of experiences, challenges, and successes in managing and utilizing European funds.
4. **Statistical Analysis:** Quantitative data analysis was performed, focusing on a wide array of statistical data relevant to Neamț and Constanța counties. Economic, social, and development indicators were scrutinized to gain insights into the impact of European funds on these regions.
5. **SWOT Analysis:** A SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis was carried out to assess the management of European funds in both counties. This analytical framework allowed for a systematic evaluation of internal and external factors that influence the effectiveness of fund management.

This multifaceted approach to data collection and analysis enabled us to construct a comprehensive and well-rounded assessment of European fund management in Neamț and

Constanța counties. It ensured a holistic understanding of the challenges, opportunities, and key factors that shape the utilization of European funds at the regional level.

## 2. The Model and Findings

Neamț County is in a unique position and has the potential to diversify its economy and become more resilient in the face of challenges. The county's main strengths include rich natural resources and the development of the IT industry, which can serve as an engine for growth and innovation. However, limited access to maritime resources and underdeveloped infrastructure are weaknesses that need to be addressed. The opportunities for Neamț County include access to European funds for development and the potential to diversify the economy, and by using these funds effectively and promoting an environment conducive to business development, the county can increase its competitiveness and create jobs. But climate change and regional competition remain significant threats.

**Table 3: SWOT analysis for Neamț County.**

	Strengths	Weaknesses	Opportunities	Threats
Economy	Rich natural resources, IT industry development	Limited access to maritime resources, underdeveloped infrastructure	European funds for development, economic diversification	Climate change, regional competition
Tourism	Tourist potential, rural traditions		Diversification and promotion of rural tourism	Climate change
Agriculture	Agricultural potential, fertile soils		The use of European funds for agriculture	Climate change
Industry	Development of the IT industry		Investment in industry, infrastructure development	Regional competition

Source: developed by the authors

**Table 4: SWOT analysis for Constanța County**

	Strengths	Weaknesses	Opportunities	Threats
Economy	Access to the Black Sea, developed tourism sector, economic diversity	Dependence on naval industry, underdeveloped infrastructure	European funds for development, economic diversification	Environmental pollution and degradation, regional competition
Tourism	Black Sea tourist resorts		Modernizing the tourist infrastructure, attracting tourists	Ecological concerns, climate change
Agriculture	Agricultural potential		The use of European funds for agriculture	Climate change
Industry	Economic diversity		Diversification and innovation in other sectors	Regional competition, environmental pollution

Source: developed by the authors

Constanța County is in a distinct position, benefiting from valuable access to the Black Sea and having a developed tourism sector, alongside a significant economic diversity. However, the county faces challenges such as dependence on the shipping industry and underdeveloped infrastructure. The main opportunities for Constanța County include access to European funds for development and the potential to diversify the economy. Modernizing tourism infrastructure and attracting tourists can further boost the tourism sector. However, there are significant threats such as pollution and environmental degradation as well as regional competition.

In the period 2007-2022, both counties had access to the following European funds:

- European Regional Development Fund (ERDF): This fund aims to promote economic and social development in European regions.
- European Social Fund (ESF): The ESF supports projects that focus on developing human resources, improving employment, and can finance training, education, social inclusion, and the creation of job-related infrastructure or programs.
- Regional Operational Program (ROP): This program aims at regional development in Romania and can finance projects such as the modernization of infrastructure.
- Program for National Rural Development (PNDR): This focuses on rural development and can finance projects related to agriculture, rural development and rural infrastructure.
- Operational Program for Fisheries and Maritime Affairs (OPFMA): Helps the sector and can finance projects related to the development of fisheries and aquaculture.
- Operational Competitiveness Program (OCP): It focuses on helping the research and development projects.
- Technical Assistance Operational Program (TAOP): Provides technical assistance for the implementation of other operational programs and can be used to improve administrative and project management capacity (MFE, 2023).

According to the official data, published by the Ministry of European Funds, at national level, until 21.09.2023, a number of 18327 projects were contracted, with budgets totaling EUR 57.13 billion and total eligible expenses of 53.36 billion euro. The European Commission's co-financing is 43.57 billion euros, with a national contribution of 4.36 billion euros (MFE, 2019).

**Table 5. Approved projects and budget Neamț County and Constanța County 21.09.2023, million euros**

County	Approved projects	Total budget
Neamț	322	333.33
Constanța	576	1809.73

*Source: developed by the authors based on Ministry of European Funds data, 2023*



According to the data in table 5, regarding the approved projects and the budget allocated in September 2023, Constanța County stands out with the larger number of projects and the significantly higher total budget compared to Neamț County. This discrepancy in financial resources and ongoing projects reflects the higher level of economic development and the specific needs of Constanța County, especially in terms of infrastructure and regional development.

**Table 6. Unemployment rate 2022, %**

County	Unemployment rate
Neamț	4
Constanța	2,3

*Source: developed by the authors based on the data of National Institute of Statistics (INS) Neamț and Constanța, 2023*

The low unemployment rate in Constanța County compared to Neamț County in 2022, according to table 6, is a sign of a more active labor market in the coastal area. This may be influenced by the presence of a strong tourism sector in Constanța, which provides seasonal and permanent employment opportunities for residents. On the other hand, Neamț County, with a slightly higher unemployment rate, would need more efforts to stimulate economic development and job creation. This difference underlines the importance of economic policy and investment in education, entrepreneurship and regional development to reduce unemployment and improve the quality of life in this area. Overall, the analysis of the unemployment rate shows us the significant differences in the economic dynamics and specific needs of these two counties, underlining the importance of adapting public policy to the local context to support employment and economic development.

**Table 7. Production of the agricultural branch, Neamț County**

	2013	2014	2015	2016	2017	2018	2019	2020
Total	1779220	1651806	1512963	1536473	1749524	1776672	1836063	1733165
Vegetable	1167254	1044550	872285	916090	1072773	1155354	1204722	1019091
Animals	597347	589107	621834	603141	651158	600216	612098	691251
Agricultural services	14619	18149	18844	17242	25593	21102	19243	22823

*Source: developed by the authors based on National Institute of Statistics (INS) Neamț data, 2023*

Table 7, which presents the evolution of production in the agricultural branch in Neamț County during 2013-2020, reflects an interesting dynamic and relevance for the local economy. We note several important aspects about this data:

- From 2013 to 2015, the total agricultural production in Neamț County decreased significantly. This phenomenon can be influenced by factors such as weather conditions, changes in agricultural practices and market changes. However, after 2015, we observe a progressive increase, suggesting an adaptation and recovery of the local agricultural sector.

- Plant production recorded a significant decline in the early years of the mentioned period, followed by a moderate increase in the later years. In contrast, livestock production had a more stable evolution, with relatively small fluctuations and even a significant increase in 2020. These differences may indicate changes in production preferences or farming strategies.
- There is a fluctuation in the production of agricultural services, with a general upward trend in recent years and this means an increase in demand for agricultural services or a diversification of agricultural activities.

**Table 8. Production of the agricultural branch, Constanța County**

	2013	2014	2016	2017	2018	2019	2020
Total	2162615	2120267	2050416	2781574	2929186	2716680	1820317
Vegetable	1616659	1598532	1529311	2241730	2377863	2147147	1170631
Animals	515125	498708	505174	527888	538082	555467	607142
Agricultural services	30831	23027	15931	11956	13241	14066	42544

*Source: developed by the authors based on the INS Constanța data, 2023*

Table 8, which presents the evolution of production in the agricultural branch of Constanța County in the period 2013-2020, provides a complex picture of the dynamics of the local agricultural economy. Several remarkable aspects can be observed about these data:

- The total agricultural production in Constanța County registered significant fluctuations from one year to the next and these variations can be influenced by factors such as weather conditions, changes in market demand and local farming practices.
- We observed that plant production dominates in Constanța County, with much higher figures compared to animal production and this can be explained by the favorable climate for vegetation and the agricultural potential of the area for various crops.
- The production of agricultural services also experienced significant fluctuations, but with a general upward trend and this increase reflects an increased demand for agricultural services or a development of this sector in the county.
- A significant decrease in total agricultural production in 2020 compared to previous years is notable and this decline can be attributed to factors such as the COVID-19 pandemic, which has impacted food production and distribution around the world.

It is important for local authorities and farmers in the area to monitor these trends and develop strategies to support and promote the sustainable development of the agricultural sector in the future, despite the challenges and fluctuations highlighted.

Next, we designed a questionnaire with 10 questions related to European funds and economic development and conducted interviews with 100 farmers from Neamț County and 100 farmers from Constanța County. The questions can be found in table 9 and the centralized answers can be found in table 10.

**Table 9. Questionnaire addressed to farmers from Neamț and Constanța counties**

No.	Question	YES	NOT
1	Have you accessed European funds for the development or modernization of agricultural activities?		
2	If you have accessed European funds, have you been able to obtain funding to an extent that meets your needs?		
3	Have European funds contributed to the improvement or expansion of your agricultural business?		
4	Have you invested in modern technologies or equipment thanks to European funds?		
5	Have European funds had a positive impact on the yield and quality of your products?		
6	Have you created new jobs in the agricultural sector thanks to European funds?		
7	Have European funds contributed to increasing the competitiveness of your agricultural business on the domestic and international market?		
8	Have you encountered significant difficulties in accessing European funds?		
9	Do you think that the administrative procedures for obtaining European funds are too complicated?		
10	Have you received support or advice from the authorities or other organizations to help you access European funds?		

Source: developed by the authors

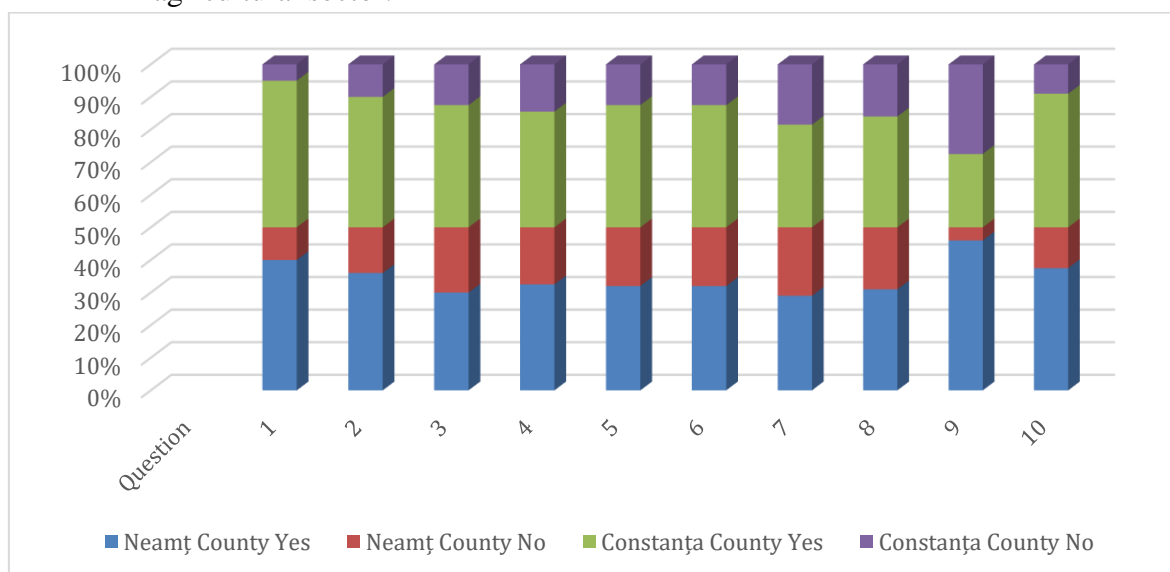
**Table 10. The results obtained after conducting the interviews**

Question	Neamț County (YES)	Neamț County (NO)	Constanta County (YES)	Constanta County (NO)
1	80	20	90	10
2	72	28	80	20
3	60	40	75	25
4	65	35	71	29
5	64	36	75	25
6	64	36	75	25
7	58	42	63	37
8	62	38	68	32
9	92	8	45	55
10	75	25	82	18

Source: developed by the authors

After analyzing tables 9 and 10, we found the following:

- Farmers from Neamț County benefit from a higher level of access to European funds compared to those from Constanța County. This fact is based on the obvious differences in the proportions of "YES" and "NO" answers in the two counties, found in most of the questions in table 9.
- It can be noted that the majority of farmers in both counties sought to access European funds to develop or modernize agricultural activities, which suggests a pronounced interest and increased willingness on their part to benefit from European financial support in order to improve their agricultural businesses.
- It can also be observed that Constanța County registers a higher percentage of farmers who obtained satisfactory financing, which indicates a better efficiency in the management and distribution of European funds in this region or, possibly, an increased need for financing in the county Constanta.
- The positive impact of European funds on agricultural businesses in the two counties is obvious, contributing to the improvement and modernization of the agricultural sector.



**Figure 1. Graphic representation of centralized responses in table 10**

Source: developed by the authors

- It is noted that more jobs were created in Neamț County thanks to European funds compared to Constanța County, reflecting the need for economic development and employment growth in Neamț County, while Constanța County may have other economic priorities.
- The fact that farmers encounter significant difficulties in accessing European funds is more common among those who have not benefited from these funds, indicating the need to simplify and facilitate the process of accessing them in order to

stimulate farmers' participation. It is worth mentioning that the perception regarding the complexity of the administrative procedures for obtaining European funds varies significantly between Neamț and Constanța counties.

- The support and advice provided by the authorities or organizations had a positive impact on accessing European funds in both counties, thus highlighting the importance of the support and resources available to farmers in their process of accessing European funding.

In terms of impact, European funds had a positive effect on farmers in both counties. These funds have contributed significantly to the improvement of agricultural business performance, job creation and the overall development of the agricultural sector. This suggests that funding programs are effective in both regions. Related to economic diversification, Constanța County seems to have a more varied economy, with an emphasis on tourism and plant production, while Neamț County stands out for the development of the IT industry and the agricultural sector. Economic diversification is an important element in maintaining long-term stability. There are also considerable opportunities for both counties to capitalize on European funds in support of the development of distinctive economic sectors. Neamț County can focus more on the development of the IT industry, while Constanta County can promote tourism and vegetable production.

Regarding the recommendations, it is essential to establish monitoring and evaluation systems to ensure the efficiency of the use of European funds. Simplifying administrative procedures and providing clear guidelines can boost farmer participation. Also, promoting cooperation, investing in human resource development, promoting tourism and supporting innovation are important directions for strengthening regional development. In addition, projects financed from European funds must take into account sustainability and the impact on the environment, in the light of climate change.

## Conclusions

The management of European funds in Neamț and Constanța counties, reveals distinct regional dynamics and opportunities for development. European funds have played an important role in enhancing economic growth, agricultural modernization, and job creation in both counties. Neamț County, with its diverse economic potential, benefits from a higher level of access to European funds. However, Constanța County, with its larger population and tourism sector, demonstrates a significant need for funding and opportunities for economic diversification. Both counties have experienced positive impacts on their agricultural sectors, although they face challenges in accessing these funds.

As Romania looks toward the future, it is poised to harness the full potential of European funds to foster regional development, innovation, and an improved quality of life. Recommendations include establishing robust monitoring systems, simplifying administrative procedures, and promoting cooperation and innovation. Moreover, focusing

on sustainability and climate resilience is essential for long-term economic growth. This research provides valuable insights for local and national authorities, guiding them in improving the management and utilization of European funds and by understanding and addressing the specific needs of each region, Romania can navigate the evolving European funding landscape and pave the way for sustained growth and regional development.

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## DIGITAL TRANSFORMATION IN EDUCATION: A COMPARATIVE ANALYSIS OF MOLDOVA AND ESTONIA AND RECOMMENDATIONS FOR SUSTAINABLE FINANCING

Adrian ANDRONIC\*<sup>1</sup>

**Abstract:** *This paper explores the digital transformation of education in Moldova, with a comparative analysis of Estonia's successful experience in this area. First, the article provides an overview of the current status of digital transformation in education in Moldova and identifies critical challenges in financing this process. Next, the Education Strategy 2030 in Moldova, which aims to improve the functionality of the educational system through the effective implementation of digital technologies to ensure the quality and sustainability of education, is discussed. The success factors of digital transformation in education in Estonia, including government support, high levels of digital literacy, a strong IT sector, and a culture of innovation and experimentation, are identified. Finally, the paper provides recommendations for financing digital transformation in education in Moldova, including allocating a specific portion of the state budget, seeking funding from international organizations and donors, and exploring opportunities for educational institutions to generate income. The implications for policy and practice and suggestions for future research are also discussed.*

**Keywords:** *digital transformation, education, Estonia, Moldova, financing.*

**UDC:** 336.144:[378.4:004.78]( 474.2+478)

**JEL Code:** I21, I28, O33, O38

### Introduction

Education is the cornerstone of progress and development in any nation. Recognizing this, the Government of the Republic of Moldova took a significant step by adopting the Strategy of Education 2030 on March 7, 2023 (Ministry of Education and Research, 2023). This comprehensive strategy signifies Moldova's commitment to enhancing the quality and relevance of its education system. It seeks not only to align Moldovan education with European Union standards but also to champion lifelong learning, social inclusion, and gender equality. The Strategy of Education 2030 encompasses the ambitious goals of developing a modern education system, elevating teaching quality, fostering digital literacy, and creating an inclusive learning environment.

Yet, a crucial question looms: How can these ambitious educational objectives be effectively realized in the digital age? Digital transformation emerges as a pivotal enabler, offering access to a spectrum of new technologies, tools, and resources capable of revolutionizing the teaching and learning processes (Petrusevich, 2020; Ronzhina et al., 2021). In Moldova, the financing of digital transformation in education assumes a pivotal role. It is the linchpin that ensures students have equitable access to modern technology and

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digital resources, thereby equipping them with the essential skills to thrive in the digital era. Furthermore, investments in digital transformation have the potential to enhance education's quality and efficiency, making it more accessible and inclusive for all learners.

This paper embarks on a compelling exploration of the critical nexus between education, digital transformation, and financing within the Republic of Moldova. We commence our journey by providing an overview of the Strategy of Education 2030, unveiling its core components and objectives. This strategic roadmap serves as the backdrop against which we evaluate the imperative of financing digital transformation.

Subsequently, we delve into an examination of the multifaceted benefits conferred by digital transformation in education. Beyond the mere integration of technology, we uncover how it can revolutionize pedagogical practices, empower learners, and pave the way for more equitable educational opportunities. In parallel, we navigate through the complex terrain of challenges and opportunities that materialize in the wake of digital transformation.

As our voyage progresses, we aim to provide policymakers and stakeholders with actionable recommendations. These insights encompass not only the necessity of financial commitments but also strategies for nurturing and sustaining the digital evolution in Moldovan education.

The core premise of this study lies in recognizing that the journey toward educational excellence is interwoven with digital innovation, and its success hinges upon prudent financial stewardship. We aspire to illuminate the path forward for Moldova, ensuring that every student has the opportunity to thrive in an education system that embraces the boundless possibilities of the digital era.

With this introduction set as the compass, our subsequent chapters will navigate through the intricacies of Moldova's educational landscape and embark on a comparative analysis with Estonia to glean valuable insights and lessons that can guide Moldova's transformative journey.

## 1. Methodology

This study employs a Comparative Literature Review Research Design to investigate the financing and implementation of digital transformation in education in the Republic of Moldova and the Republic of Estonia. The aim is to critically analyze and synthesize existing academic literature, policy documents, and reports to gain insights into the strategies, challenges, and successes related to financing and implementing digital transformation in education within these two countries.

Moldova and Estonia were chosen as case countries for this comparative analysis. The rationale behind this selection lies in the structural similarities they share as Eastern European nations, combined with their divergent experiences in digitalizing their education systems. Moldova is at an early stage of digital transformation, while Estonia is globally recognized for its advanced digitalized education system. This choice allows for a systematic exploration of different approaches to digital transformation within similar contexts.

Extensive analysis of policy documents, educational reports, and official publications from the Ministries of Education in Moldova and Estonia was conducted. This analysis provided crucial contextual information and policy insights.

A comprehensive review of academic literature and research papers related to digital transformation in education, public policy, and comparative education was undertaken. This secondary data aided in developing a theoretical framework and contextualizing the findings.

Statistical data on education indicators, ICT infrastructure, and educational expenditures were collected from reputable sources such as UNESCO, Eurostat, and national statistical agencies. These data sets enabled the quantification of certain aspects of digital transformation.

The qualitative data gathered from policy documents and the quantitative data, including education statistics, were analyzed using a thematic analysis approach. Themes related to financing mechanisms, policy implementation, digital infrastructure, and challenges were identified and compared between Moldova and Estonia. Descriptive statistics were used to provide a quantitative context for the findings.

The research adhered to ethical guidelines, ensuring the proper citation of sources and the use of publicly available data.

This study acknowledges several limitations, including potential biases in policy documents, limited generalizability of findings beyond Moldova and Estonia, and the reliance on secondary data sources, which may not always capture the nuances of policy implementation.

## 2. Literature Review

Digital transformation in education encompasses the integration of technology into teaching and learning processes (Morozov & Kozlov, 2019). Within the context of Central and Eastern Europe (CEE) and transition countries, digital transformation holds particular significance due to the region's historical and structural characteristics. This process involves the strategic utilization of digital tools, platforms, and resources to enrich the learning experience and enhance educational outcomes (Shutikova & Beshenkov, 2020). These digital tools encompass a wide spectrum, including online learning platforms, educational software, digital textbooks, and mobile devices.

The imperative of digital transformation in education has grown significantly in recent years, particularly in the aftermath of the COVID-19 pandemic. The pandemic underscored the urgency of digital readiness in educational systems, enabling schools and universities to sustain teaching and learning activities through remote modalities (Balkan Green Energy News, 2021).

Digital transformation in education offers multifaceted advantages within CEE and transition countries (Zaripova, 2021). Firstly, it can expand access to education, a particularly relevant consideration for students residing in remote or underserved regions

where traditional education infrastructure is limited. Secondly, it holds the potential to elevate the quality of education by facilitating personalized and interactive learning experiences, thereby enhancing student engagement and comprehension. Thirdly, it empowers educators by equipping them with tools and resources to augment the efficacy of their teaching methods. Fourthly, digital transformation fosters digital literacy among students, a critical skill set for their future in the digital age. Finally, it can contribute to cost reduction by replacing conventional textbooks and classroom materials with digital resources, which can be particularly pertinent in resource-constrained environments.

Financing digital transformation in education presents a formidable challenge, especially in the context of developing countries in CEE and transition regions (Dung & Tri, 2021; Kopp et al., 2019). To address this challenge, various financing strategies have been proposed and implemented. These strategies encompass public-private partnerships, funding through grants from international organizations, and innovative financing mechanisms like impact bonds. Additionally, governments can allocate resources from their education budgets to support digital transformation initiatives.

Several countries have successfully executed digital transformation initiatives in their educational systems, offering valuable insights for CEE and transition countries (Department for Education, 2019; Department of Education, 2021). For instance, Estonia, a CEE nation, stands out with one of the world's most advanced e-education systems, featuring a fully digitalized curriculum and comprehensive online learning platforms (e-Estonia, 2022). Singapore, although not in the CEE region, provides a noteworthy example with substantial investments in technology and the establishment of a national digital literacy program for all students (Tan et al., 2017; Watermeyer et al., 2022). Rwanda demonstrates another approach, where the government has collaborated with private sector entities to distribute cost-effective tablets to primary school students (Tomaszewski et al., 2015). These international case studies offer crucial insights into the successful implementation of digital transformation initiatives in education, shedding light on strategies that can be adapted to the unique context of CEE and transition countries.

While acknowledging the significance of digital transformation in education, this literature review delves into the specific context of CEE and transition countries, emphasizing both the benefits and financing challenges. Moreover, the review draws upon international case studies to offer a practical perspective on implementing digital transformation in education within these unique contexts.

### ***Analysis of the Education 2030 Development Strategy in Moldova***

Primary The Education 2030 Development Strategy in Moldova aims to improve the functionality of the educational system through the effective implementation of digital technologies to ensure the quality and sustainability of education (Ministry of Education and Research, 2022). However, the strategy needs help in promoting new media, open resources, and technologies in education, including the ineffective application of ICT in education and its modest provision with modern educational software. This is caused by

the lack of prioritization of computerization/digitization of education in policy documents, insufficiency of mechanisms for implementing computerization standards of education, lack of mechanisms for evaluating and certifying digital skills of employees in the education system, focusing initial and ongoing training efforts of education sector employees on "digital literacy" and less on "digital pedagogy," lack of a systemic vision of the equipment and software products used in educational institutions of all levels.

The implementation program consists of priority action directions, including creating new contexts and favorable environments through the interconnection of didactic and information technologies, providing educational institutions with equipment and program products, and professional training of teaching staff from the perspective of effective use of digital tools (Ministry of Education and Research, 2022). Additionally, the strategy seeks to harness the potential of digital technologies/tools to enhance the quality of teaching, learning, and assessment and develop and implement digital monitoring and evaluation tools to make the educational system more efficient. The digitization of the learning recognition system in different contexts is also promoted to promote educational progress, career management, distance learning, lifelong learning, and academic mobility.

The strategy outlines a budget plan to equip at least 80% of academic units with equipment, software, and other information and communication technologies according to national equipment standards for each level of education and type of unit. The planned budget for this objective is 516,540.4 thousand MDL for 2023, 516,031.5 thousand MDL for 2024, and 516,031.5 thousand MDL for 2025, with a total implementation cost of 1,521,603.4 thousand MDL (Ministry of Education and Research, 2022).

Another specific objective is to ensure the initial and continuous training of 100% of employees in the education sector regarding the development of digital skills and the implementation of education computerization standards. The planned budget for this objective is 124,362.0 thousand MDL for 2023, 9,445.7 thousand MDL for 2024, and 0.0 thousand MDL for 2025, with a total implementation cost of 35,414.9 thousand MDL (Ministry of Education and Research, 2022).

Digital transformation in education in Moldova presents opportunities to improve the educational system's performance based on digital technologies. However, there are challenges regarding the slow progress of promoting new media, open resources, and technologies in education and the inefficient application of ICT in education. These challenges can lead to obstacles in implementing modern pedagogies based on constructivist learning, inefficient use of material and financial resources intended for the computerization of the education sector, and impediments in expanding education throughout life, especially in the development of distance education. Additionally, children may be exposed to existing risks in the online environment, including cyberbullying and the proliferation of irresponsible behaviors in this environment.

The Education 2030 Development Strategy in Moldova presents a comprehensive approach to integrating digital technologies into the education system (Ministry of Education and Research, 2022). The strategy aims to improve the functionality of the

educational system by implementing effective digital technologies that will ensure the quality and sustainability of education.

The strategy recognizes that the slow progress of promoting new media, open resources, and technologies in education is a significant challenge in Moldova. The lack of prioritization of computerization and digitization of education in policy documents, the insufficiency of the mechanisms for implementing the computerization standards of education, and the lack of mechanisms for evaluating and certifying employees' digital skills in the education system are some of the causes of this slow progress.

The strategy also identifies several consequences of these challenges, such as obstacles in the implementation of modern pedagogies based on constructivist learning, inefficient use of material and financial resources intended for the computerization of the education sector, and impediments in the expansion of education throughout life, especially in the development of distance education.

To address these challenges, the Education 2030 Development Strategy in Moldova has identified several priority directions of action, such as providing educational institutions with equipment and program products, professional training of teaching staff, and implementation of management information systems at all levels of the educational system.

However, implementing the Education 2030 Development Strategy in Moldova faces several challenges. One of the significant challenges is the need for more funding to implement the strategy. For example, the planned budget for equipping at least 80% of academic units with equipment, software, and other information and communication technologies, according to national equipment standards for each level of education and type of unit, is over 1.5 billion MDL (Ministry of Education and Research, 2022). Similarly, the planned budget for ensuring the initial and continuous training of 100% of employees in the education sector regarding the development of digital skills and the implementation of education computerization standards is over 35 million MDL (Ministry of Education and Research, 2022).

Another challenge is the need for more infrastructure to support the implementation of the strategy. For example, access to reliable and high-speed internet in some parts of the country can help implement digital technologies in the education system. Additionally, the lack of digital literacy among some teachers and students can challenge the effective use of digital technologies in the education system.

Overall, the Education 2030 Development Strategy in Moldova presents an ambitious and comprehensive plan for integrating digital technologies into the education system. While the implementation of the strategy faces several challenges, its successful implementation can significantly improve the functionality of the educational system and ensure the quality and sustainability of education in Moldova.

### ***Comparative Analysis of Moldova and Estonia***

In this section, we conduct a comparative analysis of the digital transformation efforts in education between Moldova and Estonia. Estonia, recognized globally as a leader

in digital innovation, has made significant strides in integrating technology into its education system. On the other hand, Moldova is in the early stages of implementing digital technologies in education, with a specific focus outlined in the Education 2030 Development Strategy. To provide a clear overview of the differences and similarities, the results of this analysis are presented in the Table 5.1. This table highlights key aspects of digital transformation in both countries, including the timeline of digital integration, government support, digital literacy, infrastructure, innovation culture, and teacher training. By examining these factors, we aim to illustrate the varying degrees of progress and challenges each country faces in their respective digital transformation journeys.

Estonia's advanced digital transformation in education, driven by government support, digital literacy, IT sector engagement, innovation culture, infrastructure development, student-centered learning, comprehensive teacher training, and collaboration among educators, contrasts with Moldova's current challenges. Moldova can learn valuable lessons from Estonia's success to enhance its own digital transformation.

**Table 5.1. Comparative Analysis of Moldova and Estonia**

Aspect of Digital Transformation	Estonia	Moldova
<b>Digital Integration Timeline</b>	Early adopter since the 1990s (Aru-Chabilan, 2020)	Early stages, as outlined in the Education 2030 Development Strategy (Ministry of Education and Research, 2022)
<b>Government Support</b>	Strong government support with funding and policy emphasis on innovation (Loogma et al., 2012)	Limited prioritization of computerization/digitization in policy documents (Ministry of Education and Research, 2022)
<b>Digital Literacy</b>	High levels among students and teachers (Kattel & Mergel, 2019)	Need for improved digital skills among education sector employees (Ministry of Education and Research, 2022)
<b>Infrastructure</b>	Well-developed digital infrastructure with high-speed internet access in schools (Põldoja, 2020)	Significant investments required to meet national equipment standards (Ministry of Education and Research, 2022)
<b>Innovation Culture</b>	Encouragement of innovation and experimentation (Põldoja, 2020)	Challenges in promoting new media, open resources, and technologies (Ministry of Education and Research, 2022)
<b>Teacher Training</b>	Comprehensive programs including digital tools and resources (Põldoja, 2020)	Limited focus on digital skills training (Ministry of Education and Research, 2022)

Source: Elaborated by the author

Lessons from Estonia for Moldova:

- *Government Support:* Moldova should prioritize government support for technology integration in education, including funding and policies promoting innovation.
- *Digital Literacy:* Enhance digital literacy among both students and teachers in Moldova.

- *IT Sector Engagement:* Actively involve Moldova's IT sector in developing digital tools and resources for education.
- *Innovation Culture:* Foster a culture of innovation and experimentation among Moldovan educators to encourage innovative teaching methodologies and tools.
- *Policy Prioritization:* Ensure Moldova's education policy documents prioritize computerization/digitization and establish effective mechanisms for implementing education computerization standards.

Additionally, Moldova can draw inspiration from Estonia's e-governance and digital technologies in public services, which have enhanced efficiency, transparency, and accessibility (Kattel & Mergel, 2019). Moldova can apply similar approaches to improve the delivery of education services, such as online student registration, electronic record-keeping, and digital assessment systems. Estonia's emphasis on digital security and privacy can provide a model for Moldova to ensure the safety and protection of sensitive information in its digital education system. Moldova can benefit from studying Estonia's holistic approach to digital transformation and adapting its successes to the Moldovan context.

#### ***Financing the Digital Transformation of Education in Moldova***

In Moldova, the Ministry of Education, Culture, and Research is responsible for financing education (Manole, 2019, 2020). The government allocates funds for education through the state budget. These funds are distributed to educational institutions based on various factors, such as the number of students and the level of education. Additionally, educational institutions can generate income through tuition fees and other activities (Manole, 2020; Manole & Țurcan, 2021).

The current financing system for education in Moldova faces several challenges:

- The funding allocated to education is often insufficient, resulting in a need for more resources and infrastructure.
- The distribution of funds is only sometimes transparent and equitable, with some regions and institutions receiving more funding than others.
- There is a significant dependence on external funding and grants, which may need to be more sustainable in the long term.
- There needs to be more investment in digital technologies and infrastructure, which is necessary for the digital transformation of education.

There are several options for financing the digital transformation of education in Moldova. One option is to allocate a specific portion of the state budget to support developing and implementing digital technologies in education. Another option is to seek funding from international organizations and donors that support education and digital transformation projects. Educational institutions can also generate income by selling educational products and services, such as digital textbooks and online courses.

Public-private partnerships are also a viable option for financing digital transformation in education. The government can partner with private sector companies to

invest in digital infrastructure, software, and other technologies needed for education. In return, the private sector can access a pool of educated and skilled labor for their businesses.

Crowdfunding is another option for financing digital transformation in education, where individuals and organizations can contribute to a particular project or initiative. This approach can be used for smaller-scale projects or initiatives, such as purchasing new technology or software for a specific school or classroom.

Lastly, education savings accounts or vouchers can also be used to finance digital transformation in education. Parents can use these accounts or vouchers to pay for educational expenses, including digital technologies, and have more control over their children's education. In addition, this approach can increase competition among educational institutions and promote innovation in the sector.

To ensure sustainable financing for digital transformation in education in Moldova, we recommended that the government prioritize this area in its policy documents and allocate a specific portion of the state budget to support it. Additionally, partnerships can be established with international organizations and donors that support education and digital transformation projects to secure additional funding. Educational institutions should also explore opportunities to generate income by selling educational products and services, such as digital textbooks and online courses. Furthermore, innovative financing mechanisms, such as public-private partnerships, can be explored to finance digital transformation projects in education.

We also recommended that the government establish clear guidelines and criteria for allocating funds for digital transformation in education, to ensure that the funds are distributed efficiently and effectively. This can involve identifying priority areas for investment, such as teacher training in digital skills, development of digital content, and infrastructure improvement. In addition, the government can incentivize private investment in digital transformation projects in education by providing tax breaks and other forms of support.

Another recommendation is to establish a monitoring and evaluation system to track the progress and impact of digital transformation in education projects. This can involve establishing performance indicators and benchmarks to measure the effectiveness of the initiatives and conducting regular evaluations to identify areas of improvement.

Finally, it is essential to ensure that the financing options and mechanisms are accessible and equitable for all educational institutions, including those in rural and underserved areas. This can involve providing targeted support to these institutions, such as subsidies or grants, to ensure they have the resources to participate in digital transformation projects.

## **Conclusions**

This study has undertaken a comprehensive comparative analysis of digital transformation in education in Moldova and Estonia, with a particular focus on examining the critical financing aspects. The findings shed light on key differences and lessons that



can inform educational policy and practice in both countries, as well as offer insights applicable to other contexts.

Estonia stands out as a global leader in digital transformation, boasting a well-established system for the integration of digital technologies into education. In contrast, Moldova is in the nascent stages of its digital transformation journey, exemplified by its Education 2030 Development Strategy.

One of the core takeaways from this analysis is the identification of success factors that underpin Estonia's achievements in digital transformation in education. These factors encompass strong government support, a high level of digital literacy among educators and students, a robust IT sector's active involvement, and a culture that fosters innovation and experimentation in pedagogy.

For Moldova, these findings offer valuable lessons. The study underscores the critical importance of government support, the need for the systematic development of digital literacy among education sector stakeholders, and the encouragement of an environment conducive to innovation.

While these findings emphasize the disparities in digital transformation progress between the two countries, they also highlight the broader implications for policy and practice in the field of education. Moldova's current financing system for education is revealed as inadequate for the ambitious goal of digital transformation. In response, the study suggests a multifaceted approach to financing, which includes specific budget allocations, seeking external funding from international organizations and donors, and exploring income generation avenues within educational institutions.

In the broader scholarly context, this study contributes to the ongoing discourse on digital transformation in education. It underscores the significance of contextual factors, governmental support, and digital literacy in shaping the pace and success of digital integration in educational systems. Furthermore, it reinforces the idea that digital transformation in education should be underpinned by robust financing mechanisms, a principle applicable not only to Moldova and Estonia but to other nations navigating similar transitions.

The study's main contribution lies in its synthesis of empirical evidence from Moldova and Estonia, offering a nuanced perspective on the challenges and opportunities that digital transformation presents to education. By formalizing the research question and situating the findings within the broader academic dialogue, this study advances the conversation on digital transformation in education and provides valuable insights for future research endeavors in the field.

As an evolving area of inquiry, the next phase of research could delve deeper into the impact of digital transformation on student learning outcomes and evaluate the effectiveness of various financing mechanisms. Additionally, extending the comparative analysis to include other countries in the region would enrich our understanding of the barriers and enablers of digital transformation in diverse educational contexts.

This study serves as a stepping stone in the exploration of digital transformation in education, offering practical guidance for policymakers and educators in Moldova and beyond, while also contributing to the growing body of knowledge in the field of educational technology and its multifaceted implications.

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## THE EFFECT OF CHINA'S TRAVEL PURPOSES ON HUNGARY'S INBOUND TOURISM

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**Abstract:** *This paper conduct an empirical research and investigate the effect of China's travel purposes on Hungary's inbound tourism during a period of uncertainty. The study takes into account the influence of the Covid-19 and Ukraine-Russia war on inbound tourism. The short-run monthly sample from January 2018 to July 2022 has been utilized to capture the uncertain period. A Poisson Regression Model has been applied to calculate the efficacy of China's travel purposes on Hungary's inbound tourism. This study finds that China's leisure and business trips have positive and significant effect on Hungary's inbound tourism. China's business trips has a large contribution to Hungary's inbound tourism than leisure trips. During the uncertain period, the Covid-19 and Ukraine-Russia war had a negative and significant effect on arrivals of tourists to Hungary. Inbound tourism from China to Hungary had contributed positively to the economic performance of Hungary's tourism sector.*

**Keywords:** *Travel Purpose, Inbound Tourism, Poisson Regression, China, Hungary*

**UDC:** 338.48(439+510)

**JEL Code:** C30, D12, Z32

### Introduction

The relations between Hungary and China have been growing in the past several years. The objective of the study is to develop an empirical model for estimating China's travel purposes to Hungary in recent years. The study applies an econometrics method called the poisson regression model. The outcomes of the study ensures that Hungary's tourism market participants be able to make future choices that will reduce intertemporal opportunity costs and increase revenues. The focus of this study involves analysing China's business and leisure trips to Hungary which have gain scholarly interests in recent years (Šebeňa, 2018).

Our understanding is that China's visits per capita for business and leisure is influenced by past visits, expected future visits, real personal disposable incomes, the real cost of travel to a destination, comparative cost of tourism, exchange rate, the binary effect of the Covid-19 pandemic, and the binary effect of Ukraine-Russia war. The significance of these indicators can guide the market participants about how to design their products and services. Trade between the two countries has become sustainable. Hungary's imports from China have increased over recent past years, while its exports to China are rather lower (Kuttor, 2022).

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Given an increase of Chinese businesses in Hungary, China finds Hungary as an attractive business and tourism destination. The currency of Hungary makes the country a key consideration for Chinese tourists' destinations in the Central and East Europe (CEE) region (Rátz & Hinek, 2006). Tourism has emerged as a basic instrument for attracting foreign direct investment in the CEE and can supply the sentiments into which visitors would like to travel and do business in the region (Yeung et al., 2009). China serves as Hungary's alternative to the European Union (EU) single market in trade and foreign direct investments (Szunomár, 2015). This study provides empirical insight into how Hungary's tourism market receives an economic boost from China's visits.

Research on China's travellers and their purposes to Hungary is limited. It is important to know about Chinese people travel trends as Hungary is increasing its trade and investment with the China economy. The travel purposes of Chinese people are strongly related to their culture. However, the average Hungarian citizens hold little interest in the Chinese culture (Kasznár, 2016). As much as the knowledge about China is less familiar to the average Hungarian people in Hungary, the knowledge about Hungary is also less familiar to an average Chinese people in China. China has been able to enter the CEE market through adequate relations with Hungary (Simon et al., 2021). It is the Hungarian governing politicians that take the opportunity to benefit from the relations (Rogers, 2019). This makes the relations between the two countries less understood by an average Hungarian people. According to Kałan (2012) the interest in China by Hungarian politicians emanated from the poor economic conditions after the global financial crisis and the search for alternative sources of investments. The Hungarian government makes it its own mandate to enhance the economic, education, and cultural relationship with China.

The motivation for this study is the increasing inbound tourism from China to Hungary in recent years from both leisure and business travel purposes. It is this phenomenon that interests economists about the efficacy and contribution of China's travel to the Hungarian tourism sector. According to Johnson, Xu, and Arlt (2020) China is one of the world's largest and fastest-growing tourism markets. China's outbound tourism will continue to be a major contributor to the growth of global tourism market after the Covid-19 pandemic (Liu & Cheng, 2021). Understanding the specific travel purposes of Chinese tourists to Hungary allows policymakers, tourism boards, and businesses to tailor their strategies and offerings to better meet the demands of this valuable market. If the effects are significantly positive it can lead to increased tourist spending, job creation, and economic growth within Hungary's tourism sector. Hungary can use this study empirical insights into Chinese travelers' purposes to develop appropriate policies and regulations. There is also a lack of studies that assessed the effect of China's travel purpose on Hungary's inbound tourism during the global crises like the Covid-19 pandemic and geopolitical tensions such as the Ukraine-Russia war. Knowing how this exogenous factors influence empirical findings can help Hungary adapt its strategies and respond effectively to changing circumstances. Hence, this study fills the gap in the literature by partially estimating the endogenous effect size of China's leisure and business travel to Hungary;

and taking into account the exogenous factors that adversely affected the tourism industries of Central and Eastern European countries in recent years, that is, Covid-19 Pandemic and the Ukraine-Russia war.

In this study we utilize Poisson regression as a statistical model because inbound tourism is a count data and represents the number of occurrences of visits (Fávero & Belfiore, 2019). Inbound tourism data often involves counting the number of visitors arriving to a country. This data inherently follows a discrete and non-negative distribution, which makes the Poisson regression model a suitable choice for modelling count data (Hanley & Bhatnagar, 2022). The sample period of this study include monthly data from January 2018 to July 2022. The results of this study contributes to the tourism economics literature that China's travel purposes contributes positively and significantly to Hungary's inbound tourism.

The outline of the study continues with the literature review in section 1. The data and methodology are discussed and justified in section 2. The model and findings are discussed in section 3. The paper finalise with discussion of conclusion.

## 1. Literature review

On 3 October 1949, Hungary was among the countries that recognized the establishment of the People's Republic of China. In the same year, the diplomatic relations were enacted between the two countries. In the 1990s, an estimated 50 000 people from China used an opportunity of visa-free travel provided by the Hungarian government (Jacoby & Korkut, 2016). The developments of economic relations began with an increase in trade of goods from China to Hungary. This paved way for increasing inbound tourism from China to Hungary. The community of Chinese people became larger in Hungary than in other Central European countries.

The arrival of Chinese people in Hungary can be represented by two major events. The first event is the period between 1988 to 1992. In this period, there was an agreement between Hungary and China to offer Chinese people a visa waiver (Nyiri, 2003). One of the recent special events was the offer of the settlement bond program by the government of Hungary (Szabó et al., 2021). The program, which was open from 2013 to 2017, allowed at least 20000 foreigners to settle in Hungary and the Schengen region with possible extensions. China was one of the few countries to be on the list for its people to utilize the opportunity.

Economic sentiment is one of the key factors that attract people from many countries to make business and leisure visits as their purpose (Aharon, 2020). Every country consists of pros and cons in tourism, but it is important to report it successfully (Üngüren et al., 2015). In many countries, the locals perceive tourists as just guests, lacking the perception that other tourists are marketing for making a foreign direct investment. This can create cultural confusion about what is expected from tourists by the

locals. Investing in a combination of tourism and investment educational programmes can help clear the confusions between the locals and mainstream tourists (Cooper, 1997).

In 2011, there were 12 economic relations agreements were signed between the two countries. It was in these meetings that the Premier of China, Wen Jiabao, showed interest in meeting other CEE countries. It led to the China-CEE cooperation initiative known as the “16+1” which was officially agreed upon in 2012, in Warsaw, Poland (Semerák, 2015). Most of these economic relations yielded positive outcomes in terms of tourism, trade, and foreign direct investment (Éltető & Szunomar, 2016). Two successful economic and trade zones developed by Chinese enterprises are the Central European Trade and Logistics Cooperation Zone (CECZ) and Sino-Hungarian BorsodChem Industrial Park which are special economic zones based in Hungary (Vámos, 2017).

Stronger ties enabled Hungary to become an economic, financial, and logistics hub for China. The establishment of China’s Belt and Road Initiative (BRI) by China’s president Xi Jinping in 2013 has built up a deeper relationship with CEE countries. And Hungary was the first European country to sign the Memorandum of Understanding (MoU) with China (Yi, 2015). The 6th Summit of China and CEE countries was held in in 2017, Budapest, Hungary. The Summit brought opportunities for Chinese Small and Medium Enterprises (SMEs) to have the ‘China-CEE SMEs Matchmaking meeting’ which was organized by the Ministry of Commerce, Bank of China, the Ministry of Foreign Affairs, and Foreign Affairs of Hungary. In 2020, this made Hungary receive the largest share of China’s foreign direct investment in the CEE region. These robust economic developments paved way for increased inbound tourism from China to Hungary.

Hungary is also positive and active in promoting intercultural and people-to-people exchanges with China in the fields of tourism and arts. In 2014, the China-CEEC Tourism Coordination Center (TCC) was established in Budapest and China National Tourism Administration (CNTA) opened the first CEE-based tourism office in Budapest. China-CEEC Association of Tourism Promotion Agencies and Businesses was officially launched in 2015. The following year, a series of activities related to the Budapest International Tourism Exhibition was held. The program provides business cooperation and business trips for Chinese people to Hungary. The accessibility of a destination is also an important factor in the travel volume of a place and direct flights have a significant impact on the number of arrivals to destinations (Cetin et al., 2014). The direct airline from China to Budapest also facilitates travel activities for Chinese people. Air China opened the direct flight from Beijing to Budapest in 2015, China Eastern Airlines opened the direct flight from Shanghai to Budapest in 2019, and Hainan Airlines opened the direct flight from Chongqing to Budapest at the end of the year 2019.

Hungary is one of the CEE countries that has a large tourism industry. Tourists are just like customers in the business environment. Hence, countries that prioritize tourism should create an environment that is conducive to leisure and business tourism (Li et al., 2018). This means that the development of sectoral loyalty should be a necessary condition (Stank et al., 1999). Tourists can be as loyal as customers who purchase any other products

and services. Travelling is not like spending on daily bread, but travel customers have the power to create referrals and influence others to travel to similar destinations (Sirohi et al., 1998). In modern times, many countries compete to get traveling customers. Therefore, it is important for a country to maintain loyalty and to be consistent as possible in the provision of tourism products and services (Kim, 2008). The goal is to provide the best experience for each traveller. This can create travellers to revisit the country and refer others to the similar destination (Chi & Qu, 2008). Marketing of tourism products and services is an integral part of the tourism process. After an adequate travel experience, satisfied customers can provide a word-of-mouth form of marketing. Coupled with a quality loyalty brand, this creates perpetual visitors. According to Hughes & Allen (2005) a cultural experience by travellers enhances customer retention and referrals in tourism of CEE countries. A country can make improvements on the factors that have a high propensity to increase loyalty and increase inbound tourism.

Social networks are important to Chinese tourists. The social networking and relations that Chinese people arrange and implement tend to be misunderstood by some European countries (Hwang, 1987). One of the well-known social interactions between the Chinese people is the social network: Guanxi (关系). Guanxi is a form of social network theory in Chinese culture that describes an individual's place in the social structure and provides mutual benefit in personal and business relationships (Hammond & Glenn, 2004). Through this social capital phenomenon, Chinese people share knowledge about countries that are good for visit, settlement, or investment.

According to Chen & Chen (2004), Guanxi has been a preferred culture for people to achieve business success within China. Guanxi has a significant influence on the management of businesses by overseas Chinese people (Burt & Burzynska, 2017). The Guanxi model dominates personal and business relations. Chinese people carry this model with them wherever they go. It is a culture that initiates, builds, and ensures success through trial and error (Su & Littlefield, 2001). Beyond personal relations, the model extends into people seeking favours and rent-seeking to succeed in business.

Survey studies by Song-Agócs & Michalkó (2022) investigated how the guanxi model of networking by Chinese people influences their travel plans to Budapest, Hungary. They found that 28 percent of the Chinese tourists' respondents had friends already living in Budapest, 22 percent had relatives living in Hungary, and 31 percent had no social networks living in Hungary. These social networks created large families of Chinese communities living in Budapest. To Chinese people, it is perceived as a sign of progressive and happy life.

### ***1.2. Empirical literature***

Empirical studies that estimate count data variables are scarce in the Hungarian tourism industry. We have found that the gaps that exist are applying multivariate Poisson regression models to the count data (Muñoz-Pichardo et al., 2021). One of the gaps that exist in the current research field is empirical studies assessing factors that affect the



average inbound tourism during uncertain times (Yoon et al., 2001). Hence, we also considered studying the external factors which include the Covid-19 pandemic and the Russia-Ukraine war. The macroeconomic level of data on tourism can assist in constructing a tourism model that can guide market participants about tourism's current and expected path (Martins et al., 2017). Most empirical researchers tend to focus on the relationship between tourism and economic growth. It is agreed by various scholars that tourism generally has a positive effect on the economy (Nunkoo et al., 2019).

In a study utilizing quantile regressions, the arrival of tourists is associated with business cycle fluctuations (Brida et al., 2020). High inbounds are associated with high economic growth, and low inbounds are associated with low economic growth periods. In the long run, there is a divergence in inbound tourism between high and low-economic growth countries. Other studies find that there is a limit to the contribution of the tourism sector to economic growth (Adamou & Clerides, 2009). There is a limit to the continued increases in tourism arrivals. Scholars postulate that there is a diminishing return to inbound tourism in the long run (Seddighi & Theocharous, 2002). This is caused by growth of competitiveness between countries. The good news about the tourism sector is that the barriers to entry are low and it is less costly to start or maintain a small business.

Using the Poisson model Correia et al. (2015) found that travellers tend to demand to stay longer in Portugal after visiting a marketable destination. However, traveller's disposable incomes tend to decrease while enjoying their longer stay and then start spending similarly to the locals. Their study found that most travellers that stay for short days tend to come back at some point in the future. An interesting finding was also that creating an environment where new customers visit the country is important. This enabled a country to have a diversified category of customers, in addition to the traditional customers that usually visit the country. However, we find that the country acknowledges the factor of tourists' diversification but does not address the influence of culture in their travel purposes. Another study by Gemar et al. (2022) found a causal relationship between being a woman and the length of stay. They found that loyalty and knowledge about a country are significant factors that determine the length of stay. They emphasize more on the government's effort to perform territorial planning and management. Other scholars using quantitative methods also support this notion (Uyar et al. (2021). They found that government intervention in ecological development is important in attracting inbound tourists.

Tourism is an economic sector that is adversely affected by negative exogenous shocks. The first most recent negative exogenous event that has negatively shocked the tourism industry is the Covid-19 pandemic. Škare et al. (2020) studied the effects of shocks on tourism in several countries using panel structural vector auto-regression. They found that past pandemics tended to sharply decrease inbound tourism. After drastic falls in the pandemic cases, tourism activity immediately recovers to former levels. However, what is different about the negative effects of the Covid-19 pandemic is that it tends to persist after travel restrictions have been relaxed. Covid-19 policies between various countries have not been harmonized. Governments around the world have different policies for their citizens

and tourists (Hale et al., 2022). China is still one of the few countries that are imposing very strict monitoring of its citizens when it comes to testing for new infections (Wen et al., 2022). This has recently been placing strain on the travel decisions of people from China to other countries. A study by Wu et al. (2022) revealed that the contribution of domestic tourism to Guangdong's economy in China fell from 2.53 to 1.20 percent due to Covid-19. They found that there is a positive correlation between tourist visits and the tourism sector's contribution to the economy.

The second most recent negative exogenous event on tourism is the Ukraine-Russia war. The effect of war on tourism, occurring on the periphery of other countries, has not been empirically and precisely investigated by scholars. These events are considered geopolitical risks to tourism. According to Demiralay & Kilincarslan (2019), regional tourism industry stock indices become volatile to the rise in geopolitical risks. Considering these events tourism industry stock prices fall because of the threats and uncertainties posed by wars taking place in the region.

### 3. Data and Methodology

The main variables of interest are the Inbound Tourism per Capita, Leisure Travel, and Business Travel from China to Hungary. In addition, we take into consideration the external factors that dominated the Hungarian tourism market during the sample period. The endogenous control variables included are Disposable Income per Capita in China, Travel Cost from China to Hungary, Economic Sentiments of Hungary by Chinese people, and Exchange Rate of Hungarian Forint to the United States Dollar (HUF/USD). The exogenous control variables included are the Covid-19 cases and Ukraine-Russia War Dummy. The dataset of the study includes monthly data from the Hungarian Central Statistical Office, Our World in Data, and the World Tourism Organization. The monthly data starts from January 2018 to July 2022, which is a total of 55 observations. The goal of collecting this data is to capture the short-run effects and to have a closer observation of the tourism trend during the highly uncertain periods plagued by the Covid-19 pandemic and the neighbouring war in Ukraine.

The correlation between the variables is depicted in *Table 1*. It can be identified that there is a positive correlation between Hungary's Inbound Tourism per Capita [*trend*], leisure trips [*leitrip*] and business trips [*bustrip*]. These are the main independent variables of interest. Inbound tourism is directly associated with the number of tourists arrivals (Brida et al., 2020). But correlation does not necessitate causation and this study calculates the partial effect of China's trips on Hungary's inbound tourism. We add control variables which affects inbound tourism. There is also a positive association between the average disposable income [*dispinc*] of the people of China and Hungary's Inbound Tourism per Capita [*trend*]. Other control variables are negatively correlated with Hungary's Inbound Tourism per Capita. What is also interesting is that Covid-19 cases [*covid*] in Hungary and the Ukraine-Russia War [*ukwar*] are negatively correlated with Hungary's Inbound

Tourism per Capita [*trend*]. Covid-19 and the war are also negatively correlated with China's leisure travel. Negative exogenous shocks tend to be associated with decreases in inbound tourism (Škare et al., 2020; Wu et al., 2022; Demiralay and Kilincarslan, 2019). The data reveals that the Economic Sentiments [*esent*] of Hungary by Chinese people has, on average, been negative since the year 2018. The Economic Sentiment indicator is a composite economic indicator used to assess and represent the overall economic confidence about a country (Aharon, 2020). It is a valuable tool for policymakers, economists, and businesses as it provides insights into the overall mood of the Hungarian economy by Chinese people. It can be used to anticipate economic trends and potential changes in economic activity. The travel costs are directly associated with inbound tourism (Dwyer & Forsyth, 1993). It helps policymakers assess the partial net benefits from foreign tourism. We find that Travel Costs from China to Hungary [*trcost*] is negatively correlated with Hungary's inbound tourism.

**Table 1. Correlation matrix**

	<i>trend</i>	<i>leitrip</i>	<i>bustrip</i>	<i>dispinc</i>	<i>trcost</i>	<i>esent</i>	<i>exhu</i>	<i>covid</i>	<i>ukwar</i>
<i>Trend</i>	1.000								
<i>Leitrip</i>	0.545	1.000							
<i>Bustrip</i>	0.111	0.106	1.000						
<i>Dispinc</i>	0.609	0.770	-0.024	1.000					
<i>Trcost</i>	-0.081	-0.179	0.148	-0.137	1.000				
<i>Esent</i>	-0.244	-0.110	0.414	-0.093	0.460	1.000			
<i>Exhu</i>	-0.498	-0.472	0.085	-0.583	0.335	0.458	1.000		
<i>Covid</i>	-0.489	-0.490	0.311	-0.539	0.563	0.708	0.746	1.000	
<i>ukwar</i>	-0.325	-0.242	0.285	-0.328	0.510	0.619	0.710	0.804	1.000

Source: Developed by author

We developed an empirical model from the Real economy and Income accounts MINI (RIMINI) framework. We use this framework as a small, aggregated model that captures economic activity in Hungary's tourism sector. This model enables us to treat the tourism sector as a subsystem of the aggregate economy (Hammersland & Tr ae, 2014). This means that our RIMINI model is the conditional sub-model for the simultaneous determination of Inbound Tourism Per Capita. The model provides opportunities to be expanded into a large RIMINI model.

To regress the inbound tourism variable, we adopt the Poisson Regression Model (PRM) which is applicable when the dependent variable is a count data (F avero & Belfiore, 2019). The PRM model is then applied to the cross-sectional data. The PRM demonstrates a mathematical relationship between the count variable and independent covariates (Hanley & Bhatnagar, 2022). The inbound tourism variable involves numerical data that is counted.

This makes it appropriate to apply the PRM. The Poisson distribution models the probability of inbound tourism from China to Hungary. The model enables us to include independent variables that come from a random sample and assume the independence of each covariate. The probability of inbound tourism is denoted by Equation 1.

$$Probability(Y = y_i | \mu, t) = \frac{e^{-\mu t} \mu t_i^{y_i}}{y_i!} \quad (1)$$

where  $\mu$  is the Poisson distribution incidence rate,  $t$  is the unit of exposure,  $e$  is an exponential term, and  $y_i$  is the inbound tourism numbers. The specification of the PRM renders the model to be classified as non-linear. The incidence rate is determined by independent variables denoted in by the regression equation in Equation 2.

$$\mu = \text{exp}(\beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k) \quad (2)$$

where  $\beta_1$  to  $\beta_k$  are the Poisson regression coefficients, which are unknown as parameters that must be estimated, and  $\text{exp}$  is the link function equivalent to the logarithm of  $\mu$ . They explain the partial effects of the independent variables,  $X_s$ , on the dependent variable,  $\mu$ . These coefficients are statistically more consistent than those of the Ordinary Least Squares (OLS). We can then be able to interpret the effects of these covariates in percentage form as they are in logarithms.

The PRM coefficients have an exponential conditional mean on the count variable (Consul & Famoye, 1992). They have an exponential distribution rather than a normal distribution in OLS. It is important to evaluate if the included independent variables help explain the dependent variable. This can be explained by a measure of goodness of fit called the Pseudo R-squared [ $R^2$ ] which is denoted by Equation 3. The Pseudo  $R^2$  is a value between 0 and 1, where 1 means perfect fit (Heinzl & Mittlböck, 2003). The more the value of  $R^2$  is to 1 the greater the goodness of fit and we can have confidence in the set of independent variables that helps estimate the independent variable.

$$Pseudo R^2 = 1 - \frac{\ln \ln (L_M)}{\ln \ln (L_0)} \quad (3)$$

where  $L_M$  is the likelihood of the fitted model, and  $L_0$  is the likelihood of the null model. An alternative, called the Wald-statistic, to the coefficient of determination is also produced by the empirical results. We can use this alternative to confirm if all the combined variables significantly explain inbound tourism (Karaalioglu & Korkmaz, 2021). Ultimately, we use the probability value of the Wald-statistic to confirm if the overall model is statistically significant.

#### 4. The Model and Findings

This study questions whether China's travel purposes is significant in explaining Hungary's inbound tourism. The hypothesis states whether there is a causal link between China's travel trips and the overall Hungary's inbound tourism. The first hypothesis tests the significance of endogenous factors. H<sub>1</sub>: China's travel purposes have a significant effect on Hungary's inbound tourism. The second hypothesis tests the significance of exogenous factors. H<sub>2</sub>: Covid-19/Ukraine-Russia war has a significant effect on Hungary's inbound tourism. Therefore we estimate the econometric regression model provided by Equation 4.

$$\ln \ln (trend) = \beta_0 + \beta_1 \ln(leitrip) + \beta_2 \ln(bustrip) + \beta_i \sum_{i=1}^6 \ln(X_i) + D(ukwar) + \varepsilon \quad (4)$$

where  $\ln$  is the logarithm function of the variables,  $trend$  is the dependent variable of the study called the Inbound Tourism per Capita from China to Hungary,  $leitrip$  is the Leisure Travel from China to Hungary,  $bustrip$  is the Business Travel from China to Hungary,  $X_i$  is the a vector of control variables which includes 6 indicators,  $D(ukwar)$  is the dummy variable representing the Ukraine-Russia War and  $\varepsilon$  is the error term.

The study finds interesting outcomes that can assist industry participants in enhancing the domestic tourism markets. *Table 2* summarizes the empirical results. The explanation of results is divided into endogenous and exogenous factors. The endogenous factors are macroeconomic indicators that can be influenced by the markets and belong to the model. Exogenous factors are indicators that cannot be influenced by the markets but should be included in the model because they influence the outcomes (Ludvigson et al., 2021). Exogenous factors captured by the model are the Covid-19 pandemic and the Ukraine-Russia war. The coefficient in the results table represents the partial effect of each variable on Inbound Tourism. We find that all the variables included in the model are statistically significant.

The *Pseudo-R<sup>2</sup>* states that 76.03 percent of the variation in Hungary's inbound tourism is explained by the included independent variable in the model. This percentage is produced by the coefficient of determination represented by the goodness of fit measure, the Pseudo R-squared (AlMuhayfith et al., 2016). The *R<sup>2</sup>* measure ranges from 0 to 1, with values closer to 1 indicating that we have confidence in the included covariates that estimate inbound tourism with precision. The Wald chi-square statistic is significantly different from zero, which means that included independent variables should not be removed from the model. The P-value for the chi-square tells us that the overall model is highly significant.

**Table 2. Poisson Regression Results of Hungary's Inbound Tourism from China**

Variable	Log (Inbound Tourism per Capita from China to Hungary)	Coefficient
<b>Endogenous factors</b>		
<i>Leitrip</i>	Log (Leisure Travel from China to Hungary)	0.01573***
<i>bustrip</i>	Log (Business Travel from China to Hungary)	0.07617***
<i>dispinc</i>	Log (Disposable Income per Capita in China)	0.01192**
<i>Trcost</i>	Log (Travel Cost from China to Hungary)	-0.0051***
<i>Esent</i>	Log (Economic Sentiments of Hungary by China persons)	0.0124**
<i>Exhu</i>	Log (Exchange Rate of HUF/USD)	0.0105**
<i>Cons</i>	Intercept	0.9472***
<b>Exogenous factors</b>		
<i>covid</i>	Log (Covid-19 Cases)	-0.0046***
<i>ukwar</i>	Ukraine-Russia War Dummy	-0.0735***
<b>Summary</b>		
<i>N</i>	Number of observations	55
<i>Wald Chi (8)</i>	Wald chi-square statistic	80.62
<i>Prob &gt; chi2</i>	P-value for the chi-square	0.0000
<i>Pseudo-R<sup>2</sup></i>	Goodness of fit	0.7603

Source: Developed by author. Note: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  denote statistical significance at the 10%, 5%, and 1% level.

Firstly, we analyse the effects of endogenous factors. We find that a percentage increase in leisure travel from China to Hungary has a positive and highly significant effect on Hungary's inbound tourism per capita by an estimated 1.57 percent. Unsurprisingly, an estimated 7.62 percent increase in Hungary's inbound tourism per capita is led by a percentage increase in business travel from China to Hungary. With the travel costs from China to Hungary increasing, Hungary's inbound tourism per capita is decreasing by an estimated 0.51 percent. Disposable income per capita in China and economic sentiments of the Hungarian economy by the Chinese people also have positive and significant effect on Hungary's inbound tourism per capita. Secondly, we analyse the effects of exogenous factors. We find that a percentage increase in Hungary's Covid-19 cases has a negative and highly significant effect on its inbound tourism per capita by an estimated 0.46 percent. In general, the decrease in tourism sector contribution to the economy had not just been Hungary's experience but also a global trend. We find that the ongoing war between the

countries so far has negatively impacted Hungary's inbound tourism more than Covid-19. The Ukraine-Russia war has a negative and highly significant effect on Hungary's inbound tourism per capita by an estimated 7.35 percent.

## Conclusions

Travel purposes from China to Hungary has increased in recent years. In addition these developments, the Hungarian inbound tourism sector has been constrained by recent exogenous factors. It is the aim of this study to empirically understand the dynamics of China's travel to Hungary. This gives rise to the demand for a scientific study that assess the short-run horizon in the presence of uncertainties. We utilized monthly data with a sample period from January 2018 to July 2022. The main variables of interest are Hungary's inbound tourism per capita, which is the dependent variables. The main independent variables are leisure and business travel from China to Hungary. To estimate the causal effect of China's travel purposes on Hungary's inbound tourism we apply the Poisson Regression model.

Our empirical study found that travel purposes by the Chinese people have had a positive contribution to the Hungarian tourism sector. We can conclude that leisure and business travel of Chinese people has a causal and positive effect on Hungary's inbound tourism. Business trips from China to Hungary have a significantly large effect size than leisure trips. China's leisure trips have increased Hungary's inbound tourism by an estimated 1.57 percent. China's business trips have increase Hungary's inbound tourism by an estimated 7.62 percent. Exogenous factors are negatively correlated with inbound tourism and have a negative effect on Hungary's inbound tourism. These exogenous factors are the Covid-19 pandemic and the Ukraine-Russia war which have created elevated tourism uncertainty. This comes at a time when travel costs from China negatively affect Hungary's inbound tourism. However, the inverse effect is small but it's significant.

Hungary's economic sentiments by the Chinese people is crucial, especially from the perspective of business trips. Leisure trips by Chinese persons have been negatively correlated to travel costs, exchange rates, economic sentiments, the Covid-19 pandemic, and the Ukraine-Russia war. The war has contributed to increases in the intertemporal costs of travelling, such as increases in energy prices, which has put pressure on inflation on the European continent. Business trips have not been sensitive to these factors and have had a higher positive effect on Hungary's inbound tourism than leisure trips.

Historical developments in international affairs and trade have enabled China to continue being a key trading partner to Hungary. The Chinese people have embraced various political and economic relations between the two countries. Based on this study we find that growth in the disposable incomes of the Chinese people is beneficial to the Hungarian economy. The higher these incomes are, the higher will be the demand for travelling to Hungary. These demands should be met by a tourism supply that is competitive in Central and Eastern Europe.

The travel purposes of Chinese travellers to Hungary have become sustainable. More and more Chinese people are travelling to Hungary for leisure and business. The increasing number of private visits such as people coming for studies in Hungary is providing an opportunity for Chinese people to settle for longer stays. Hungary is one of the safest countries in Europe and this highly resonates with Chinese people's preferences. Hence, safety and security are the product and service features that must be maintained by Hungary.

Future empirical research of China's travel purposes should investigate the mediating effect of the most dominant Chinese culture, the Guanxi (关系). Guanxi is a Chinese term that refers to the concept of building and maintaining social relationships, connections, and networks, often based on mutual trust and reciprocity (Gao et al., 2010). This culture can play a significant role in the decision-making process of Chinese tourists, both when choosing a travel destination and during their travel experience (Berger et al., 2017). Efforts should be made to appropriately quantify the Guanxi which should be incorporated into the quantitative models.

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## EYE-TRACKING IN ADVERTISING RESEARCH: AN INVESTIGATION AMONG GENERATION Z AND Y OF SHOCK TACTICS' EFFECTIVENESS

Tatiana GAUGAȘ \*<sup>1</sup>

**Abstract:** Advertising has become an integral part of everyday life, due to the abundance of advertising messages, it is virtually impossible to pay attention or to retain all of them; thus, consumers learn to ignore most advertisements they are exposed to. Striving for exceptionalism and persuasion, advertisers tend to use dramatic emotions, they create messages that would shock consumers, and they increasingly break social and moral norms, so that their advertising messages break through the traditional advertising clutter and reach the existing or potential customer. Since the 1980s, shock advertising has gained interest among advertising industry specialists and academics. However, the impact of shock advertising on consumer behavior can vary and its effectiveness is questionable. This article aims to analyze the differences in the reactions among generations Z and Y to shock advertising, using the eye tracking method. A total of 40 participants were invited to take part in the study. The core of the research was based on seven distinct types of shock tactics. Each of these groups represented a category of advertising posters. Within each group, there were 3-5 individual images, each varying in design, content, and nature. This variety ensured a comprehensive understanding of participants' reactions to different types of advertisements within the same category. After the data analysis, it was concluded that there are differences in the perception of different types of shock depending on the generation. The results indicate that generation Z is more tolerant of shock tactics, having a more positive reaction than generation Y. The younger age group (16-20 years) appears to engage with visual stimuli in a more dynamic and perhaps exploratory manner. They seem to have a more focused or selective attention, especially when the content is emotionally or ethically charged. This paper provides marketers with a better understanding of the effectiveness of shock advertising based on age variable, recommending alternative methods to capture the attention of consumers.

**Keywords:** shock tactics in advertising, eye tracking research, consumer behavior, generation theory

**UDC:** 659.118:659.117-053

**JEL Code:** M1, M3

### Introduction

The role of advertising is to create a connection between the company and the target audience by presenting the benefits of its products or services and promoting a positive brand image. Advertising has become an integral part of everyday life, but in a modern world an average person may be exposed to more than 3000 advertising messages

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every day. Thus, over time, consumers learn to ignore them and remember only 11% of daily advertisements (Trott, 2013).

Advertising can appeal to the rational side of consumers, it can convey information and cause cognitive reactions, however most interesting is the emotional aspect of advertising that affects the feelings of the audience. Striving for exclusivity and persuasion, advertisers tend to use dramatic emotions, they create messages that would shock consumers, so that their advertising messages would ripple through the contemporary advertising clutter and reach the potential customer. Shocking advertising is created to emotionally affect and stir thinking, to touch people, at a fundamental level, and encourage them to act. Shocking advertising is a conscious attempt to shock the consumer by violating society's social, cultural, moral, and religious values. Critics of shock tactics in advertising accuse the creators of shocking ads of emotional manipulation and social issue trading, while their advocates analyze the factors that cause shock in advertising and seek to determine how they positively affect the emotions and behavior of the audience. It is argued that shock tactics are used to make people stop and notice an advertisement. However, there is no unanimous opinion among experts in the field on this topic of research, despite over forty years of continuous discussion, the impact of shock advertising on consumers remains a relevant object of scientific research. Studies related to the impact of shock advertising on consumer emotions and behavior reveal that the nature and intensity of consumer reaction is determined by demographic and socio-cultural factors of the target segments, as well as by different advertising contexts. Age factor has a significant impact on the perception of shock ads. This factor can significantly differentiate how people interpret and respond to provocative or controversial elements in an ad. The aim of this article is to conduct a comparative analysis of the impact of shock advertising on generation Z and Y using neuromarketing method of research – eye tracking. In order to achieve the stated objective the author formulated the following research hypotheses:

1. Demographic factors such as age and gender of the audience influence the effectiveness of shock ads.
2. Generation Y and perceive shock advertising as more offensive than younger youth from generation Z.
3. Generation Y and Z have different reactions to various shock tactics in advertising.

## 1. Literature review

Since the 1980s, shock advertising has gained interest among both advertising industry specialists and academics. Shock advertising, also known as shockvertising, is a marketing or advertising strategy that aims to provoke a strong and often emotional response from the audience through the use of provocative, controversial, or shocking content. This strategy typically goes beyond the boundaries of what is considered normal or expected in advertising and relies on elements designed to elicit surprise, disbelief, or even discomfort. When discussing such a type of advertising, a term is particularly common in practice - shock advertising. However, a review of the scientific literature reveals that marketing theorists and practitioners use different terms to define shock ads. Other terms with the same

semantic meaning that are mentioned in the literature by researchers are: irritating, non-traditional, offensive, taboo, provocative, shocking and controversial.

Shock advertising is advertising that conflicts with established expectations, norms and behaviors (Stiensmeier and Pelster). Dahl (2003), one of the most cited authors on shock advertising, defined it as "a deliberate attempt to surprise an audience and thereby violate societal norms and values and personal ideals in order to capture the attention of a target audience". [Darren, 2018, p.269]

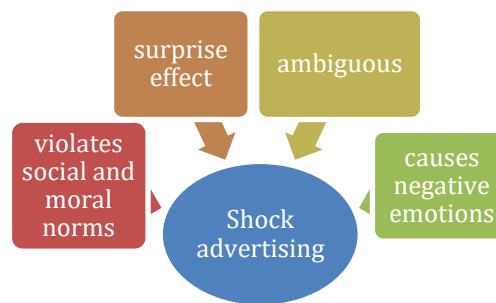
Offensive advertising is commonly viewed as advertising that intentionally, rather than unintentionally, horrifies and upsets viewers (Gustaeson and Yssel, 2003). Venkat and Abi-Hanna (2003) defined it as one that calculatedly offends its audience. Authors Gerard Prendergast, Wah-Leung Cheung and Douglas West use the concept of offensive advertising to refer to 2 types of advertising: that which promotes products that may offend and that which uses offensive ways of promoting products (2008).

Controversial advertising has been described as "an advertisement that suddenly captures the viewer's attention by creating a buzz (effect of controversial discussion), violating moral or social norms, traditions and customs" (Skorupa, 2014).

Pflaumbaum conceptualized shock advertising as one that challenges various taboos in order to surprise the target audience and create negative reaction. Javed and Zeb referred to definitions by Dahl and others, but proposed their own definition of "shockvertising" stating that it is advertising that suddenly grabs the attention of the audience and creates the resonance or buzz marketing effect and may go against social norms, customs, traditions or cultural values (Tiwari, 2019).

Nigel K. LI. Pope, Kevin E. Voges and Mark R. Brown (2019) have referred to shock advertising using the term provocative advertising, which they define as characterized by an intentional attempt to gain attention through shock and which operates through three characteristics: distinctiveness, ambiguity, and violation of social norms and cultural taboos. Parry (2013) noted that shock advertising includes terms and formulations such as "advertising provocation", "violent advertising" (Andersson, 2004), "advertising taboo" (Sabri and Obermiller, 2012)., "offensive advertising" (Waller, 2005) and "sexually referenced advertising" (Sengupta and Dahl, 2008).

From the concepts analysed in the literature it can be concluded that not all the terms used in the description of shock advertising are absolutely identical, however many common aspects and characteristics are found, among them are: violation of social and moral norms, creation of surprise effect to cause the highest level of shock. The message used is ambiguous and confusing, leading to group discussions and creating a buzz to attract greater attention among the general public. Another common element mentioned in these notions is - provoking negative emotions among consumers, which occurs as a result of violating ethical and moral norms in society. The negative reaction of consumers to shock advertising may be partly due to the fact that no one gives the reason or explanation why the shock tactic is used, which creates confusion and greater interest. (Figure 1.)



**Figure 1. Common characteristics of terms referring to shock advertising**

*Source: developed by author based on literature review*

Based on the relevant literature review, the author offers the following definition: 'shock' advertising is a form of advertising that is designed to create a strong emotional impact on the audience by intentionally and unexpectedly violating social and moral norms, values and norms in order to attract people's attention, to differentiate among competitors, to achieve a higher level of message recall, as well as to persuade them to perform an action.

For the national context, shock advertising is a new, less studied field, but one that is attracting increasing attention from both theorists and practitioners in the field who are looking for innovative methods of communication. The importance of studying shock advertising is argued by the need to understand what reactions it can provoke among consumers, how it could help companies create a competitive advantage, and what are the benefits and risks of using shock tactics in different advertising contexts. Studies have focused on defining the elements and features of shock advertising, with the common emphasis that it must break social norms in a way that are intentional and unexpected by consumers. Researchers have demonstrated that shock advertising can be a much more effective means of attracting consumer attention and memorizing the message compared to traditional promotional methods, it has been observed that culture, beliefs, personal values of an individual are factors that could influence responses to shock ads and perceived offensiveness (Fam et al., 2004). For example, religious consumers may be more easily offended by the nature of shock advertising than non-religious consumers, especially if the advertisement uses religious taboos to promote the brand (Nooh et al., 2014). Demographic factors such as age and gender of the audience also influence the effectiveness of shock ads, with women being more likely to be offended (Lee et al., 2020), younger generations have a higher tolerance for shock levels compared to people who are Generation Y (Urwin et al., 2014), and people aged 22+ perceive shock ads as more offensive than younger youth (Waller et al.2013). Existing research on shock advertising focuses mainly on products and services that are offensive to consumers, such as cigarettes, alcohol, condoms, sexually transmitted diseases, and pharmaceuticals (Chan et al., 2007), less studied is the impact of various types of shock on consumer behavior. There are divergent and conflicting views on the factors that would influence consumer reactions in various contexts and the effectiveness of shock ads in the commercial and social communication (Parry et al., 2013). In the literature, more attention is paid to the analysis of the immediate impact of shock tactics in advertising and less to the sustainability or long-term impact of this communication



strategy. In addition, previous studies have described the components of shock advertising in isolation, and fewer have investigated the phenomenon in a context-dependent environment (Christy and Haley, 2008).

Studying the impact of shock advertising on consumers is important for several reasons:

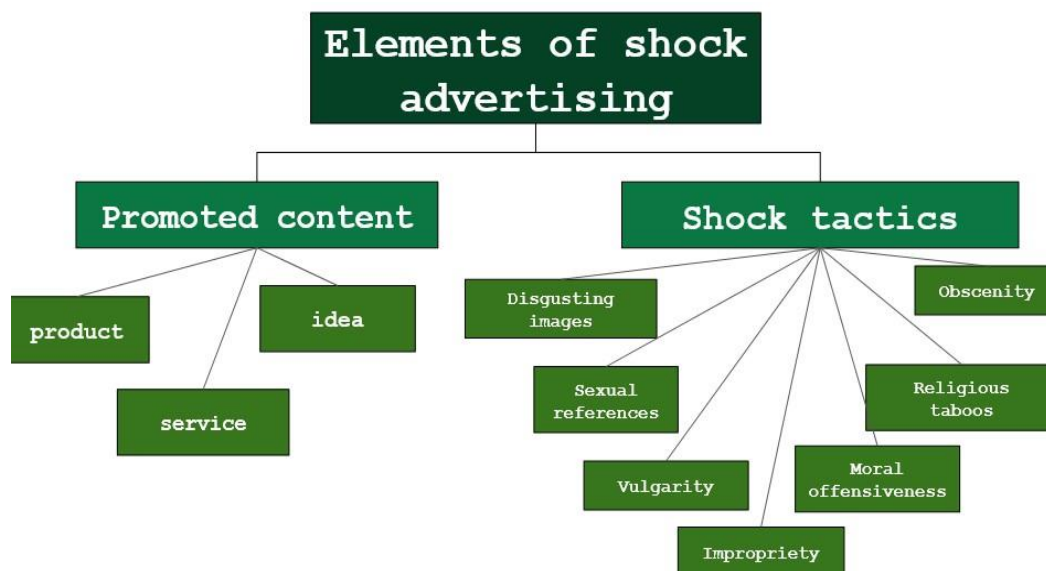
- *Ethics and responsibility in advertising*: Shock ads can have a powerful impact on consumers, influencing their attitudes, behaviors and purchasing decisions. It is important to assess the extent to which these advertising campaigns comply with ethical principles and whether they violate any social norms to ensure that the emotions and vulnerabilities of the public are not exploited or manipulated.
- *Emotional and psychological effects*: Shock ads can provoke intense emotional reactions such as shock, anxiety, sadness, or anger. By studying these effects, one can better understand how consumers react to such messages and images, and how they can affect their psychological and emotional state, and the opinion created towards the company and the object of promotion.
- *Influencing buying behavior*: Shock ads can influence consumers' purchasing decisions by creating a strong and memorable impression of a product or brand. By studying the impact of shock ads, it would be possible to assess how effective these strategies are in generating sales and brand loyalty.
- *Corporate image and brand reputation*: Shock campaigns can have immediate effects on a brand's corporate image and reputation. Studying these impacts can help companies understand how to manage and respond to possible negative reactions or criticism from the public.
- *Regulation and legislation*: Studying the impact of shock advertising can influence the development and implementation of advertising regulation and legislation, ensuring a balanced approach between creativity and freedom of expression and protecting consumer interests and welfare.
- *Raising attention and creating awareness*: Shock ads have the potential to differentiate themselves from other common advertising campaigns. By using provocative or unexpected elements, they can quickly grab the attention of the audience and make the product or brand easier to remember.
- *Generating discussion and audience interest*: Shock ads can spark intense discussion among the audience, and this can be an effective strategy to generate interest and curiosity around the product or brand being promoted. Thus, the campaign can benefit from increased exposure through media and social media.
- *Increased audience engagement and interaction*: Shock ads can lead audiences to interact more with the campaign, share content on social media or provide feedback. This increased engagement can help build a closer relationship between consumers and the brand.
- *Promote the social cause or message*: Some social marketing campaigns are designed to draw attention to important social causes or messages. By presenting

controversial or provocative themes, these campaigns can raise public interest in social or environmental issues.

- *Establishing a strong market position:* Shock ads can be useful in an intensely competitive environment where it is difficult to make a strong impression. By using unconventional messages or images, the brand can demonstrate that it is innovative and bold, which can differentiate it from the competition.
- *Evolution and innovation in advertising:* By studying the impact of shock advertising, one can better understand trends and changes in advertising and how messages and strategies adapt to new consumer demands and expectations.

It is important to note that the use of shock advertising comes with risks. It can be perceived negatively by certain consumer groups and can damage brand reputation in unexpected ways. Before adopting such a strategy, companies should do extensive research and consider the values and preferences of their target audience. Ethics and responsibility in advertising should also be considered to avoid the use of shocking messages or images that could be offensive or harmful to certain segments of the public.

Marketers have different approaches to the shock cases evoked in advertising and what would be the key element causing the shock. Wilson and West, Katsanis, Fahy(2018) argue that the audience might be shocked primarily by the advertising content itself. On the other hand, Percy, Albers-Miller and Stafford, Nadein and Petrova (2014) argue that the shock reaction could be caused by the shock tactics used in advertising which through various emotional appeals would create a shocking way in which advertising is presented. (Figure 2).



**Figure 2. Elements of shock advertising**

Source: developed by author based on Dahl et al, p.270

In a study based on the analysis of television commercials, Barnes and Dotson (2014) specified that the consumer's rejection reaction could be caused by the product being promoted and the emotional appeals that are used. Empirical research indicates that these features encourage cognitive processes that produce strong effects on memory, the

authors hypothesize that shocking advertising content, because it attracts attention and provokes cognitive processing, is more likely to influence appropriate behavior.

When evaluating offensive television advertising, Barnes and Dotson (2014) identified the following products that can generate shock reactions: condoms, feminine hygiene products, men's and women's underwear. Phau and Prendergast (2014) singled out cigarettes, alcohol, condoms, female contraceptives, feminine hygiene products as controversial. Waller (2005) presents a list of 15 products and groups them by their level of consumer offense (from least to most offensive): alcohol, cigarettes, condoms, female contraceptives, feminine hygiene products, women's underwear, funeral services, gambling, men's underwear, pharmaceuticals, political parties, racial extremist political groups, religious cultures, sexually transmitted diseases, and weight loss programs.

A more in-depth analysis of the emotions triggered by shock advertising was carried out by Dahl et al. (2003) who identified seven types of shock tactics or "shock appeals"): disgusting images, sexual references, profanity or obscenity, vulgarity, indecency (ethical rudeness), moral offences, religious taboos. The typology of shock tactics according to Dahl (2003) is described in Table 1.

The review of the scientific literature shows that active discussion of the purpose of shock advertising and its impact on consumer behaviour has attracted the attention of many researchers and is still relevant today. It is argued that shock tactics are used to make people stop and notice an advertisement. Researcher Williams (2007) agrees with this and states that shock is an effective means to capture attention and a quick way to communicate a message for any organization. In his studies Fendley (2003) notes that shock advertising attracts media interest and the company's name appears in the public eye. Meanwhile Dahl (2003) predicts that shock messages are used to draw attention to an advertisement in the hope of not only notice but also further elaboration of the issue.

The impact of shock tactics depends on demographic, socio-cultural factors and advertising context. One of the most important factor is age: Liu's studies show that there are differences in the perception of shock ads among consumers of different ages, usually younger consumers have a more positive view for the use of shock tactics than older people. This was confirmed by Hwa and Prendergast (2007), by concluding that people who were over 40 years old were more likely to refuse to buy products in shocking advertisements compared to younger people. Barry and Brugiere (2007) pointed out that the younger consumer segment may have a more positive attitude towards offensive advertisements and will not have a negative attitude towards buying the product.

Since the early 1970s, marketing researchers have observed that younger generations have different preferences, values and behaviours and react differently to company marketing efforts. So in 1971 they began researching and monitoring consumer behaviour in the US using a specific method - Yankelovich MONITOR. It was the first and most comprehensive study of Americans' lifestyles, buying behavior, and moral values. This innovative method has been used longitudinally from year to year, thus over twenty-five years an analysis of prospective social trends has been conducted. The system made

analyses of the similarities and differences between the behaviour of different generations. Thus emerged Wiliam Strauss and Neil Howe's theory of generations, deviding in five distinctive generations (Table 2).

**Table 1. Classification of shock tactics in advertising according to Dahl et al.**

Shock tactics/Offending element	Description	Examples
<b>Disgusting images</b>	Use of images of blood, body parts or secretions, orifices, especially urinary/fecal, gases, diseases, parasites, injuries, death.	<i>Social advertisements:</i> images of lung and mouth cancer on cigarette packets.
<b>Sexual references</b>	Images or references to sexual relations, full or partial nudity.	<i>Commercial advertising:</i> Dolce Gabbana, Opium perfume, Calvin Klein.
<b>Profanity / obscenity</b>	Swearing, obscene gestures, racial epitaphs.	<i>Social ads:</i> Smoking turns you into a slave (France), the importance of using condoms (Health Canada). <i>Commercials:</i> British clothing brand French Connection using FCUK brand abbreviation, Benetton - image of an African-American woman breastfeeding a white baby.
<b>Vulgarity</b>	References to cruelty or bad taste, actions of humans or animals, such as such as nose picking, humping or drinking from the toilet.	<i>Social advertisements:</i> the Bernardos organisation used an image of a child with a beetle instead of a spoon to collect donations.
<b>Indecency</b>	Violations of social values or breaches of decency and ethical norms e.g. dress, manners.	<i>Commercial ads:</i> Sisley with the image of shopping addiction, Darwin company with the advertising "Those Days", Covoare.md company.
<b>Moral offence</b>	Harming innocent people/animals, violence, alluding to persons or objects causing violence (e.g. Hitler), violation of standards of correct behaviour (e.g. shooting a person in the back), placing children in provocative situations (e.g. sexual, violent or exploitation of victims).	<i>Social advertisements:</i> Humans for Animals, with the image of a seal killing a baby, Concordia with advertising to collect donations to help poor children, with the image of children suckling from a pig.
<b>Religious taboos</b>	Improper use of spiritual words or religious symbols and/or rituals.	<i>Commercial:</i> Benetton company with a priest and a mother kissing, Ice cream maker Antonio Frederici with the image of two kissing priests, a pregnant nun.

Source: Developed by author based on Dahl et al, p.270

**Table 2. Delimitation of generations according to the theory of Wiliam Strauss and Neil Howe**

Years	Generation
1940-1960	Baby boomers
1960-1980	Generation X
1980-2000	Generation Y
2000-2020	Generation Z
2020	Generation Alpha

*Source: Developed by the author*

Each of these generations has its own moral values, opinions and personal attitudes towards the role of family and career, life balance, private life, which they have developed under the impact of the changing social environment. There are several studies that would analyse the relationship between the impact of shock tactics in advertising and the generation of the consumer. Sarry Perry et al have analysed how consumers of different generations react to shock advertising in the profit and non-profit sectors. The results of this study showed:

- Generation X finds shock tactics in advertising more controversial than Generation Y;
- Younger generations are more open to accepting shock in advertising and do not provoke negative emotions;
- Most baby boomers got insufficient information from shock ad content, which did not influence them to make the purchase, but created more confusion for them;
- Generation X is able to tune out shock advertising and ignore it;
- Generation Y finds many shocking ads on the internet and the level of offence is lower than Generation X;
- Generations Y and Z pay less attention to shock elements in advertising than older generations;
- Violence and fear are the highest perceived shock tactics for Generation Z.

Another study that set out to explore the effectiveness of shock advertising on Gen Y behaviour was conducted by Urwin and Venter. The results of this research revealed that the majority of respondents either did not remember anything about the shock ad, or only remembered the images, so the shock did not promote recall of the message, and the images sampled the content of the ad. Consumers rated the use of sexual references as the least shocking and therefore the most ineffective compared to the other shock tactics used in the study (religious taboos, disgusting images, indecency and moral offence).

A study by Kantar Millward Brown found that Generation Z is more accepting of unconventional gender roles and diversity in advertising. The study also found that this generation is more likely to engage with and distribute ads that align with their values and beliefs. Another study published in the Journal of Consumer Marketing found that

millennials are more likely to remember and interact with ads that causes strong emotions, including shock and surprise. However, the study also noted that these emotions must be related to the product or service being promoted to be effective.

A study by the Advertising Research Foundation found that while shock advertising can be effective in attracting attention and generating buzz, it is less effective in stimulating long-term brand loyalty and buying behaviour. The study suggested that shock tactics should be used with moderation and in combination with other advertising techniques. A study by The Drum found that Generation Z is more likely to be upset by shock advertising that is seen as insensitive or offensive. Overall, these studies suggest that shock tactics in advertising can be effective in engaging both Generation Y and Generation Z, but they need to be used carefully and in combination with other advertising techniques.

## 2. Data and Methodology

This study is a part of a complex exploratory research on the impact of shock tactics in advertising on local consumers. The main objective of the research is to assess the impact of shock tactics in advertising on consumer behaviour, to analyse various shock tactics to determine which are perceived to have a higher level of shock and to determine how does age factor influence consumers' perception of shock advertising, based on generation Y and Z, using neuromarketing method of research – eye tracking. Eye tracking can be a valuable tool in shock advertising research for several reasons:

1. **Understanding Attention Patterns:** Shock advertising relies on its ability to grab viewers' attention. Eye tracking reveals exactly where viewers are looking, helping researchers understand which elements of a shocking advertisement are the most attention-grabbing. This information can inform the design and placement of shocking elements for maximum impact.
2. **Assessing Emotional Responses:** Shock advertising often aims to provoke strong emotional responses. Eye tracking can be used in conjunction with other physiological measurements (e.g., facial expression analysis, heart rate monitoring) to assess how viewers emotionally engage with and react to shocking content.
3. **Analyzing Visual Engagement:** Eye tracking provides data on how long viewers dwell on specific elements within a shocking ad. Researchers can determine whether viewers linger on shocking images, indicating a deeper emotional or cognitive response, or if they quickly divert their gaze, suggesting avoidance or discomfort.
4. **Comparing Impact Across Audiences:** Different viewers may react differently to shock advertising due to factors such as demographics, personality traits, or prior experiences. Eye tracking can help researchers compare how various audience segments respond to the same shocking content, enabling more targeted and effective campaigns.

5. **Optimizing Creative Elements:** Shock advertising often involves a combination of visual and textual elements. Eye tracking can help pinpoint which elements are most effective in conveying the shock value and delivering the intended message.
6. **Determining Message Recall:** Shocking advertisements aim to be memorable. Eye tracking can be used in post-exposure tests to assess how well viewers remember specific aspects of a shocking ad, including key messages, brand names, or product details.
7. **Evaluating Ethical Boundaries:** Shock advertising sometimes pushes ethical boundaries. Eye tracking research can provide insights into whether viewers perceive shocking content as offensive, exploitative, or in poor taste. This information can guide ethical decision-making in advertising.
8. **Tracking Viewer Engagement Over Time:** Long-term exposure to shocking advertising can have varying effects on viewers. Eye tracking studies conducted over multiple exposures can reveal how viewers' attention and emotional responses change over time, helping advertisers fine-tune their campaigns.
9. **Comparing Shock Tactics:** Researchers can use eye tracking to compare the impact of different shock tactics within the same campaign or across different campaigns. This allows for data-driven decisions on which tactics are most effective for achieving campaign objectives.
10. **Consumer Insights:** By understanding how viewers engage with and respond to shocking content, advertisers can gain valuable insights into consumer preferences, sensitivities, and triggers. This knowledge can inform future marketing strategies beyond shock advertising.

The specifics of the methodology are detailed below:

### ***1. Tools and Equipment***

- **Application:** The study utilized the Ogama application, a renowned software for eye-tracking analysis. Ogama offers a comprehensive suite of tools that allow for the recording and analysis of visual attention data.
- **Hardware:** The Eye Tribe tracker was the chosen hardware for this study. This device captures the gaze data by tracking the movement and position of the participant's eyes in real-time.

### ***2. Stimuli***

The core of the research was based on eight distinct groups of stimuli. Each of these groups represented a category of advertising posters. Within each group, there were 3-5 individual images, each varying in design, content, and nature. This variety ensured a comprehensive understanding of participants' reactions to different types of advertisements within the same category.

### ***3. Participants***

- A total of 40 participants were invited to take part in the study.

- The participant pool was structured to ensure diversity in terms of age and sex. This was crucial to analyze and compare the differences in visual attention patterns across different demographic groups.

#### **4. Procedure**

During each individual experiment, a systematic approach to randomization was employed to ensure unbiased results. The order in which the eight groups of stimuli were presented to the participants was shuffled for every session. Furthermore, within each group, the specific stimuli (advertising posters) were also randomized in their presentation order. This double-layered shuffling technique was crucial in eliminating any potential sequence effects or biases that could arise from the consistent order of viewing. It ensured that participants' reactions were genuine and solely based on the content of the stimuli, rather than their position or sequence in the experiment.

- Participants were seated comfortably in front of the Eye Tribe tracker.
- They were then presented with the advertising posters from each of the eight groups, one at a time. The order of the groups was randomized to prevent any order bias.
- As participants viewed each poster, the Ogama application, in conjunction with the Eye Tribe tracker, recorded their gaze patterns, fixations, saccades, and other relevant eye movement data.
- The collected data provided insights into where participants looked, for how long, and in what sequence.
- Using the Ogama application, this raw data was then processed and analyzed to derive meaningful patterns and insights, especially concerning the differences in gaze behavior across age and sex.

The methodology was designed to ensure a comprehensive understanding of how different demographic groups perceive and interact with advertising posters, providing invaluable insights for marketers and advertisers.

The analysis of the collected eye-tracking data was conducted using a combination of SPSS and Python, capitalizing on the strengths of each software.

SPSS, a widely recognized statistical software, was primarily used for its robust data management capabilities and its suite of statistical tests. Descriptive statistics were first generated to get an overview of the data distribution. Inferential statistical tests, such as ANOVA and t-tests, were then conducted to determine significant differences between groups, especially concerning age and gender.

Python, on the other hand, was employed for its flexibility in data manipulation and visualization. Utilizing libraries such as pandas for data wrangling and matplotlib and seaborn for data visualization, the eye-tracking data was further dissected to reveal patterns and insights. Custom scripts were written to automate repetitive tasks, ensuring consistency in the analysis. Moreover, heatmaps and gaze plots were generated using Python to visually represent where participants focused their attention on the advertising posters.



Together, SPSS and Python provided a comprehensive toolkit for a thorough and nuanced analysis of the eye-tracking data, ensuring both statistical rigor and detailed exploratory insights.

The definitions of the eye-tracking indicators provided by research:

#### **1. Trial Durations (milliseconds)**

This refers to the total time a participant spends viewing a particular stimulus or image, measured in milliseconds (ms). It provides an indication of how long the content held the viewer's attention. If a viewer spends 5000 ms (or 5 seconds) looking at an advertisement, it suggests that the ad might have captivated their attention for that duration.

#### **2. Gaze Fixation Count**

This is the number of times a viewer's gaze remains relatively stationary on specific areas of interest within a stimulus. Each stationary period, where the eyes are taking in information, is termed a 'fixation'. If a viewer's gaze fixation count is 10 while looking at a magazine cover, it means their eyes settled and focused on 10 different areas while viewing that cover.

#### **3. Gaze Fixations Count Per Second**

This metric divides the total gaze fixation count by the total viewing time, giving an average of how many fixations occur every second. It can indicate how rapidly a viewer is processing or scanning the content. If a viewer has a gaze fixation count of 10 over 5 seconds, the gaze fixations count per second would be 2.

#### **4. Gaze Fixation Saccade Ratio**

A saccade is a rapid movement of the eye between fixation points. The Gaze Fixation Saccade Ratio compares the number of fixations to the number of saccades. A higher ratio might suggest that viewers are making rapid eye movements, possibly indicating surprise or shock. If a viewer has 5 fixations and makes 4 rapid eye movements between them, the ratio would be 5:4 or 1.25.

#### **5. Gaze Average Saccades Length**

This measures the average distance (in terms of screen space) between consecutive fixations. It can indicate how broadly or narrowly a viewer is scanning the content. If a viewer's eyes jump a long distance across a billboard to focus on a bold headline after reading a smaller text, the saccade length for that movement would be longer than if they were just reading the smaller text line by line.

Understanding these eye-tracking indicators can provide invaluable insights into how viewers interact with content, helping researchers and marketers optimize visual materials for their target audience.

### **3. The Model and Findings**

#### ***General Observations on 16-20 Years Age Group's Eye-Tracking Behavior:***

Based on the extensive discussion and analysis of the eye-tracking data across the various groups, here's a comprehensive analysis of how the younger age group (16-20 years) perceives and reacts to the stimuli:

The younger age group tends to have varied viewing times across different groups, suggesting a more dynamic and perhaps unpredictable engagement with visual stimuli. Their gaze fixation counts are generally lower in several groups, indicating a more focused or selective attention to specific elements of the content. The Gaze Fixation Saccade Ratio and Gaze Average Saccades Length in some groups indicate that the eyes of the younger demographic might move more rapidly, possibly reflecting a more exploratory or curious nature.

### *Specific Insights*

1. **Disgusting Images:** The younger age group had a slightly shorter viewing time, suggesting a possible aversion or quicker emotional processing of disturbing content.
2. **Religious Taboos:** Their viewing times were almost similar to the older age group, indicating a balanced or neutral stance towards religious imagery.
3. **Moral offense:** The younger group spent more time on these images, suggesting a deeper engagement or perhaps a more evaluative approach to content that challenges moral values.
4. **Sexual References:** Their gaze patterns indicate a more focused attention, possibly reflecting the curiosity or heightened interest typical of this age group.
5. **Indecency:** The younger age group spent slightly more time on these images, suggesting a deeper engagement or perhaps a more evaluative approach.
6. **Impropriety:** Their viewing times were slightly less than the older group, indicating a possible neutral or detached stance towards such content.
7. **Vulgarity:** The younger group had a shorter viewing time, suggesting a possible aversion or quicker emotional processing of such content.
8. **Positive Brand vs. Negative Brand:** Their viewing times were slightly shorter, indicating a more direct or straightforward approach to brand imagery (Tabel 3).

### *General Observations on 21+ Years Age Group's Eye-Tracking Behavior*

Based on the extensive discussion and analysis of the eye-tracking data across the various groups, here's a comprehensive analysis of how the older age group (21+ years) perceives and reacts to the stimuli:

- The older age group generally exhibits longer viewing times across several groups, suggesting a more contemplative or reflective engagement with visual stimuli.
- Their gaze fixation counts are generally higher, indicating a more comprehensive or detailed examination of the content.
- The Gaze Fixation Saccade Ratio and Gaze Average Saccades Length in some groups indicate that the eyes of the older demographic might move more deliberately, possibly reflecting a more analytical or methodical nature.

**Table 3. Eye tracking insights**

Shock tactics in advertising	Trial Durations milliseconds	Gaze Fixation count	Gaze Fixations count per second	Gaze Fixation Saccade ratio	Gaze Average Saccades Length
<b>Disgusting Images</b>	6702.2578125	9.55	1.39	387.21	230.28
<b>Religious Taboos</b>	5607.125	7.67	1.42	425.85	268.92
<b>Moral offense</b>	5616.125	8.03	1.49	393.33	190.00
<b>Sexual References</b>	5158.1	7.50	1.48	395.17	239.28
<b>Indecency</b>	5210.158	6.80	1.28	1.28	357.74
<b>Impropriety</b>	5244.4	7.45	1.43	1.43	388.88
<b>Vulgarity</b>	5702.6	8.26	1.41	1.41	414.11

Source: developed by the author based on eye tracking research data

**Specific Insights:**

- Disgusting Images:** The older age group had a slightly longer viewing time, suggesting a more contemplative or perhaps a more emotional processing of disturbing content.
- Religious Taboos:** Their viewing times were almost similar to the younger age group, indicating a balanced or neutral stance towards religious imagery, but with a slightly more detailed examination.
- Moral offense:** The older group spent less time on these images compared to the younger group, suggesting a quicker judgment or perhaps a more established stance on content that challenges moral values.
- Sexual References:** Their gaze patterns indicate a more comprehensive examination, possibly reflecting the maturity or nuanced understanding typical of this age group.
- Indecency:** The older age group had a slightly shorter viewing time, suggesting a quicker judgment or perhaps a more established stance on ethically challenging content.
- Impropriety:** Their viewing times were longer than the younger group, indicating a more contemplative or perhaps a more emotional processing of such content.
- Vulgarity:** The older group had a notably longer viewing time, suggesting a deeper engagement or perhaps a more reflective approach to such content.
- Positive Brand vs. Negative Brand:** Their viewing times were slightly longer, indicating a more analytical or methodical approach to brand imagery.

**Conclusions**

In essence, eye-tracking indicators suggest that the younger age group engages with visual content in a more dynamic and focused manner. Advertisers should prioritize engaging, dynamic, and resonant messaging when targeting this younger demographic.

- The younger age group (16-20 years) appears to engage with visual stimuli in a more dynamic and perhaps exploratory manner. They seem to have a more focused or selective attention, especially when the content is emotionally or ethically charged. Brands aiming to target this younger demographic might consider content that is engaging, dynamic, and resonates with the curiosity and evaluative nature of this age group.
- The older age group (21+ years) appears to engage with visual stimuli in a more contemplative and methodical manner. They seem to have a more comprehensive or detailed examination, especially when the content is emotionally or ethically charged. Brands aiming to target this older demographic might consider content that is nuanced, reflective, and resonates with the analytical and methodical nature of this age group.

In essence, eye-tracking indicators suggest that the older age group engages with visual content in a more contemplative and comprehensive manner. Advertisers should prioritize nuanced, reflective, and resonant messaging when targeting this older demographic group. It's important to note that these generational characteristics are generalizations, and individual reactions can vary widely within each generation. Successful shock advertising should consider the specific target audience and take into account not only generational differences but also cultural, regional, and individual variations in consumer behavior and preferences. Additionally, ethical considerations should always guide the use of shock tactics in advertising.

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## THE ROLE OF DIGITAL TECHNOLOGY IN THE DEVELOPMENT OF ENTERPRISES IN THE EUROPEAN UNION

Marina COBAN<sup>1</sup>

**Abstract:** *The adoption of digital technologies by EU businesses enables them to achieve better performance in terms of productivity, management practices, innovation and has a major impact on the economic growth of European countries. The aim of the paper is the analysis of digital transformation of enterprises in the EU states. We used comparative analysis of existing data from the Eurostat database. Several indicators are analyzed in this paper, such as the degree of digital intensity, the use of Cloud computing, Big data, Artificial intelligence, the share of SMEs that sell online and sell online cross-border in various EU countries. The advantages and disadvantages of e-commerce as well as the problems faced by SMEs in selling online cross-border, such as problems related to returning products, solving complaints and disputes, lack of knowledge of foreign languages were highlighted. Our study provides an overview of the current state of adoption of digital technologies by EU businesses and identifies the main trends of digital technologies progress in different EU countries.*

**Keywords:** *digital technology, digital transformation, Cloud computing, Big data, Artificial intelligence, e-Commerce*

**UDC:** [334.72:061.1EU]:004

**JEL:** O3, O52, P52

### Introduction

The use of digital technologies by enterprises allows to obtain better performances in terms of productivity, management practices, innovation. The digital transformation of the European Union countries is important for recovery, prosperity, security, competitiveness and the well-being of societies. This transformation is also essential for achieving the transition to a climate-neutral, circular and resilient economy. The EU's objective is to be digitally sovereign and to implement digital policies that enable citizens and businesses to benefit from a sustainable and more prosperous digital future.

In this regard, the present research has established the goal to analyze Digital technology indicators and Digital Intensity Index in large and SMEs in the EU countries.

Business digitalization involves connecting digital technologies to improve business processes, increase enterprise productivity and customer loyalty. Thanks to the use of digital technologies, companies can satisfy customer requests faster, simplify communication between business and client, automate communications within the company, reduce labor costs, gain competitive advantages, improve services and products and have the opportunity to expand their markets.

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In the present paper it is analyzed the situation in the field of digital transformation of enterprises in the EU states. Several indicators are analyzed, such as the degree of digital intensity, the use of Cloud computing, Big data, Artificial intelligence and the share of businesses that sell online.

The paper includes a literature review in the sphere of digital economy, the comparative analysis of the indicators was carried out based on Eurostat databases, the share of small and large enterprises in EU countries that have adopted digital technologies.

Afterwards, the present research provides several recommendations for increasing the degree of digitization of enterprises.

## 1. Literature review

In order to have a better understanding of the issues related to the use of digital technologies by enterprises in European countries a subset of the relevant literature was selected. Accordingly, *Shaping Europe's Digital Future* (2020, p.3) businesses need a framework that allows them to start up, scale up, pool and use data, to innovate and compete or cooperate on fair terms. And Europe needs to have a choice and pursue the digital transformation in its own way.

According to *2030 Digital Compass: the European way for the Digital Decade* (2021, p.2) digital technologies are now imperative for working, learning, entertaining, socialising, shopping and accessing everything. Using digital technologies, Europe can be digitally sovereign and can take advantage of digital transformations. Digitalization allows entrepreneurs to innovate, set up and grow their business wherever they live, opening markets and facilitating investments across Europe and globally, and creating new jobs.

The role of Digital Technology in the Development of the Enterprises has been discussed by many authors in their literature. A number of studies (Verhoef, P.C. *et al*, 2021, p.890) show that the use of digital technologies changes the business model of companies having organizational implications. Digital technologies help to create and appropriate more value for the firm (Kane, Palmer, Philips, Kiron, & Buckley, 2015, p.5).

Some authors (Parviainen, P., *et al*, 2017, p.63) mentioned that digitalization has been identified as one of the major trends changing business. The transition from the analogue economy to digital economy will lead to the changes in the structure of the economy and business model. (Oh D.H., Danilchanka A., Zhalezka B., Siniauskaya V., 2021, p.114). The digitalization is one of the most important provocations associated with the process of Industrialization 4.0 (Dorogaia, I., 2022, p.57). Digitalization causes changes for companies due to the adoption of digital technologies in the organization.

The global study of digital business (Kane, *et al*, 2015, p.3) found that maturing digital businesses are focused on integrating digital technologies, such as social, mobile, analytics and cloud. Less-mature digital businesses are focused on solving business problems with individual digital technologies.

Cloud computing essentially allows an enterprise to easily access IT resources anywhere and anytime with minimal need for control or oversight. Tanweer A., (2020, p.108) highlighted that Cloud computing has been considered as one of the best computing paradigms in the field of information technology in recent years.

In the modern business environment, the amount of information is growing rapidly in all areas of activity of the society. Big data, that is considered a key driver of marketing and innovation processes, allows to analyze these huge data sets and effectively use the results of this analysis in forecasting and making the right management decisions. Some authors Loebbecke, C., & Picot, A. (2015, p.149) highlighted that digitization and big data analytics reshape business models and impact employment.

Artificial intelligence — one of the newest technologies that permeates all business spheres. It helps companies improve customer service, process incoming calls, effectively use marketing tools, analyze competitors, etc. Its use by manufacturing enterprises allows solving complex tasks to increase productivity, lower costs and increase overall efficiency.

Big data, artificial intelligence (AI), blockchain and robotics will have major effects on business (Chen, Chiang, & Storey, 2012, P.1165; Ng & Wakenshaw, 2017, p.3).

The beginning of the 21st century is characterized by the rapid development of digital technologies. There are several business processes in which digital technologies are being introduced: product quality; the term of bringing the product to the market; production efficiency; logistics.

Thanks to the literature examined, the following idea can be pinpointed that only those enterprises that are equipped with digital technologies and are interested in digital interaction will eventually turn out to be the most capacious and profitable, demonstrating rapid development in a permanently changing global environment.

## 2. Research methodology

This paper is based on the analysis of the statistical data provided by Eurostat, on the examination of the strategies and policies developed by the European Commission on digitalization issues. To carry out the study, we used such scientific research methods as analysis and synthesis, which allowed us to present the essence of the studied theme, to highlight the advantages, benefits, challenges of the digital transformations of enterprises, to show the methods of solving different complex problems.

To compare the indicators related to digital technologies, we have used bar graphs, which allowed to visually represent data, to analyze, to identify differences among different EU countries and to interpret information in a concise way.

Systemic analysis and comparative analysis gave us the opportunity to compare the degree of digitization of enterprises in different EU states using such indicators as electronic sharing of information, use of social networks, use of more advanced technologies such as big data analysis, cloud services and artificial intelligence. Following



the research carried out, relevant conclusions were made and practical suggestions were offered that could help businesses take advantage of the benefits offered by digitization.

### 3. Findings

EU enterprises' use of digital technology is expressed through the Digital Economy and Society Index (DESI).

The digitalization of business includes the electronic sharing of information, the use of social networks, the use of the most advanced technologies such as big data analysis, cloud services and artificial intelligence (AI).

Businesses are increasingly digitalized, but the use of advanced digital technologies remains low. Although already 33,99% of EU enterprises are based on cloud computing (in 2022), only 7,91 % used AI (in 2022) and 14,22 % big data (in 2022).

Support measures amounting to EUR 24 billion are planned for the digitization of business and EUR 18 billion for research and development in the digital field. The largest investments in this area are offered by Italy, Spain, Germany and Greece.

Table 1 shows the values of this indicator for the 2021 year.

**Table 1. Digital technology indicators in EU enterprises**

Nº	Digital technology indicator	2022
1	SMEs with at least a basic level of digital intensity, % SMEs	54,86%
2	Electronic information sharing, % enterprises	38,09
3	Social media, % enterprises	29,34
4	Big data, % enterprises	14,22
5	Cloud, % enterprises	33,99
6	AI, % enterprises	7,91
7	ICT for environmental sustainability, % enterprises	65,89
8	e-Invoices, % enterprises	32,17
9	SMEs selling online, % SMEs	18,47
10	e-Commerce turnover, % SME turnover	11,64
11	Selling online cross-border, % SMEs	8,73

Source: DESI 2022

As we can see from table 1 in 2022, 54,85 % of SMEs used digital technologies, at least at the basic level of digital intensity. The largest share, 65,89 % of enterprises, use ICT for environmental sustainability. Electronic information is used by 38,09 % of enterprises, Cloud computing – 33,99 %, e-Invoices -32,17 %, social media by 29,34 % of enterprises. The use of other technologies is still at a low level. Thus, only 14,22 % of enterprises use Big data and 7,91 % AI.

According to Eurostat data, the best performers in the integration of digital technologies are Finland (59%), Denmark (58%) and Sweden (57%). Romania (15%), Bulgaria (16%) and Hungary (21%) show the worst performances.

According to the objective proposed in the Path to the Digital Decade, by 2030 more than 90% of SMEs should reach at least a basic level of digital intensity, 75% of EU companies should use cloud, AI and Big data.

To measure the use of different digital technologies at enterprise level it is used digital intensity index (DII). This index shows how many technologies out of 12 are used by the enterprise.

The basic DII level involves the use of at least four digital technologies. According to this criterion, SMEs with very high, high and low DII are distinguished.

Only in a few EU countries, such as Finland, Denmark, Malta and Sweden, the DII is very high, over 90%, which means that out of the 12 digital technologies monitored at least 10 are used. In these countries the share of enterprises with high DII is at least 80%. In Austria, Ireland, Slovenia and Germany this DII constitutes over 40%. Other countries such as Romania, Bulgaria, Hungary, Greece and Latvia have a very low DII, indicating the use of digital technologies by businesses in these countries in the range of 0-3 of the 12 technologies monitored. In Romania, Bulgaria, the share of enterprises with a basic level of digital intensity is less than 30%.

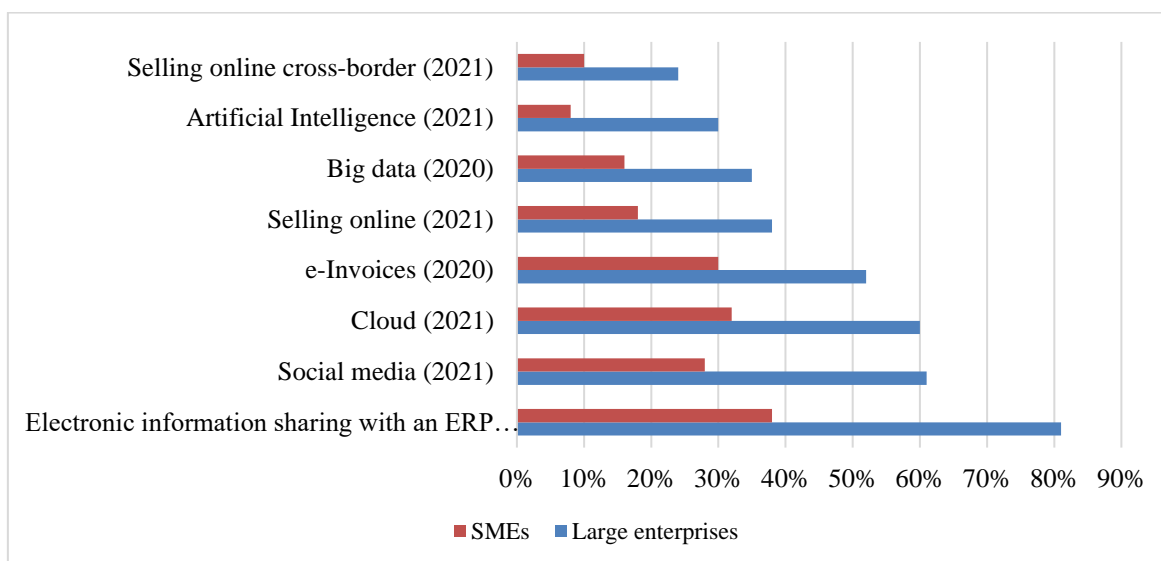
Table 2 shows the composition of the DII in 2021 and the degree of adoption of different technologies monitored by the DII. Large companies in the EU are more digitized than SMEs, but they still have reserves for increasing the indicators.

**Table 2. Digital Intensity Index indicators tracking digitization processes (% enterprises), 2021**

№	Digital Intensity Index indicators	Large	SMEs
1.	The maximum contracted download speed of the fastest fixed line internet connection is at least 30 Mb/s	95%	80%
2.	Use of any social media	83%	58%
3.	Enterprises where more than 50% of the persons employed used computers with access to the internet for business purposes	58%	49%
4.	Use of any cloud service	72%	40%
5.	Have software enterprise resource planning (ERP) package to share information between different functional areas	81%	37%
6.	Have customer relationship management (CRM)	65%	34%
7.	Buy intermediate-sophisticated cloud computing (CC) services	60%	33%
8.	Use of at least 2 social media	61%	28%
9.	Use any Internet of Things (IoT)	48%	28%
10.	Enterprises with e-commerce sales of at least 1% turnover	38%	18%
11.	Enterprises where web sales are more than 1% of the total turnover and B2C web sales more than 10% of the web sales	12%	11%
12.	Use any AI technology	28%	7%

Source: Eurostat, European Union survey on ICT usage and e-commerce in enterprises

Large enterprises are adopting digital technologies largely. Figure 1 shows the data on the adoption of digital technologies by small and medium-sized enterprises in 2020 and 2021.



**Figure 1. Adoption of digital technologies (% enterprises), 2020, 2021**

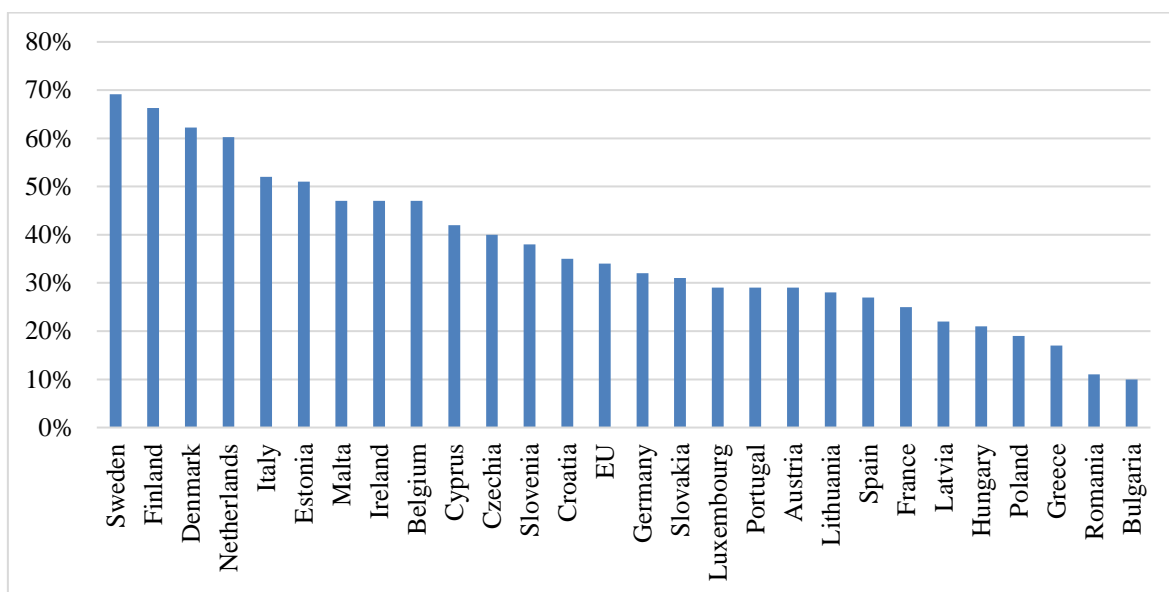
Source: Eurostat, European Union survey on ICT usage and e-commerce in enterprises

As we can see from figure 1, the percentage of large enterprises that use electronic information sharing through enterprise resource planning software (ERP) constitutes 81% while for SMEs it constitutes 37%. The share of companies using social media is 61%, while SMEs only 28%. Among large companies, 38% sell online and only 18% for SMEs. SMEs are lagging behind enterprises in the use of cloud, AI and big data.

Cloud computing is a model for providing enterprises access to computing resources, including servers, databases, software applications, storage capacity and computing power. Instead of building their own IT infrastructure enterprises can access computing resources hosted by third parties on the internet (the ‘cloud’).

The Path to the Digital Decade sets requirements that over 75% of EU enterprises adopt cloud computing until 2030. According to Eurostat data in 2021 34% of EU enterprises purchased sophisticated or intermediate cloud computing services for finances/accounting, for managing information about their customers (customer relationship management – CRM) and for planning their processes and resources (enterprise resource planning - ERP). Moreover, 24% reported using cloud computing platforms for computing power in order to run their own business software applications. One of five enterprises (21%) bought cloud computing services for testing, application implementation or development. In 2021 cloud uptake by large companies was 60% and by SMEs 33%. Figure 2 shows the data regarding share of enterprises per country using cloud computing services.

It can be observed that there are significant differences across countries. In Sweden (69%), Finland (66%), Denmark (62%) and the Netherlands (60%) at least 60% of enterprises used cloud computing. On the other hand, in Greece (17%), Romania (11%) and Bulgaria (10%) less than 25% of enterprises did so.



**Figure 2. Cloud computing services of sophisticated or intermediate level per country (% of enterprises), 2022**

Source: Eurostat, European Union survey on ICT usage and e-commerce in enterprises

The analysis of cloud computing services usage by sector showed that 66% of enterprises in the ICT sector use these services at sophisticated or intermediate level, followed by publishing activities; motion picture, video and television program production, sound recording and music publishing, programming and broadcasting (60%); travel agency/tour operator reservation service and related activities (48%), real estate activities (41%); accommodation (36%); electricity, gas, steam, air conditioning and water supply (35%); wholesale and retail trade; repair of motor vehicles and motorcycles (33%), manufacturing (32%); transportation and storage (29% of enterprises). The sector with the least cloud usage is the construction sector (26% of enterprises).

The Path to the Digital Decade sets requirements that over than 75% of EU companies adopt big data by 2030. Big data is larger, more complex sets of data that are so large that traditional data processing software cannot manage them, but they can be used to solve business problems that were previously impossible have been able to tackle before.

Big data are characterized by volume, variety and velocity. With big data, there are possibilities to process high volumes of unstructured data. Variety refers to many types of data that are available. Traditional data types were structured. With the rise of big data, data comes in new unstructured data types. Unstructured data types, such as text, audio, and video, require additional preprocessing to derive meaning and support metadata.

***Big Data can help to range business activities such as:***

- *product development*- enterprises use data and analytics from focus groups, social media, market tests to plan, produce and launch new products;
- *predictive maintenance* - by analyzing some indications of potential issues before the problems have happened, organizations can deploy maintenance more cost effectively and maximize parts and equipment uptime;

- *customer experience* - Big data enable to gather data from social media, web visits, call logs, and other sources to improve the interaction experience and maximize the value delivered;
- *fraud and compliance* - Big data help to identify patterns in data that indicate fraud and aggregate large volumes of information to make regulatory reporting much faster;
- *machine learning* - availability of big data allows to train machine learning models;
- *operational efficiency* - with big data, there is the possibility to analyze and assess production, customer feedback and returns, and other factors to reduce outages and anticipate future demands.
- *drive innovation* - Big data can help to innovate by studying interdependencies among humans, institutions, and process and then determining new ways to use those insights.

***Big Data have some benefits:***

- Big data make it possible to gain more complete answers because there is more information.
- more complete answers means a completely different approach to tackling problems.

According to Eurostat data, in 2021 34% of large enterprises used big data, and only 14% of SMEs used big data.

Analysis of Big data usage by sector showed that enterprises are more likely to analyze big data in the travel agency, tour operator reservation service and related activities and in publishing activities sectors (both at 28%), followed by the ICT (25%); transportation and storage (22% of enterprises); electricity, gas, steam, air conditioning and water supply (20%); accommodation (17%); wholesale and retail trade; repair of motor vehicles and motorcycles (15%); construction(13%); real estate activities (13%); manufacturing (10%).

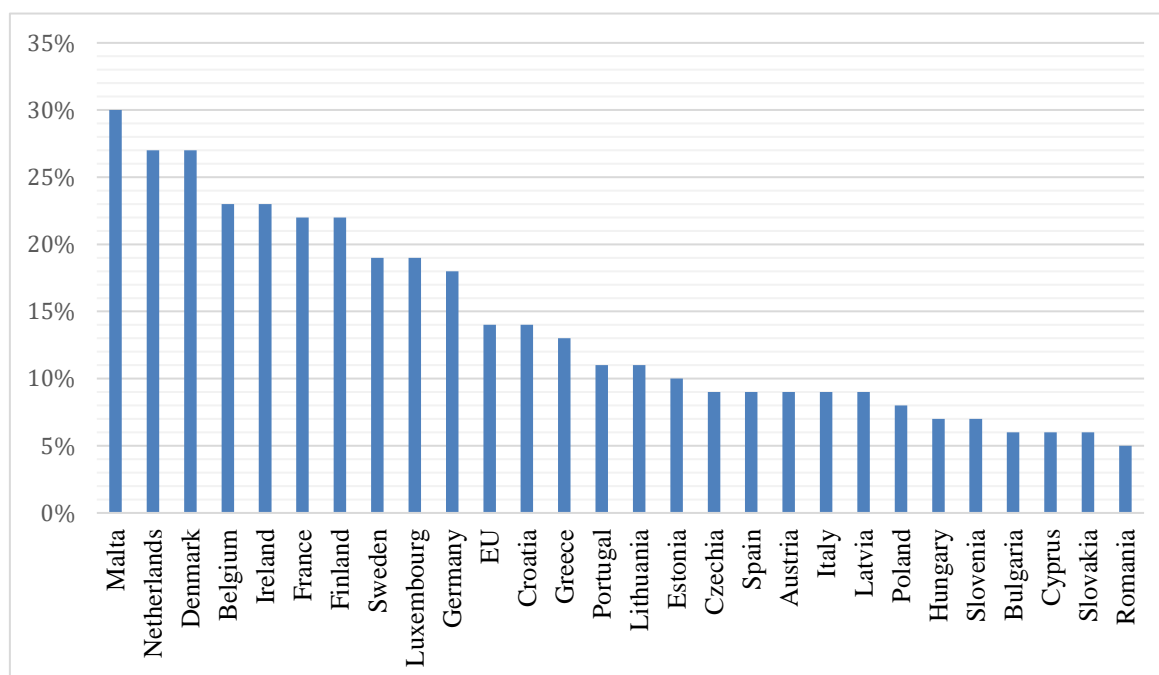
The analysis of the share of enterprises analyzing Big data is presented in figure 3.

According to the data in figure 3, in Malta almost 30% of enterprises analyze big data, followed by the Netherlands and Denmark with 27%. Only 5-6% of enterprises in Romania, Slovakia, Cyprus and Bulgaria analyze big data.

The Path to the Digital Decade target requires that more than 75% of EU companies adopt AI technologies by 2030.

The application of artificial intelligence in the enterprise changes the way of business work. There are applications for enterprises based on AI to enhance customer service, maximize sales, assure cyber-security, optimize supply chains, free up workers from some tasks, improve existing products and develop new products.

Enterprise leaders determined the use of AI to face big challenges. The domain of artificial intelligence is changing rapidly because of the enormous amount of AI research being done. There are a multitude of AI use cases. Investment in AI-enabled hardware and software robotics is expected to rise.



**Figure 3. Enterprises analyzing big data (% of enterprises), 2022**

Source: Eurostat, European Union survey on ICT usage and e-commerce in enterprises

Business leaders must understand how AI works, where AI technologies can be used by businesses and where they cannot. It is important to know all benefits and risks:

- current and potential AI use cases;
- how to elaborate a successful AI strategy;
- the necessary steps for implementing AI tools in the enterprise.

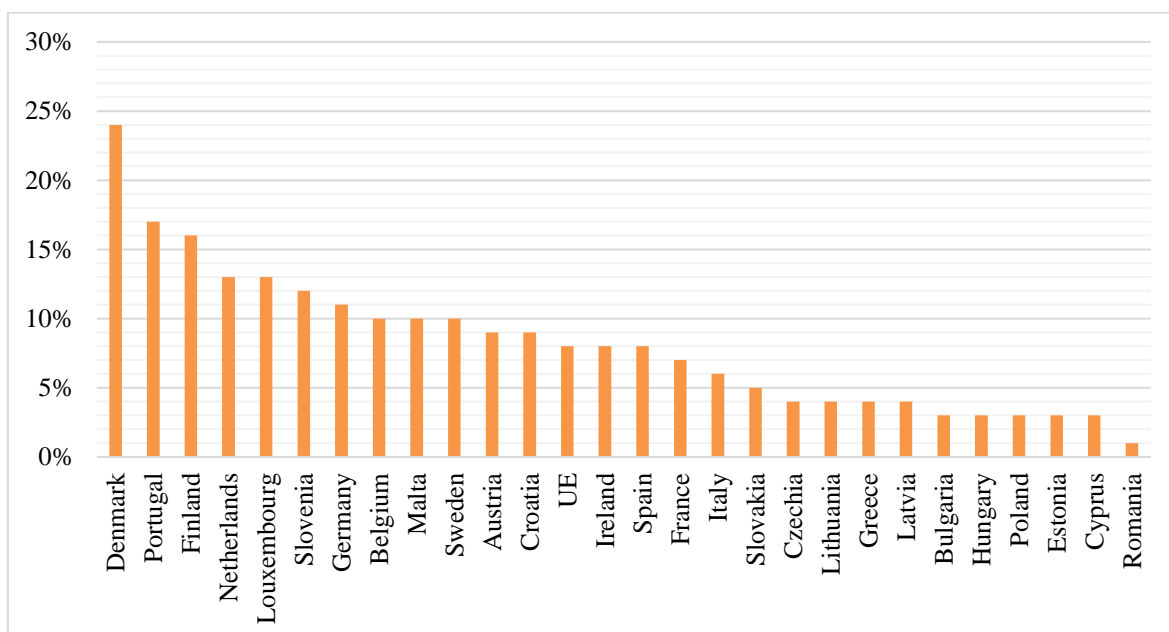
The analysis of the share of enterprises using an AI technology is presented in figure 4.

According to the data in figure 4, the adoption of AI technologies in European Union countries is quite low, at 8%. However, there are some differences between Member States. Some countries have an adoption rate of AI technologies above 10%. Among them there are Denmark (24%), Portugal (17%), Finland (16%), the Netherlands (13%), Luxembourg (13%), Slovenia (12%), Germany (11%), Belgium (10%), Malta (10%), Sweden (10%).

There are seven countries with an adoption rate between 5 and 10%, such as Austria (9%), Croatia (8%), Ireland (8%), Spain (8%), France (7%), Italy (6%), Slovakia (5%).

Another 10 countries have a very low adoption rate of up to 5%, for example Czechia (4%), Lithuania (4%), Greece (4%), Latvia (4%), Bulgaria (3%), Hungary (3%), Poland (3%), Estonia (3%), Cyprus (3%).

Romania has the lowest absorption of AI in the EU, 1%. This situation is due to the very low level of digitization of enterprises in Romania. Basic technologies are not widely used by businesses and advanced technologies are not widespread.



**Figure 4. Enterprises using an AI technology (% of enterprises), 2022**

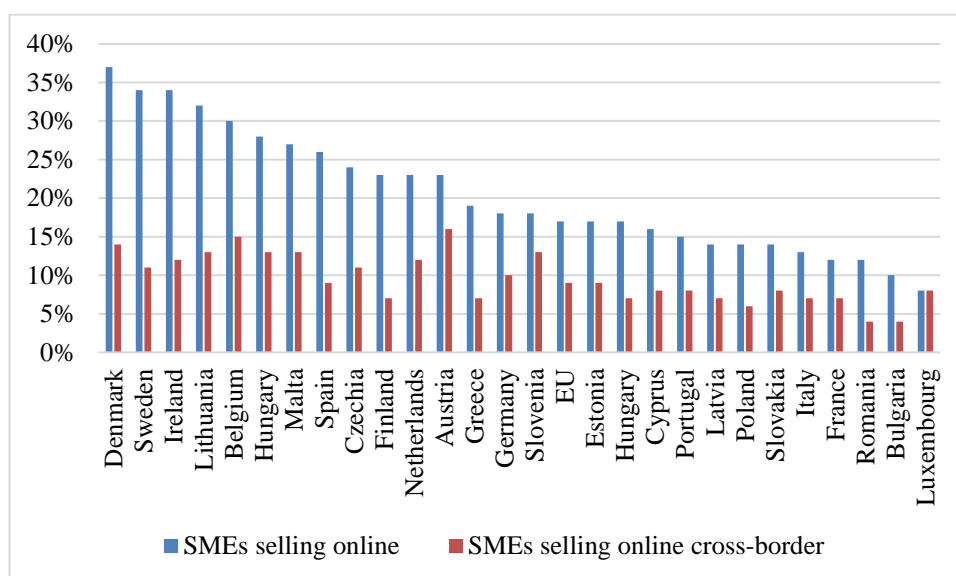
Source: Eurostat, European Union survey on ICT usage and e-commerce in enterprises

A sectoral overview shows that in 2021 the ICT sector was ahead in the use of AI technologies with 25% of enterprises adopting AI, followed by publishing activities at 18%. Other sectors, adopt the AI in the following way: travel agencies - 8% of enterprises; electricity, gas, steam, air conditioning and water supply - 8%; real estate activities - 7%; manufacturing - 7%; accommodation - 7%; wholesale and retail trade; repair of motor vehicles and motorcycles - 6%. The use of AI technologies shows an uptake of about 5% in transportation and storage and the construction sectors.

Digital services in the EU are regulated by the Digital Services Act (DSA) and the Digital Markets Act (DMA). These rules contribute to creating a safer and more open digital space, where the rights of users of digital services are protected; they establish fair competition conditions to stimulate innovation and competitiveness. In 2021, 20% of small and medium-sized enterprises in the EU produced online sales amounting to 12% of the total turnover. In the period 2015-2021, the number of SMEs that sold online increased by 3%, and the turnover of these enterprises increased by 2%.

Businesses that sell online result in reduced costs, increased efficiency, and improved productivity. E-commerce has an important role for both large companies and SMEs, both on the domestic market and abroad. But in 2021, only 9% of SMEs produced online sales to customers from other EU countries.

The indicators regarding selling online and selling online cross-border are reflected in the European Union survey on ICT usage and e-commerce in enterprises. The analysis of the share SMEs selling online and selling online cross-border is presented in figure 5.



**Figure 5. SMEs selling online and selling online cross-border (2021) (% of SMEs)**

Source: Eurostat, European Union survey on ICT usage and e-commerce in enterprises

According to Eurostat data in 2021, SMEs from Denmark (37%), Sweden (34%), Ireland (34%), Lithuania (32%) and Belgium (30%) had the most online sales. In cross-border online sales Austria is the leader with sales of 16% out of all businesses, followed by Belgium (15%), Denmark (14%), Malta (13%) and Slovenia (13%)

The majority of SMEs (56%) with web sales in other EU countries have no difficulties in cross-border online trade. On the other hand, 43% of SMEs report at least one obstacle in online cross-border trade such as high costs of delivery or product returns, problems related to the resolution of complaints and disputes, and lack of knowledge of foreign languages.

E-commerce has certain advantages such as: faster buying process, cost reduction, available advertising and marketing, flexibility for customers, faster response to market demands, several payment modes, easier exports.

But there are also some disadvantages of e-commerce such as : potential security threats, competition, IT issues, shipping logistics, limited connection with customers.

E-commerce has helped businesses gain access and establish a wider market presence by providing cheaper and more efficient distribution channels for their products or services.

## Conclusions

Thanks to the use of digital technologies, companies can gain competitive advantages, improve services and products, and have the opportunity to expand their markets.

The analysis of the use of cloud computing by businesses shows that 34% of EU businesses have purchased sophisticated or intermediate cloud computing services, such as finance/accounting applications, for managing customer relationship management



information and for planning their processes and resources. Significant differences can be observed between countries. In Sweden, Finland, Denmark and the Netherlands, at least 60% of businesses used cloud computing. On the other hand, in Greece, Romania and Bulgaria, less than 25% of businesses have done so.

Today, there is a massive amount of data used by businesses. With big data, it is possible to process large volumes of unstructured data. Big Data can help in various business activities such as product development, predictive maintenance, customer experience, fraud and compliance, machine learning, operational efficiency, driving innovation. The leader among European countries analyzing big data is Malta, with almost 33% of businesses followed by the Netherlands and Denmark with 27%. Only 5-6% of enterprises in Romania, Slovakia, Cyprus and Bulgaria analyze big data.

Applying artificial intelligence to save money, increase efficiency, generate insights and create new markets is changing the way businesses work. There are AI-based business applications to improve customer service, maximize sales, ensure cyber security, optimize supply chains, relieve workers of certain tasks, improve existing products, and develop new products. Adoption of AI technologies in European Union countries is quite low, of 8%. However, there are some differences between Member States. With regard to electronic commerce, we found that in 2022, 18,4% of small and medium-sized enterprises in the EU sold online. Online sales result in reduced costs, increased efficiency and improved productivity for businesses. E-commerce plays an important role for both large companies and SMEs, both domestically and abroad.

The analysis allowed to identify the level of digitalization of enterprises in different European countries. In European countries, business is increasingly digitized, but the use of advanced digital technologies remains low. Large companies in the EU are more digitized than SMEs, but they still have room for improvement. SMEs must be ready for implementing digital technology.

In these circumstances, the European Union must improve the legal framework in order to create favorable opportunities for the digitalization of enterprises in different countries.

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## THE IMPROVEMENT OF ACCOUNTING AND DOCUMENTATION OF THE GOODS SALE THROUGH ELECTRONIC SETTLEMENT METHODS

Eudochia BAJEREAN\*<sup>1</sup>  
Andrei JIZDAN\*<sup>2</sup>

**Abstract:** *The domestic commercial entities use as an alternative settlement method: payment services offered by e-money companies. This article is intended for both theoreticians and practising accountants, since, in addition to developing the existing theoretical basis, the aim is to identify relevant solutions for solving problematic accounting issues related to the documentation of the use of local payment services. Technological progress does not stand still, and in the last decade, so-called companies issuing electronic money have started to appear on the local trade market of the Republic of Moldova. The importance of the topic requires research into the practical application and accounting of transactions related to the use of payment services offered by e-money companies. The applied research methodology involves both general and specific approaches such as: analytical method, web-graphical analysis, synthesis method, comparison method, systemic method and other relevant research methods. Therefore, in the following, an attempt will be made to identify the correct way of documenting the cash collection process by applying domestic payment services.*

**Keywords:** *payment services, Paynet, e-commerce, electronic money institution, settlement methods.*

**UDC:** [657.28:004.738.5]:339.18(478)

**JEL Code:** M40, M41.

### Introduction

In addition to "traditional" settlement methods, such as the payment of funds to the cashier of the business entity by customers/purchasers of goods and services, which is supported by the issuance of the tax invoice and ECC voucher, or the execution of the bank transfer, business entities currently use the services provided by e-money companies (e.g. Paynet) as settlement methods.

Thus, in accordance with the provisions of the Law no.114 (2012) on payment services and electronic money, the National Bank maintains public registers of payment institutions, postal service providers and electronic money issuers, which have been issued/withdrawn/suspended the license of the National Bank for the activity of providing payment services, respectively, for the activity of issuing electronic money.

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Law no.114 (2012) is applicable to payment service providers for the activity of providing payment services, as well as to electronic money issuers for the activity of issuing electronic money (Law no.114, 2012).

The technological progress keeps on going and in the last decade, so-called e-money companies have been emerging on the local trading market of the Republic of Moldova. Thus, according to the legal provisions, a payment institution is a commercial company, other than a bank, a postal service provider or an e-money institution, which holds a license for the provision of payment services, and an e-money institution is a commercial company, other than a bank, which holds a license for the issuance of electronic money (Law no.114, 2012).

Thus, the following categories of payment service providers can be distinguished:

- a. banks and subsidiaries of banks in other countries, operating in accordance with Law No 202/2017 on the activity of banks ("traditional" bank transfers);
- b. payment companies (National Bank of Moldova, 2023);
- c. e-money institutions (National Bank of Moldova, 2023);
- d. postal service providers operating in accordance with the Postal Communications Law No 36/2016 (Law no. 36, 2016);
- e. National Bank of Moldova (hereinafter - National Bank) - if it does not act as monetary policy authority or other public authority;
- f. State Treasury of the Ministry of Finance (hereinafter - State Treasury).

The relevant for commercial entities are the payment services offered by electronic money institutions.

Researchers Mihaila, S., Codrean, V., Bădicu, G. and Dască, I. (2021), are among the few local scholars and authors who have been concerned with the issues of the researched field. On the international level, the works of the author Grosu, V. (2022) are relevant to this subject.

Currently, payment services offered by electronic money institutions have started to be applied by entities operating in the retail sector, in particular, by those economic agents who widely sell to customers/buyers via the Internet, i.e. by using so-called online shops or internet shops. As a result, such trade entities become active participants in a new form of commercial activity - e-commerce, which simultaneously with the pandemic situation "sparked" or even better "went up in flames" and offers traders as well as manufacturers in the Republic of Moldova the opportunity to provide buyers with efficient, simple and fast settlement methods.

The way of use, functioning as well as accounting of operations involving the application of bank cards (issued by commercial banks), is already well known to the trade entities in the Republic of Moldova. Concerning the use of payment services offered by e-money companies as a method of settlement with customers/buyers, commercial entities are currently facing major difficulties, problems and limitations due to the fact that the local legislation contains significant gaps in this respect. This raises dilemmas and problematic issues related to the correct reflection in the accounting records and the proper

documentation of such economic transactions. In most cases, payment services offered by electronic money institutions operate in a similar, almost identical way from an accounting point of view, with minor differences in the additional or specific services and options, as well as in the fees charged by electronic money institutions.

The above arguments prove the topicality and importance of the subject under discussion, thus establishing the necessity of investigating the complex problematic issues related to the use of payment services offered by electronic money issuers (e.g. Paynet) by the trade entities in the Republic of Moldova, as well as the improvement of these settlement methods by studying the major changes and metamorphoses that have taken place in the business environment in the Republic of Moldova, as well as the development of new technical solutions in the last decade.

The purpose of the work is to identify the exact way of documenting and accounting the economic operations directly related to the collection of funds from the buyers of the trading entities for goods sold through payment services offered for use by e-money companies, through a unique but complex approach oriented to the study of processes and actions in the trading entities through an in-depth analysis of the innovations occurring in the commercial activities. Without pretending to have exhausted, dissected and totally consumed this topic, there is a strong certainty that the subject addressed will serve as a starting point for further and more in-depth studies in this new and very broad field.

At the same time, it is strongly expected to formulate relevant conclusions, well-founded recommendations, proposals and suggestions of know-how aimed at eliminating the problems identified and to bring the domestic regulatory framework closer to the economic reality in which trade entities operate. Similarly, there is an obsession with establishing with certainty the legally binding documents necessary for documenting operations aimed at the use of domestic payment services by trade entities as a settlement method.

The topicality of the subject is reconfirmed by the strong need for knowledge, constant examination and analysis involving reasoning and criticism of the way of documenting and accounting for economic transactions involving the use of payment services offered by electronic money companies as settlement methods, targeting tools based on high-performance information technologies in commercial establishments during the course of their business activities as a tool for assessing the results obtained. Generally speaking, we anticipate a drastic reduction in the use of cash flow in the economy in the future, especially with regard to commercial relationships, which will inevitably lead to the emergence of new settlement methods that will substantially reduce the use of "paper" in the process of making payments for goods purchased by buyers. Thus, the investigation of new settlement methods from an accounting and tax point of view is the way forward, which in our view has a much higher value.

Since the settlement method through the payment services offered by the companies issuing the electronic currency is just beginning to be applied by the commercial entities, a few relevant publications in this regard have been identified like Jizdan (2017) and Jizdan (2018). Thus, this research has an absolutely innovative

character, because it presents the entire cycle of documents necessary to document the economic operations related to the use of payment services offered by companies issuing electronic currency. These aspects in particular are subject to study and analysis, and so we consider that the work investigates a topical subject for the local, regional and other accounting environment. The subject under investigation is both topical and relevant, thus generating increased interest and attention from both theorists, tax experts and practicing accountants dealing with business entities.

With reference to the issues examined, the following research objectives have been identified, which allow the topic to be addressed:

- examining the information flows relating to the particularities of accounting for economic transactions using local payment systems as settlement methods;
- justifying the need to develop the theoretical basis for accounting for the collection of funds using electronic methods in general and local payment systems in particular;
- investigating the aspects related to the accounting of accounting items in commercial entities, involving an in-depth analysis of the literature through the application of innovative scientific techniques and procedures.

By focusing on the investigated topic, the aim is to obtain results that will be translated into the development of the theoretical and practical knowledge basis on the use of payment services offered by electronic money issuers to commercial entities in the Republic of Moldova, as well as the formulation of proposals and suggestions regarding the improvement of documentation, taxation and accounting related to the process of collecting funds from buyers through domestic payment services adapted to the changes that have occurred over more than a decade of time. Therefore, the scientific results that are submitted for support relate to the improvement of the documentation and accounting process for electronic settlement methods, including the payment services offered by electronic money issuers.

### **3. Data and Methodology**

Any scientific work involves the careful selection of research methodology. Thus, in this particular case, the aim is to identify the correct way of documenting and accounting for the process of cashing funds by using the payment services offered by e-money companies as settlement methods, having as a strong basis multiple research methods considered relevant to the topic under investigation:

- the analytical method (investigation of the most important theoretical issues arising directly from the literature currently available);
- the synthesis method (gathering relevant information and summarising the most important aspects concerning the collection of money laundering for goods sold through domestic payment services);

- the comparison method (studying, in contrast and by comparison, how the collection of funds is documented and accounted for using "traditional" and electronic settlement methods);
- the systemic method (arguing and interpreting relevant information);
- other relevant research methods.

The similar methodology was successfully applied in other researches like Mihaila, S., Codrean, V., Bădicu, G. and Dascăl, I. (2021) and Grosu, V. (2022), which represents an additional reconfirmation of the relevance of the application of the chosen research methodology.

The work envisaged for elaboration will include multiple complex scientific-methodological materials on all aspects related to the peculiarities and specifics of cash collection for goods sold in case of using payment services offered by e-money companies, with the use of scientific research methods such as: observation, inductive and deductive reasoning, analysis, classification, documentation, recording and synthesis.

The legislative and normative acts in the field of accounting in the Republic of Moldova, as well as the visions and theoretical expositions of scholars and specialists from the Republic of Moldova as well as from abroad, will serve as support for the research.

#### 4. The Model and Findings

In order to identify the relevant scientific publications related to the topic and subject under investigation, a statistical analysis of the publications (so-called bibliometric analysis) was carried out using several relevant research criteria. Thus, the analysis was carried out using the Google Scholar search engine, and identified a relatively limited number of researches and publications, which reconfirms the topicality and importance of the investigated topic, as well as its innovative character.

There are no express answers to the practical questions and dilemmas in the local legislation. Thus, this research will attempt to identify solutions and formulate concrete answers to some of the problems identified, based on the fact that the business environment and accountants cannot be "satisfied" with interpretations of the legislation in force regarding the documentation of the collection of funds through payment services.

Following the in-depth analysis carried out, it is evident that the issue under study is of great interest to researchers and scholars from Moldova and abroad, as confirmed by the small but growing number of publications and research on e-commerce in general and payment services in particular. This repeatedly reconfirms the evolution of accounting in relation to the development of new forms of commerce as well as the settlement methods used.

##### ***The use of payment services offered by companies issuing electronic money***

Since payment services offered by electronic money issuers in the Republic of Moldova operate in a similar way from an accounting and tax point of view, we will examine the Paynet payment service as a relevant example.

The Paynet payment system is intended for online shops and web services. Using the web interfaces of the Paynet service, the commercial entity provides the opportunity for



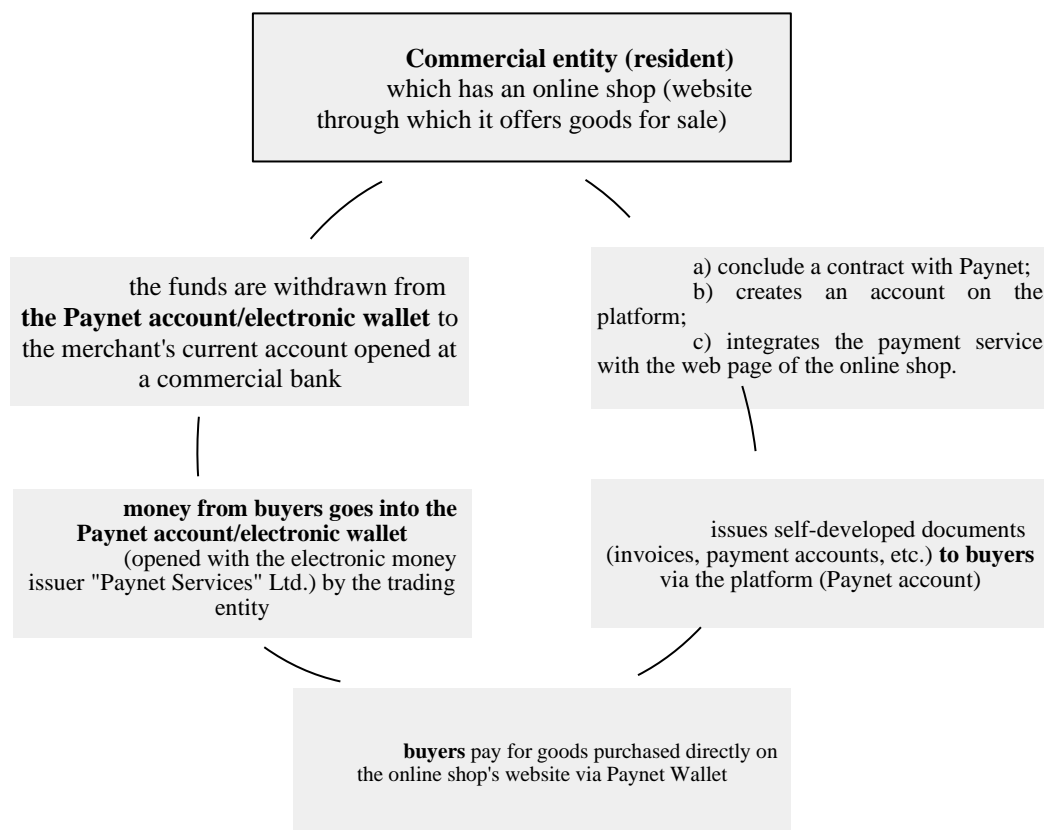
their customers/buyers to have the possibility to make payments from bank cards and e-wallets. In addition to the Paynet web interface, the merchant has access to the loyalty system of the Paynet e-money issuer. More information about the services and benefits offered by the Paynet payment service can be found by visiting [www.paynet.md](http://www.paynet.md) (Paynet Services SRL, 2023).

### ***Paynet payment service working principle***

The matter of the cash collections for goods sold and services rendered to buyers by trading entities is a highly important one, and continues to be very topical. Extremely important are the problems faced by practising accountants with regard to the correct reflection of such transactions involving the use as a settlement method with purchasers: the payment service offered by an electronic money company, in particular Paynet.

For a better accounting and tax understanding of operations using the Paynet payment service, it is recommended to read the information and conditions of use of this platform, which can be viewed on the official website [www.paynet.md](http://www.paynet.md).

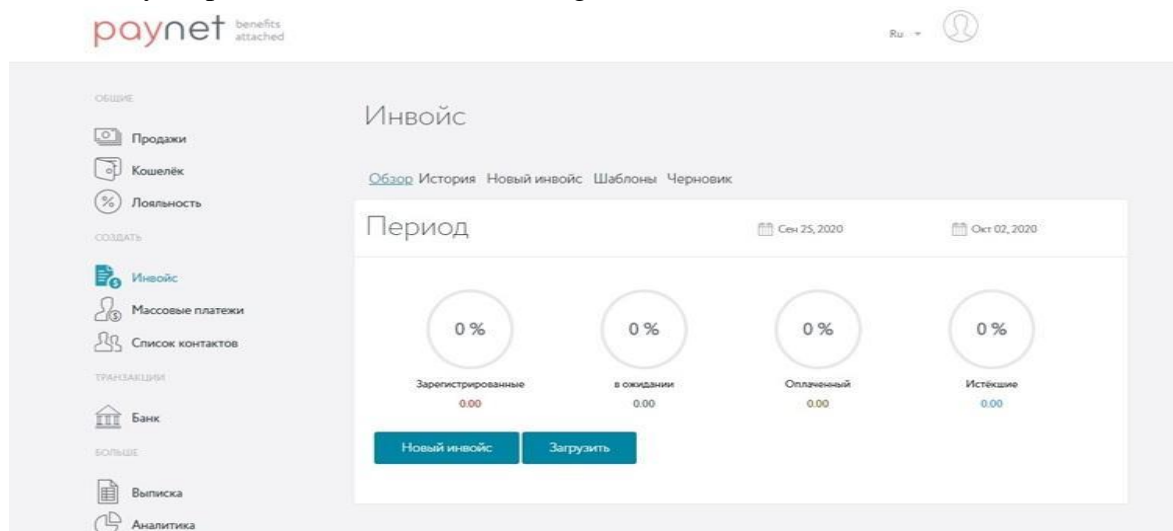
Very simply stated, the principle of operation of transactions using the Paynet payment service is presented in the figure below:



**Figure 1. Paynet payment service working principle**

*Source: developed by the author*

As a general rule, in order to use the payment service offered by the electronic money institution Paynet, the commercial entity shall conclude a contract with "Paynet Services" SRL, under which the commercial entity obtains an electronic wallet (account) within the Paynet platform ([www.paynet.md](http://www.paynet.md)). From a practical point of view, an eWallet on the Paynet platform is shown in the image below:

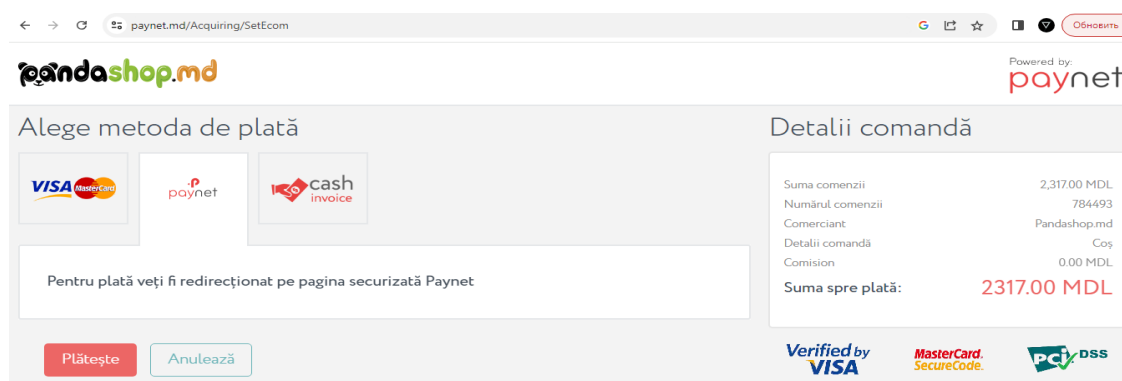


**Image 1. The visual aspect of the Paynet electronic wallet**

Source: <https://paynet.md>

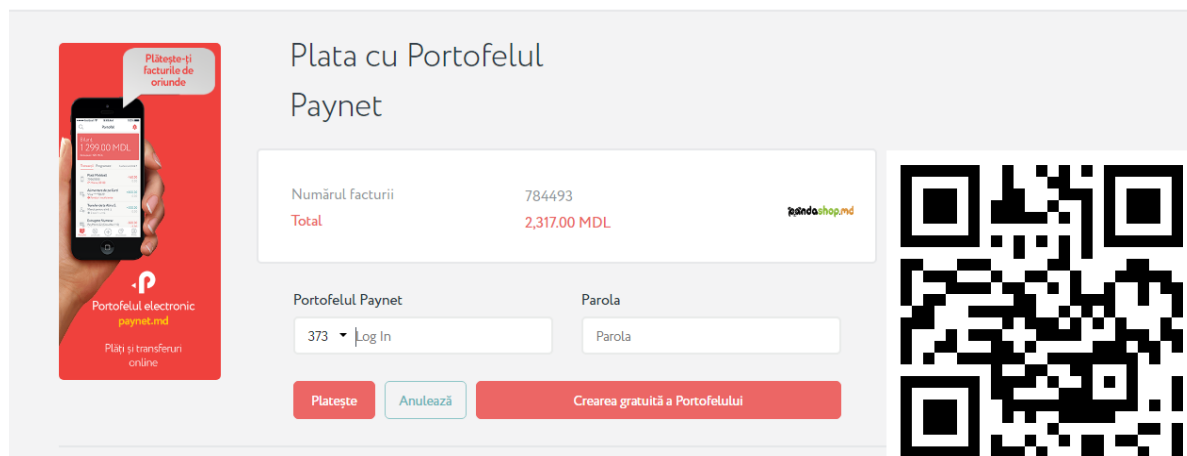
Once the e-wallet is created, the commercial entity has two options:

- a. integrating the Paynet payment service directly on the web page of the online shop (if the commercial entity has an online shop). In this case, the buyer will purchase the goods directly on the web page of the online shop by adding the product to the virtual shopping cart. At the last stage of the purchase, the buyer will choose the payment method, one of these methods being the payment via the Paynet payment service. From a practical point of view, the choice of payment method by the buyer directly on the web page of the commerce entity is shown in the images below:



**Image 2. The choice of payment method by the buyer directly on the webpage of the commercial entity**

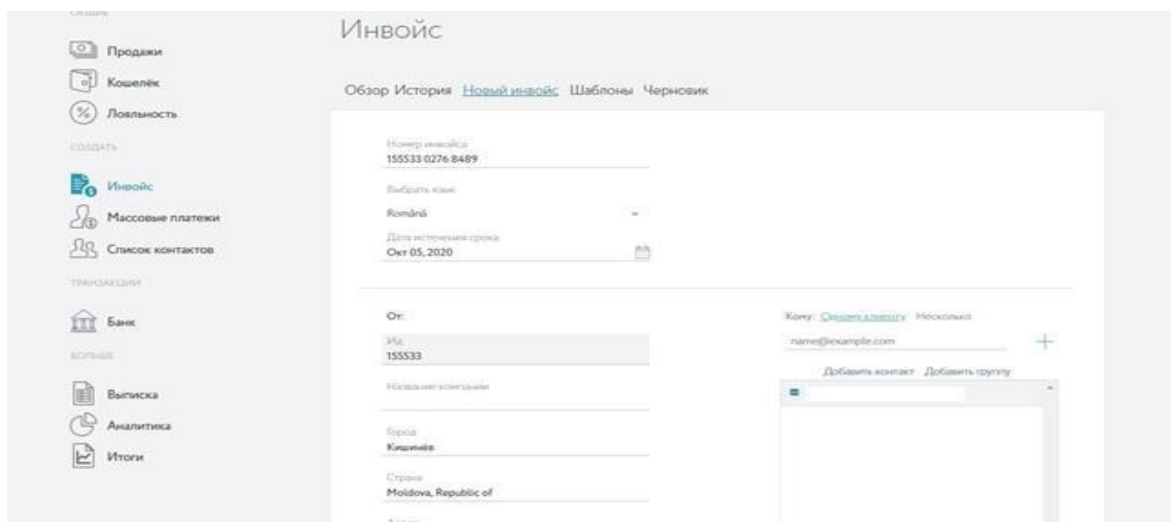
Source: <https://paynet.md>



**Image 3. The visual aspect of the Paynet payment interface /**

Source: <https://paynet.md>

- b. in the absence of an online shop (website), the commercial entity can create payment accounts within the account/electronic wallet that can be sent to buyers via email, viber, whatsapp, telegram, etc. The buyer will receive a link, when opening it, he/she will be able to pay for the goods purchased through the Paynet electronic wallet (opened as a natural person), by bank card, at the terminal, at the commercial bank counter. The payment account issued via the Paynet platform is illustrated below:



**Image 4. The payment account issued by the commercial entity to the buyer via the Paynet platform**

Source: <https://paynet.md>

The funds paid by the buyers will be accumulated in the merchant's Paynet eAccount/Portfolio. All cash receipts can be viewed based on the primary document: the Paynet statement, illustrated below:

Выписка

5453010000155533 - Счет

Сен 01, 2020

Сен 02, 2020

тип	детали	дата	дебет	кредит	баланс
Конечный баланс					9,742.56
	VGS-Victoriabank/2020-09-14 13:35:37/637356867942935449/20.40 MDL / 680.00 MDL	сен 16, 2020, 12:01	659.60		9,742.56
	VGS-Victoriabank/2020-09-14 11:57:50/637356812974605395/20.40 MDL / 680.00 MDL	сен 16, 2020, 12:01	659.60		9,082.96
	VGS-Victoriabank/2020-09-12 12:27:32/637355103245498904/20.40 MDL / 680.00 MDL	сен 14, 2020, 12:00	659.60		8,423.36
	VGS-Victoriabank/2020-09-11 15:22:23/637354343872113411/20.40 MDL / 680.00 MDL	сен 13, 2020, 12:00	659.60		7,763.76
	VGS-Victoriabank/2020-09-11 12:52:21/637354251183373143/20.40 MDL / 680.00 MDL	сен 13, 2020, 12:00	659.60		7,104.16
	VGS-Victoriabank/2020-09-11 12:49:08/637354251188998813/55.00 MDL / 1836.00 MDL	сен 13, 2020, 12:00	1,780.92		5,444.56
	VGS-Victoriabank/2020-09-05 17:09:15/63734922327860123/20.40 MDL / 680.00 MDL	сен 07, 2020, 12:00	659.60		4,663.64

**Image 5. Statement of cash receipts from buyers on the Paynet platform /**

Source: <https://paynet.md>

At this point, the trading entity has the possibility to withdraw funds to a current account opened in a commercial bank in the Republic of Moldova. The bank statement, shown in the picture below, serves as the primary supporting document:

AccountStatement

Page 1 of 2

Help

Statement for account:

Name: AO ~ Currency: MDL

Client: AO ~ Fiscal code:

Opened: 28/06/2019

IBAN: I

Date	Debit	Credit	Doc number	Doc type	Account	Receiver/Payer	Bank code	Fiscal code	Destination
06/05/2020	Sold initial	0.00							
06/05/2020		435.00	01	1	MD25ML000000002796963547		MOL.DMD.2X363	1002600028096	Transferarea platilor incasate de la persoane fizice din 05.05.2020
06/05/2020	1.00		293314565	6	MD56ML0000000022512632029		MOL.DMD.2X363	1018620004781	Transferarea platilor incasate de la persoane fizice din 05.05.2020
06/05/2020	3.88				MD24ML000000000046778631				1.-1.3. Deservirea conturilor (MDL, multivalutar) Contul: 22512632029 pentru perioada: 20200328 - 20200428
06/05/2020	96.98				MD24ML000000000046778631				1.-1.5. B. Plata pt. deservirea lunara a sistemului MICB Web-Business Contul: 22512632029 pentru perioada: 20200406 - 20200506
07/05/2020		313.60	07	1	MD25ML000000002796963547		MOL.DMD.2X363	1002600028096	Transferarea platilor incasate de la persoane fizice
07/05/2020	1.00		293409351	6	MD56ML0000000022512632029		MOL.DMD.2X363	1018620004781	Transferarea platilor incasate de la persoane fizice
12/05/2020		3,100.00	528	1	MD29AG0000000022373064389	(R) PAYNET SERVICES SRL	AGRNMD2X	1013600036596	Transfer banilor din contul 5453010000155533 in sistemul Paynet conform m cererii 278588227023238 din 11/05/20

Statement options:

From: 01/05/2020

To: 31/05/2020

Print options:

add document Credit

add document Debit

Export to IC:

Export for Universal Accounting:

Export to PDF


**Image 6. The bank statement reflecting the withdrawal of funds from the Paynet Electronic Account/Portfolio to the bank current account**

Source: developed by the author

At the end of each calendar month, the electronic money issuer of Paynet shall issue the commercial entity with a tax invoice for the fees for the payment service provided. The electronic money institution usually charges two types of fees:

- the fee for the use of the payment service (PSP fee);
- the fee for withdrawing funds from the Paynet account/electronic purse to the current bank account opened in a commercial bank in the Republic of Moldova.

Formular tipizat  
Anexa nr. 1 la Ordinul Ministerului Finantelor  
nr. 118 din 28 august 2017 a.  
Типовая форма  
Приложение № 1 к Приказу Министерства Финансов  
№ 118 от 28 августа 2017 г.

FACTURA FISCALA      Seria, Nr.      AAL7366957      

НАЛОГОВАЯ НАКЛАДНАЯ      Серия, №

Data eliberării / data livrării Дата выписки / Дата поставки      30 aprilie 2021 / 30 aprilie 2021		8. Foaia de parcurs seria: numar: data:									
1. Furnizor: Поставщик      Paynet Services SRL, adr.Chisinau, bd. Decebal 6, cont. MD04AG00000022612222715, BC'MOLDOVA-AGROINDBANK'S.A. suc.'Miron Costin', BIC AGRNMD2X710		9. Transportator Перевозчик      Paynet Services SRL, adr.Chisinau, bd. Decebal 6									
2. Cumpărător/beneficiar: Покупатель      LEATHERMAX SRL, mun. Chişinău, sec. Ciocana, str. Ginta Latină, 12/16, ap.(of.) 51		c.f./nr.TVA ф.к./код НДС      1013600036596 / 0507447									
3. Delegație data delegatului		4. Documente anexate Прилагаемые документы      Raport №04/2021									
5. Punct încărcare Пункт погрузки      Chisinau, bd. Decebal 6		6. Punct descărcare Пункт разгрузки      mun. Chişinău									
7. Redirijări Передросовки											
10.1 Denumirea mărfurilor / activelor, serviciilor și codul poziției tarfane al mărfii / activului Наименование товаров / активов, услуг и код товарной позиции / актива	10.2 Unitatea de măsură Единица измерения	10.3 Cantitatea mărfurilor/activelor, volumul serviciilor Количество товаров/активов, объем услуг	10.4 Preț unitar fără TVA, lei Цена единицы без НДС, лев	10.5 Valoarea totală fără TVA, lei Общая сумма без НДС, лев	10.6 Cota TVA Ставка НДС %	10.7 Suma totală a TVA, lei Общая сумма НДС, лев	10.8 Valoarea mărfurilor/activelor, serviciilor, lei Стоимость товаров/активов, услуг, лев	10.9 Alta informație Другая информация	10.10 Tip ambalaj Тип упаковки	10.11 Număr locuri Количество мест	10.12 Masa brută, tone Масса брутто, тонн
00001061 Comision PSP	шт	1,000	315,94	315,94	Fără TVA		315,94				
00000764 Comision retragerea E Wallet	шт	1,000	10,00	10,00	Fără TVA		10,00				
11. TOTAL (pe pagină) / Всего (по странице)				325,94	x		325,94	x	x	x	
12. TOTAL (pe factura fiscală) / Всего (по налоговой накладной)				325,94	x		325,94	x	x	x	
13. Permis eliberarea: Отпуск разрешен:		Contabil, Gornostaeva Inna		15. Primit mărfurile/activele intermediarului (transportatorului): Принят товар(активы) посредника (перевозчика)							
16. Predat mărfurile/activele intermediarului (transportatorului): Сдан товар(активы) посреднику (перевозчику)				17. Primit mărfurile/activele (serviciile) cumpărătorului/beneficiarului: Принят товар(активы) (услуги) покупатель		director					
Predat mărfurile/activele (serviciile): Сдан товар(активы) (услуги)											

**Image 7. Fiscal invoice issued by the electronic money institution related to the fees for using the payment service and withdrawing funds from the Electronic Wallet/Account**

Source: developed by the author

Additionally, Paynet issues a report on payments received via the payment service from purchasers of goods and services, which is a primary supporting document necessary for accounting for the amount of money received by the electronic money institution on behalf of the merchant.

**Raport**

pentru perioada de raportare: 01.04.2021-30.04.2021

întocmit în baza Contractului privind acceptarea plăților în mediul Internet (magazine electronice)

№ PSP 12-02/20 Achitare PSP din 12.02.2020

mun. Chișinău

30.04.2021

**Paynet Services SRL**, reprezentată legal prin Administrator, Dnul Greadcenco Călin, care acționează în baza statutului, denumită în continuare "Provider", pe de o parte

**Leathermax SRL**

reprezentată legal prin Director, D-I(na), care acționează în baza statutului, denumită în continuare "Comerciant", pe de o altă parte,

Luând în considerare prevederile Contractului privind acceptarea plăților în mediul Internet ( magazine electronice)

PSP 12-02/20 Achitare PSP din 12.02.2020, pentru perioada de raportare: 01.04.2021-30.04.2021 este întocmit Tabel r

Datoriile restante Providerului față de Comerciant la începutul perioadei	Valoarea totală de plăți primite de către Provider pe parcursul perioadei de gestiune în favoarea Comerciantului	Valoarea totală transferată pe contul Paynet al Comerciantului din suma plăților	Valoarea comisionului reținut către Provider	Datoriile restante Providerului față de Comerciant la sfârșitul perioadei
1	2	3	4	5=1+2-3-4
-	10 418,00	10 102,06	315,94	-

Luând în considerare prevederile Contractului-Cadru privind utilizarea Portofelului Electronic și a Contului Paynet nr. CC 12-02/20 din 12.02.2020, pentru perioada de raportare: 01.04.2021-30.04.2021 este întocmit Tabel nr.2 :

Nr.	Denumire comision	Comision, %	Valoarea tranzacțiilor, lei	Valoarea comisionului reținut, lei
0	1	2	3	4=2*3
1	Comision pentru transferul mijloacelor banesti la cont bancar din contul 5453018843703899 în Sistema Paynet, nu se aplică TVA	10,00	1,00	10,00

Valoarea totala comisionului reținut a constituit : 325,94 ( Trei sute douăzeci și cinci lei 94 bani ).

Comerciantul nu are pretenții față de calitatea serviciilor prestate de către Provider.

Prezentul Raport este întocmit în două exemplare, având aceeași putere juridică, câte unul pentru fiecare din părți.

**SEMNĂTURILE PĂRȚILOR:****Image 8. Primary supporting document: report on acceptance of payments on the Internet**

Source: developed by the author

Thus, the report on payments received via the payment service from purchasers of goods and services shows the total amount of payments received by the electronic money institution during the reporting period (calendar month) in favour of the commercial entity, the total amount transferred to its Paynet account and the amount of the commission charged by Paynet. Therefore, the commercial entity has all the information and primary supporting documents to correctly reflect the economic transactions in the entity's accounting records.

## Conclusions

With regard to the documentation of transactions involving the use of payment services offered by electronic money institutions, including Paynet, we consider that primary supporting documents should be used for such economic transactions:

- report on acceptance of Internet payments (issued by the e-M institution);
- Paynet statement, which displays cash receipts from the merchant's customers/buyers;
- the tax invoice relating to the fees charged by the electronic money institution;
- the delivery-receipt document concerning the fees charged by the electronic money institution;
- the current bank account statement reflecting the withdrawal of funds from the Paynet Electronic Account/Portfolio to the current bank account.

In accordance with the provisions of Law No 287/2017 (Law No. 287, 2017) on accounting and financial reporting, those should be recognised as primary supporting documents, and can be used for accounting of economic transactions involving the use of this payment system.

We can generally state that in the context of globalization, the development of modern payment tools and the growth of online sales of goods and services, an increasing number of commercial entities in the Republic of Moldova are diversifying their payment processing systems, including by implementing payment services offered by e-money companies. In order to achieve this goal, it is necessary to identify some innovative tax solutions, adjusted to the current economic reality.

In our opinion, the process of improving the accounting of trade entities certainly concerns the segment of settlement methods and instruments, since the development of electronic payment services offered by local (Moldovan) e-money companies is an inseparable element of trade relations both now and in the not so distant future.

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## FOREST FIRES IN A CHANGING CLIMATE: RISK ASSESSMENT AND MANAGEMENT IN LEIRIA NATIONAL FOREST, PORTUGAL

Kwadwo YEBOAH BOTAH\*<sup>1</sup>

**Abstract:** Forest ecosystems are vital for sustainable development and human well-being globally and in Europe. Sustainably managed forests are fundamental in combating natural disasters and providing multiple important goods and services for humans and the environment. However, with increasing climate change and its associated effects, forests have become severely and regularly prone to fires. This is seriously threatening forest protection, human safety, the economy, and biodiversity. In this context, understanding future forest fire risks, susceptibility, hazards, and fire prevention is essentially needed. This study thus examines the forest fire risks and hazards in Leiria National Forest (Mata Nacional de Leiria), Portugal using the 2017 forest fire as a benchmark. With the adoption of GIS and remote sensing techniques and data, vegetation type (NDMI), human factors (roads and settlement proximity), and terrain characteristics (slope and aspect) were assessed to map fire risk. Through multi-criteria analysis, these data were integrated to generate a forest fire risk index. Results demonstrate that about 46% of the study area is within high-risk and risky zones, 50% is considered moderate-risk fire zones and 3% is classified as low and risk-free zones. Sensitivity analysis indicated that high-risk areas are mostly low moisture coniferous fuel types while risk-free areas are high moisture deciduous fuel types. Further, it was established that the observed high-risk and risky zones are attributed mostly to proximity to settlements and roads and little topographical influence. The study thus suggests an increased future forest fire risk under the prevailing conditions and a hiking potential of increased burnt areas. We thus proposed effective proactive measures and adaptive management approaches to prevent and mitigate the devastating impacts of forest fires within the study location.

**Keywords:** Forest Fires, Climate Change, Fire Risk Assessment, Spatial Framework, Fire Hazards, Leiria National Forest, Mediterranean Europe

**UDC:** 005.931.11:614.841.42(469)

**JEL Code:** Q51, Q54, Q57

### Introduction

Forest fires are becoming considerably common in Europe as a result of climate change and its potential consequences (Pausas, 2009; San-Miguel-Ayanz, et al. 2018; EFFIS, 2021). While fire prevention efforts in the Mediterranean region have increased, high warming scenarios, frequency of drought, and low precipitation levels coupled with land use conditions are anticipated to result in an increased risk of forest fires, expanded burn areas, and longer fire seasons in most European regions (Buhk et al. 2006; Oliveras et al., 2011; Casau et al. 2022; Parente et al. 2022). Better information and more knowledge

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are consequently needed to understand future forest fire risks and develop innovative preventive measures. Large-scale forest fires have negative consequences on forest ecosystems, services, and functions such as affecting air and water quality, biodiversity, species richness, soil, and landscape aesthetics (San-Miguel-Ayanz, et al. 2018; Rodrigues et al. 2020; Pacheco et al. 2021). Additionally, they contribute to climate change as they emit high amounts of greenhouse gas emissions and particles into the atmosphere that disturb air quality and lead to health problems and economic losses (Eskandari, 2017; Nuthammachot et al., 2019; EFFIS, 2021).

In Portugal, wildfire accounts for a majority of the country's burned surface area mostly driven by climate and weather conditions (heat, wind) (Pausas, 2004; Aguiar et al., 2021; Parente et al., 2022). During the last few decades, Portugal has experienced a significant number of wildfires usually as a result of a combination of drought, heat, wind, as well as socio-economic and land-use factors (Pausas, 2004; Rodrigues et al., 2020; Farinha et al., 2022). Climate change and land-use activities have led to increased growth of woody vegetation, rising flammable fuel load, and changes in moisture content that are critical to fire ignition and spread (Ruffault et al., 2016; Castro et al. 2020; Casau et al., 2022). In 2003 summer, Portugal accounted for the worst-hit country in the EU burned forest area estimation (Eisenreich, 2005; Clerici et al., 2014; San-Miguel-Ayanz, et al., 2018; Júnior et al., 2022). This led to severe financial loss (1 billion euros loss), social cost (loss of lives), and ecological impacts (PM<sub>10</sub> emissions, forest loss) (UNEP, 2004; Pereira et al., 2005; Oliveira et al., 2017; Casau et al., 2022). Portugal has been described as a hotspot of forest fires in Europe (Pereira et al., 2005; Júnior et al. 2022; Parente et al., 2022).

In 2017, wildfires in Portugal made the country the highest in terms of forest fires and burnt areas (60%) in Europe (EFFIS, 2021; Casau et al., 2022; Júnior et al. 2022). A wildfire that burnt 86 percent (94000 ha) of the largest Portuguese public forest, Leiria National Forest (Mata Nacional de Leiria (MNL), in the central west of the country, was the major contributor (Botequim et al., 2017; Aguiar et al., 2021). This forest fire was directly responsible for multiple disturbances such as loss of biodiversity and lives, and a decline in forest cover (Botequim et al., 2017; ICNF, 2017; Castro et al., 2020). About 84% of Maritime pine trees (*Pinus pinaster* Aiton) which covers most areas of the land were affected by the fire (Rodrigues, et al., 2021). MNL forest is known for its crucial functions such as timber production, recreational activities, and cultural significance (AFN, 2010 cited in Aguiar et al., 2021). The forest has a history of wildfires dating back to the 19th century that pose a significant threat to the biodiversity, and social, and economic functions of the forest (Pinto, 1938; Botequim et al., 2017). Climate change (heatwaves and drought), human activities, and ineffective management practices have been described as the main drivers responsible for the fires (Nunes et al., 2016; Parente et al. 2017; Castro et al., 2020). This has made the forest receive considerable attention in environmental discourse over the years. Forest fire incidence continues to increase because of existing natural and human pressures on the forest Botequim et al., 2017; ICNF, 2017; Castro et al., 2020). With an expected increase in climate change and its related hazards and risks

(social, economic, environmental, health, etc.) coupled with the evolution of human influence on the environment in some years to come (IPCC, 2014), it is essential to understand forest fire risk levels and the likelihood and magnitude of future forest fire events to enable the development of plans to identify and prioritize fire-prone zones.

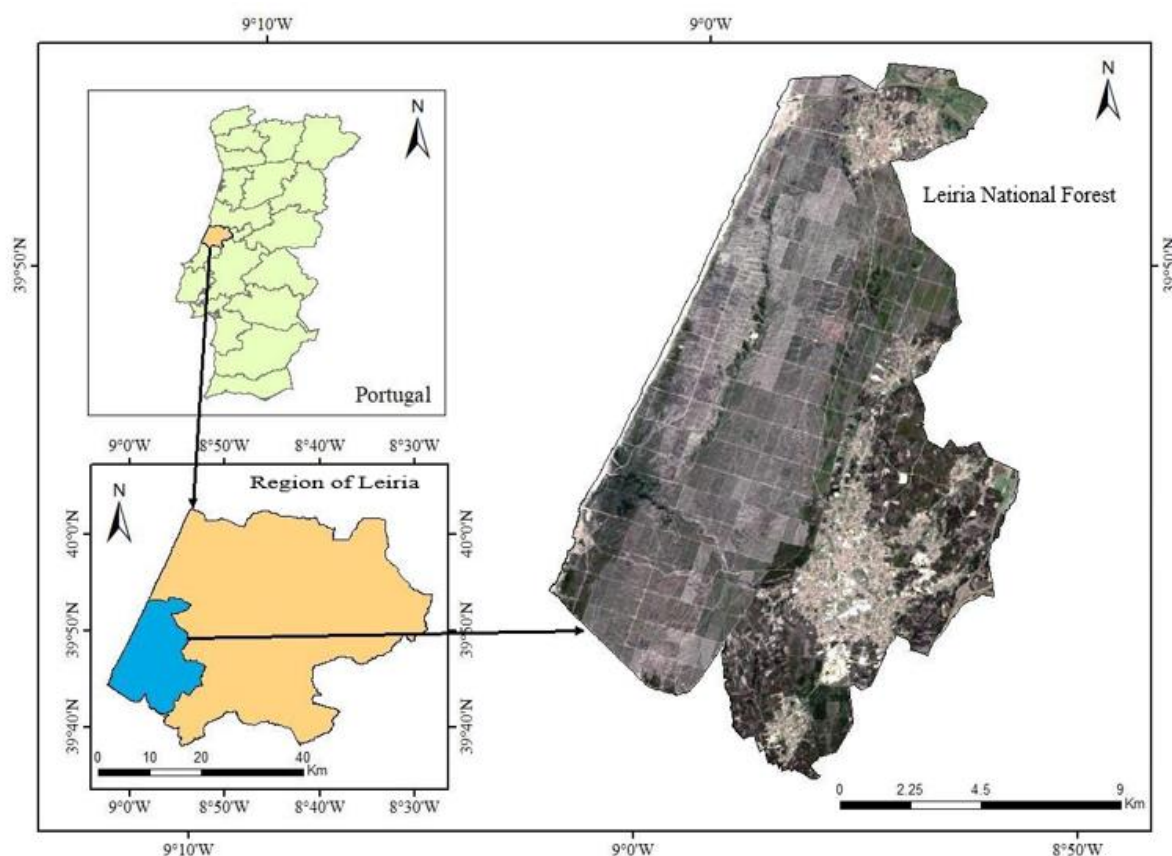
So far, forest fires in Portugal have been widely documented by numerous studies (see Meira-Castro et al. 2015; Nunes et al. 2016; Parente et al. 2017; Nunes et al. 2019; Pacho et al. 2021; Casau et al. 2022). However, most of these studies have focused on drivers (Castro et al., 2020), spatial patterns (Nunes et al. 2016; Parente et al. 2017), vulnerability (Nunes & Lourenço, 2017), danger rating (Júnior et al. 2022) spread (Sá et al., 2022), fire soil risk (Parente et al. 2020), or risk reduction (Casau et al., 2022) among others. Precise data in terms of understanding fire detection, sensitivity, risks, and management remain in their infancy (Maia et al. 2012; Monteiro-Henriques & Fernandes, 2018; Aguiar et al., 202; Casau et al., 2022). Assessment of forest fire risk mapping with respect to the 2017 forest fires and taking into account the major risk factors to forest fires to assess current and future fire risk within the study locality could barely be found in the literature. The research gap is even more evident with the case forest under study and in the methodology i.e. the adoption of a multi-criteria decision analysis (Analytic hierarchy process (AHP)) for forest fire risk assessment.

Hence, there is a need to fill this gap and generate more valuable information to understand future forest fire risks to help mitigate potential threats and institute proactive and innovative management strategies by paying significant attention to existing management strategies to minimize or prevent future occurrences. With the availability of geospatial techniques and data, it is imperative to model forest fire risks in the area to deliver robust information and knowledge for planning decision support. Using the 2017 forest fire as a benchmark and the adoption of AHP approach and GIS (see Ajin et al., 2016; Eugenio et al., 2016; Gigović et al., 2018; Nuthammachot & Stratoulas, 2021), the study aims to examine forest fire hazards and risks in the study region, taking into account the prevailing factors of fires (vegetation type, proximity to settlements and roads, and topography (slope, aspect)) and ultimately propose sustainable management plans to prevent fire incidents and sustainably manage the area.

## 1. Study Area

The Mata Nacional de Leiria is located on the coast of Portugal, approximately 140 kilometers north of Lisbon (39°46'18.30''N; 8°58'05.35'' W). It is bounded to the North by the river Liz, to the south by the municipality of Nazare, to the west by the Atlantic Ocean, and to the east by the city of Marinha Grande. It covers an area of around 11,080 ha, which corresponds to about 60% of the area of the municipality of Marinha Grande (Alcarva, 2011). The site is covered mainly by pure stands of maritime pine with different age classes and divided into 342 rectangular management units with, approximately, 35 ha each. It has a maximum width of 8,394 m and a maximum length of 18,549 m (Aguiar et al., 2021).

The area is part of the Mediterranean temperate climate, characterized by the influence of the proximity to the sea. The fundamental characteristics of this type of climate are hot and dry summer, winter of mild temperatures, and usually rainy (AFN, 2010). Temperature and precipitation show strong seasonal variation. Temperature records its maximum values in the months of June, July, August, and September, while the highest amounts of rainfall are concentrated between the months of October and April. Regarding average temperatures, there are no major differences, only in the average maximum of the hottest month (August) which ranges from 21.5°C to 25°C.



**Figure 2. Study Area Map: (a) Portugal (b) Region of Leiria (c) Leiria National Forest**

Source: author's research

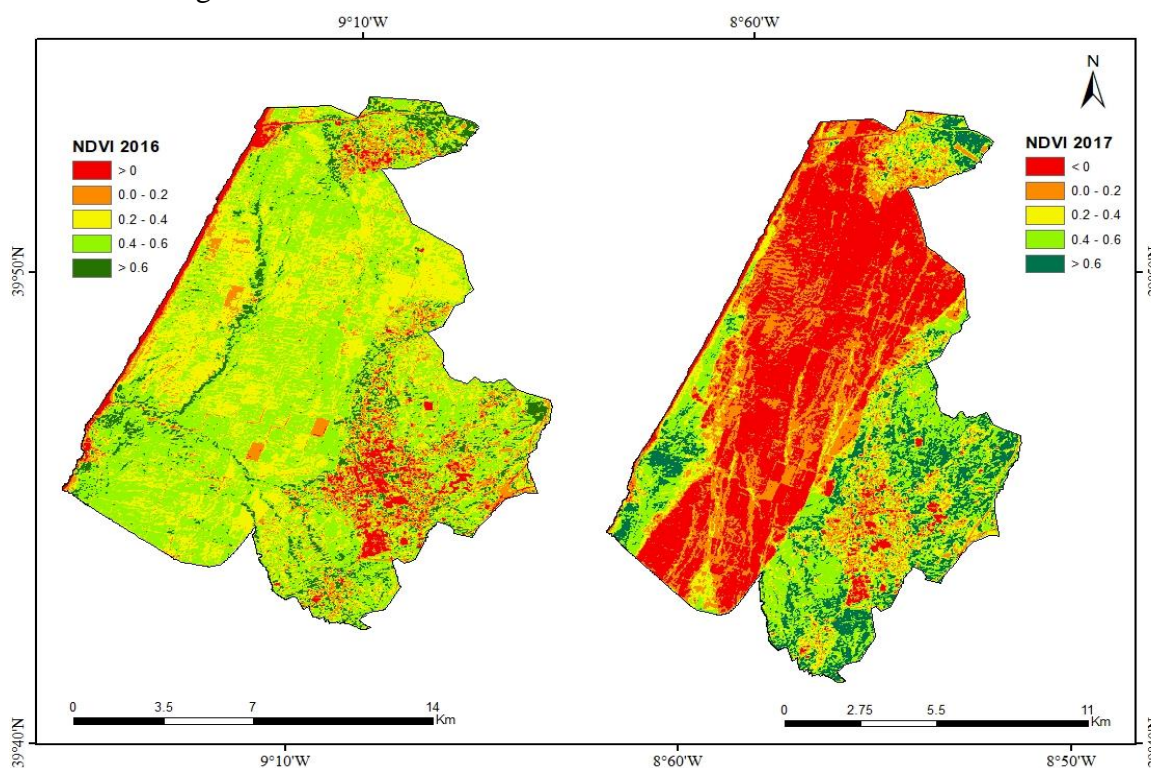
### **1.1 October 2017 Fire Incidence**

On October 15, 2017, the Leiria National Forest (Mata Nacional de Leiria) was heavily affected by 2 fires, both caused by re-ignitions, in the parish of Pataias in Praia da Légua and Burinhosa about 9km and 1km to the National Forest of Leiria, with a total of 19,975.2 ha burning, of which 9,475.15 ha are in the National Forest of Leiria, representing about 85% of its surface (CTI Report, 2017). The relatively uniform vegetation in some places, flat terrain, and wind contributed to the severity of the fire. The fires were predominantly on the surface (but with total blight of the crowns) in the pine forests with heights greater than 10-12 m and of crowns in the remaining ones (CTI Report, 2017).

According to San-Miguel-Ayanz (2020), this situation resulted from exposure to hot, dry air from the south intensified by Hurricane Ophelia combined with the severity of seasonal drought. In fact, on October 15th the potential for the development of large fires was high and the moisture content of all forest fuels (dead and live fine) was very low (ICNF, 2021).

Given the number of occurrences of rural fire on October 15th associated with the extreme weather conditions that were felt that day, the ignitions quickly gave rise to large areas covered by fires in Mata Nacional de Leiria, therefore, the difficulty of suppression in the face of the extreme behavior of the fire combined with the difficulty of mobilizing fire-fighting means (San-Miguel-Ayanz, 2020). Regarding the fire suppression conditions, they were carried out on a day with extremely strong winds, high temperatures, and low atmospheric humidity (no night recovery), which exceptionally aggravated the risk and extreme behavior of the fire, with very high propagation speeds, high consumption of materials and high resilience (ICNF, 2020).

The fires of October 2017 were the largest that occurred here, radically altering the ecosystems and landscape of the forest. The recurrence indirectly reflects all the variables involved in the process, from the natural conditions (weather, fuel, relief, etc.), to the direct and indirect causes of fire, essentially of human origin, including efficiency, or not, of prevention and combat, constituting a relevant indicator in forest fire risk assessment (Oliveira et al., 2017). The depiction of the vegetation before and after the fire can be seen in the NDVI figure below.



**Figure 3. NDVI Maps of Study Area (Left, 2016 before the fire; Right, 2017 After the Fire)**

*Source: author's research*

### **1.2. Fire Risk Factors**

Climatic conditions, fuel, topography, and anthropogenic elements are the most significant drivers of the ignition of forest fires in the Mediterranean regions (Ganteaume, 2013). Climatic factors and the availability of fuel decide the conditions beneath which fires happen and spread once ignition has occurred. The extraordinary fire scenes and obliterating fire seasons in Europe are, in most cases, driven by extreme fire weather conditions. In this way, climate change is expected to have a strong impact on forest fire regimes in Europe (De Rigo, 2017). Fire as the main threat to forests in the Mediterranean basin is especially high in forest areas characterized by summer droughts, high plant productivity, and the presence of shrubs which substantially increase the severity of fire damages (Cruz & Viegas, 2001). Currently, Maritime pine (*Pinus Pinaster* Ait.) is the most important timber species in Portugal, its area extending over 710600 ha (DGRF, 2006). Maritime pine stands are mainly even-aged plantations frequently affected by forest fires. The current management is mainly done without considering explicitly the risk of fires. Thus, the need to address fire risk in forest management planning is evident. Modern forest planning tools are needed to advise managers to adopt practices that reduce the losses due to fires (Garcia-Gonzolo, 2014).

Portugal is by far the Mediterranean country that has suffered the most due to forest fires: in the last 30 years, it has faced more fire incidents with more hectares burned. About 35% of the region's fire incidents and 39% of the area affected each year occur in Portugal. An average of 3% of Portugal's forests burn each year (WWF, 2019). The year 2017 presented extreme meteorological conditions, with a severe heatwave and extreme atmospheric instability in June, the influence of Hurricane Ophelia, and a record drought in October. These extreme conditions led to a multiplicity of wildfires, many active fire fronts, and explosive fire behavior, contributing to the catastrophic fires in the central and northern regions of the country, with heavy impacts on human lives and assets. These critical fire episodes often referred to as mega-fires or extreme wildfire events (EWEs) have been documented in several scientific publications (see San-Miguel-Ayanz et al., 2013; Costa et al., 2020)

Studies in Portugal have addressed the behavior and effects of fire on maritime pine stands, especially about prescribed burning (Fernandes, & Botelho, 2004; Fernandes & Rigolot 2007; Fernandes et al., 2009). The MNL is mainly made up of pure stands of maritime pine (*Pinus pinaster* subsp. *Atlantica*) exploited to produce quality wood in rotations of 75 years with 3,154 ha of extension (AFN, 2010). *Pinus pinaster* stands have characteristics inherent to the species that favor the progression of fires - flammability of the species associated with the presence of volatile compounds, the existence of a thick dead blanket in the abundant soil, and undercover, often allowing the vertical continuity of the stands. However, maritime pine also has characteristics that give it resistance to fire – thick bark in the adult stage and serotine cones that allow the release of seeds after the fire, provided that the fire has not destroyed the cones (Collins et al., 2013; Pinto-Correia et al., 2011).

## 2. Data and Methodology

In order to minimize and manage forest fire impacts on forest ecosystem services and functions, analyzing the geospatial patterns of forest fire risk zones is imperative (Gigović et al., 2018; Naderpour et al. 2021; Nuthammachot & Stratoulis, 2021). This will help understand and demarcate forest fire risk areas and come up with conservation plans (Naderpour et al., 2019; 2021). To do this forest fire risk zones and maps were produced by employing fire risk factors data layers discovered as the main factors responsible for forest fires within the study area (Catry et al., 2010; Castro et al., 2020). GIS techniques and data are known to have a vital potential for assessing forest fire risks (Leblon et al., 2012).

### 2.1. Data

In this study, GIS and Remote sensing data sets and techniques were employed. The data sets adopted were acquired from different sources. The remotely sensed data were freely acquired from the USGS Earth Explorer website (<https://earthexplorer.usgs.gov/>). Two Landsat 8 satellite data were utilized in this study (path 204, row 32: December 05, 2016; path 204, row 32. November 06, 2017). The acquisition date of these data was chosen based on the 2017 fire occurrence date and cloud-free conditions (20% cloud cover). These images were used to derive spectral indices. In addition, ASTER Digital Elevation Model data was obtained from <https://earthdata.nasa.gov> whereas land use and land cover data (settlement, water, forest cover, etc.) were retrieved from the CORINE map obtained from the European Environment (100m resolution grid). Roads and settlement data were obtained from OpenStreetMap (OSM). Information such as date, location, and fire-damaged area about the forest fire in the area was obtained from the EFI site. These retrieved data were stored in a GIS database and integrated into ArcGIS for analysis to be carried out.

### 2.2 Methods

The initial method entails gathering, extracting, and producing the required study area data sets. To generate the forest fire risk, data layers like vegetation type, slope, aspect, and land features (roads and settlement proximity) were individually evaluated. A weighting criteria system (Analytic hierarchy process (APH)) was assigned to each of the variables (layers) as done by various forest fire risk analyses (see Akay, 2019; Gulcin & Deniz, 2020). Parameters with the greatest effect on forest fire sensitivity were given the highest weight score. All parameters are given a risk score based on their level of sensitivity to fire. The most sensitive to fire is expressed with the number 4 (high-risk) and the less favorable is expressed with the number 0 (risk-free). Each layer is then evaluated based on its risk of forest fires and a forest fire risk index map is produced. To do this, a weighted overlay analysis is performed where the assigned weighted value of each thematic layer together with their assigned influence on forest fire is calculated based on pixel points. The risk map is then produced based on this analysis with a classification of

areas ranging from high to risk-free zones. Area distribution and the percentage of risk zones are estimated based on this analysis.

### **2.3. Land use Map**

The land use map of the study area was generated from the CORINE database. The study area was classified into multiple classes (see Figure 3a). Forest boundaries were generated by delineating the forest area from the land use map. This was used in producing the forest area layer of the NDMI and that of the NBR. Roads and settlement layers were generated by clipping and extracting the road lines and settlement polygons from the land use type map obtained from OSM.

### **2.4. Forest Cover or Fuel types**

To understand the vegetation type within the forest area, a Normalized Difference Moisture Index (NDMI) was performed on satellite data obtained from earth explorers with the help of ArcGIS. This index defines the moisture levels in vegetation mostly in drought and fire-prone areas ([www.esri.com](http://www.esri.com)). It uses the NIR and SWIR bands (bands 5 and 6 respectively) to create a ratio designed to mitigate illumination and atmospheric effects. The calculation of the NDMI was performed by employing the following formula.

$$\text{NDMI} = (\text{NIR} - \text{SWIR1}) / (\text{NIR} + \text{SWIR1}) \quad (1)$$

The NDMI data identified several individual moisture classes within the forest area but this was then classified into five classes based on the classification criteria: 1) Very Dry 2) Dry 3) Moderate Moist 4) Moist 5) High Moist. This helps to differentiate between vegetation and fuel types based on their moisture index to understand the sensitivity of various parts of the forest to fire. This layer was included because fuel type plays a vital role in fire ignition and propagation (Keenan et al., 2015). Forest areas with low moisture index were considered to be more of a coniferous forest when overlapped with the land cover of the area and more prone to forest fire and those with high moisture index were discovered to be more of a deciduous forest and as such less prone to fire (Gazzard, 2012; Akay, 2019).

### **2.5. Topographic features**

Two scenes of ASTER Global Digital Elevation Model (DEM) data were obtained from [www.earthdata.nasa.gov](http://www.earthdata.nasa.gov). These scenes were combined, using mosaicking. Slope and aspect maps were generated by using the mosaic DEM of the study area with the help of ArcGIS. The slope was classified into the following five classes: Steep ( $>30^{\circ}$ ), High ( $20-30^{\circ}$ ), Middle ( $10-20^{\circ}$ ), Low ( $5-10^{\circ}$ ), Gentle ( $<5^{\circ}$ ). Hill shade, water, and road layer enabled the verification of the slope information accuracy. The slope classes enabled the identification of high and low-risk areas. These features are factors known to contribute significantly to the spread and speed of fires (Akay, 2019). The spread intensity of forest fire increases as the surface slope increases which results in high fire risk and vice versa (Jaiswal et al., 2002). Likewise, the rate of forest fire and its risks rise as aspects face the sun directly as compared to those shadowed by mountains and fuels (Gülçin & Deniz,



2020). The flat direction was considered risk-free, the north was low risk, the east was moderate, the west was risky, and the south direction was considered high risk.

### 2.6. Roads and Settlements Proximity to the Forest

Settlement and road data layers were generated based on land use data from OSM. These data were extracted to suit the study area using ArcGIS. To assess the risk of forest fires in the study area, a distance (Euclidean) analysis was carried out around these features to understand their proximity to the forest. Forest areas closer to these features are considered to be more susceptible to fire and vice versa. Forest fire risk increases as the distance of the forest to the roads and settlements reduces (Sivrikaya et al., 2014). The proximity of the forest to roads and settlements is significant due to human influence on forest fire within the study area (see Gugliette et al., 2011; Malik et al., 2013; Castro et al. 2020).

### 2.7. Pre and Post-Fire Indices

Considering the date of the fire, two Landsat 8 ETM images were acquired one just after the fire had been extinguished and one a year before the fire. They were obtained from [www.usgs.gov/earthexplorer](http://www.usgs.gov/earthexplorer). NDVI was used to identify the vegetation cover of the study area before the fire. This index represents the vegetation pattern of the earth's surface (Chen et al. 2016). This was utilized to determine the pre and post-fire NDVI and assess NBR to understand the area of damage caused by the fire in the study area. This will also help to distinguish between burned and unburned areas. These spectral indices were calculated by using the following equation (see Table 1).

**Table 1. Indices and Equations Applied**

Spectral Index	Abbreviation	Formula
Normalized Difference Vegetation Index	NDVI	$NDVI = \frac{NIR - R}{NIR + R}$
Normalized Burn Ratio	NBR	$NBR = \frac{NIR - SWIR}{NIR + SWIR}$

Source: author's research

The NDVI values range from -1 to +1. Areas representing a value of around 0 are poor in vegetation (built-up land, bare lands, etc.) whereas areas closer to +1 portray healthy vegetation, and areas near -1 show water bodies (ww.esri.com). Where NIR, R, and SWIR indicate the reflectance of the near-infrared, red, and short-wave Infrared bands respectively. NBR values ranging from -1 to 1 represent burned and unburned areas respectively. Conducting NBR by employing Landsat thermal bands provides enhanced results of burned and unburned land separation (Veraverbeke et al., 2011).

### 2.8. Weighted Value (AHP)

Based on previous studies (Malik et al., 2013; Akay, 2019; Gulcin & Deniz, 2020), a weighting index was assigned to each parameter based on their level of sensitivity to forest fires and the relative importance of each element. Vegetation had the highest weighted

value of 30% since its contribution to forest fire is high. According to the individual vegetation, weighted values areas with low moisture content had high scores, and high moisture content had low values (Table 3). The slope was given the second-highest weighted value. The weighted value of slope indicated that slopes between 0-5 degrees had the maximum weights while high slopes had low weights. Distance from the roads and distance from the settlements were given the third and fourth weighted values respectively. In terms of distance, the weighted value rises as the distance between the forest area and these features reduces (Table 3). The aspect was given the fifth weighted score. Overall weighted values can be seen in Table 2.

**Table 2. The Weighted Values of Criteria**

Criteria	Influence (weighted values)
Vegetation/fuel type	30
Slope	25
Distance to Roads	20
Distance to Settlements	15
Aspect	10

*Source: author's research*

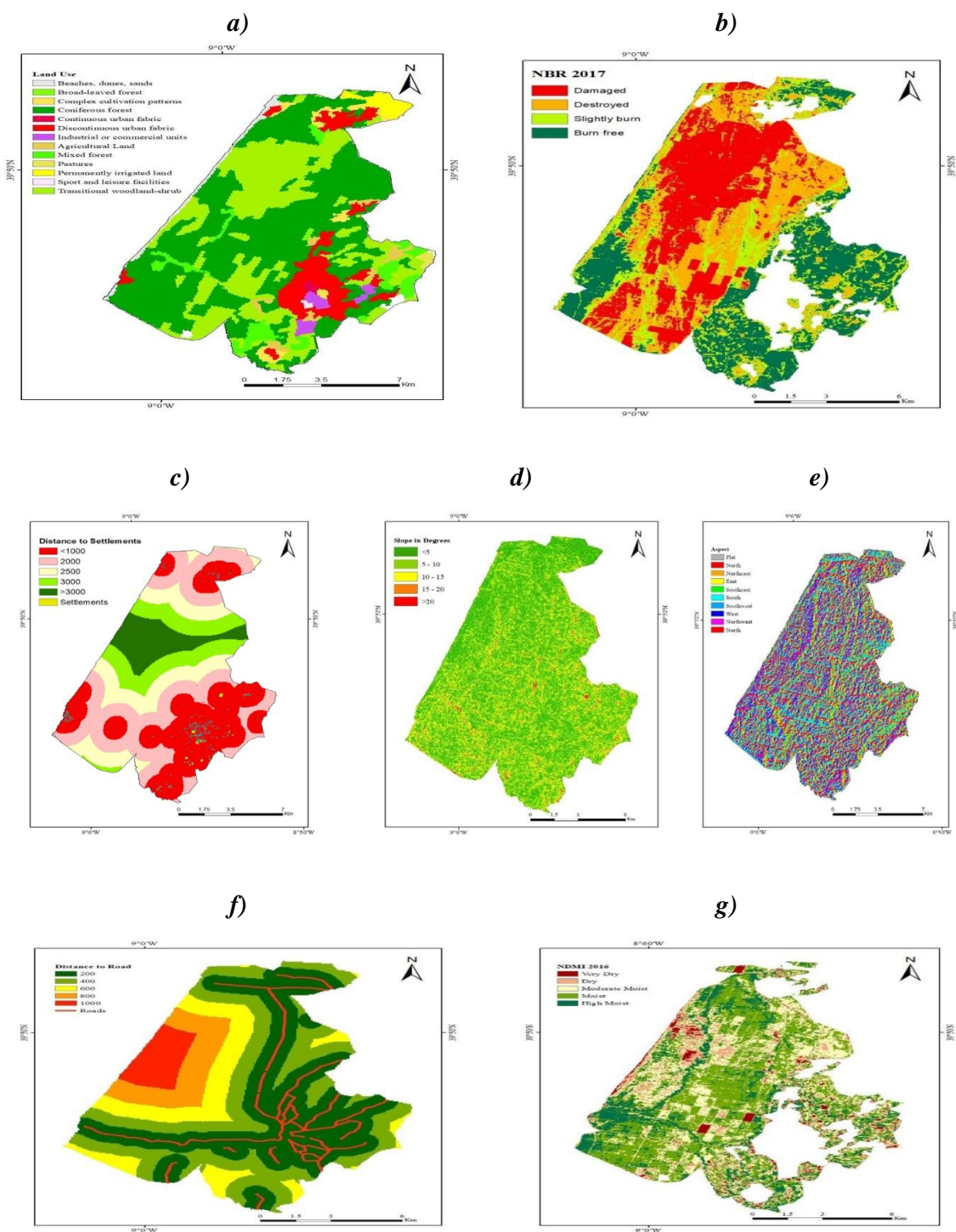
### **2.9. Validation**

To validate the accuracy of the final forest risk, the 2017 fire incidence that occurred within the study area was adopted. Attributes of the fire event such as geographical coordinates were used to overlay with the final fire risk map produced. The value of the fire risk class on the pixel that corresponds to the fire incident was extracted to assess the distribution of the estimated fire risk classes that correspond to the recorded fire event. Land use data and other selected variables were also overlaid with the 2017 fire to validate their potential and degree to fires as well as the type of activities prone to fires in the study area.

**Table 3. Weights Assigned to Each Applied Variable**

Variable (weight)	Class	Rating	Risks	
Vegetation	Very Dry	4	High Risk	
	Dry	3	Risky	
	Moist	Moderate	2	Moderate
		Moist	1	Low Risk
		High Moist	0	Risk-Free
Distance to Road	<300	4	High Risk	
	600	3	Risky	
	1200	2	Moderate	
	1800	1	Low Risk	
	>1800	0	Risk Free	
Distance to Settlement	<1000	4	High Risk	
	2000	3	Risky	
	2500	2	Moderate	
	3000	1	Low Risk	
	>3000	0	Risk Free	
Slope	Up to 5	4	High Risk	
	5-10	3	Risky	
	10-15	2	Moderate	
	15-20	1	Low risk	
	>20	0	Risk Free	
Aspect	South	4	High Risk	
	West	3	Risky	
	East	2	Moderate	
	North	1	Low Risk	
Flat	0	Risks Free		

*Source: author's research*

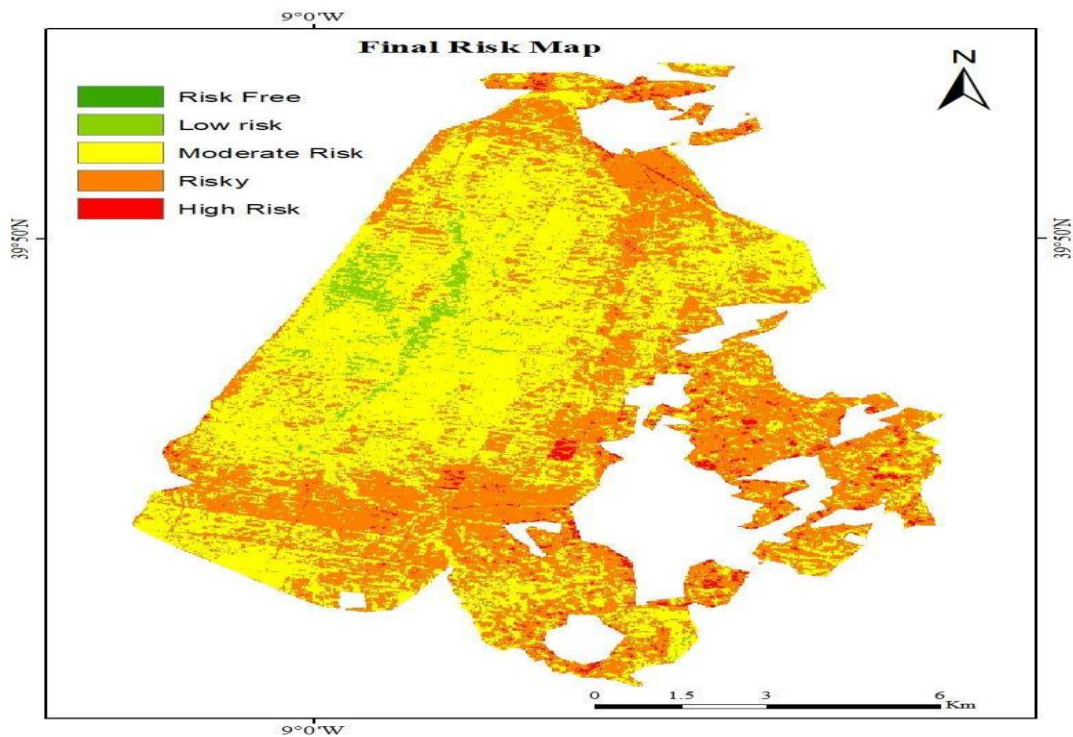


**Figure 3. The seven individual variables adopted in this study (a) Land use (*Corine LULC Map, 2018*) (b), NBR 2017 (c), Distance from settlement (d), Slope (e), Aspect (f) Distance from road (g) Fuel Type**

Source: author's research

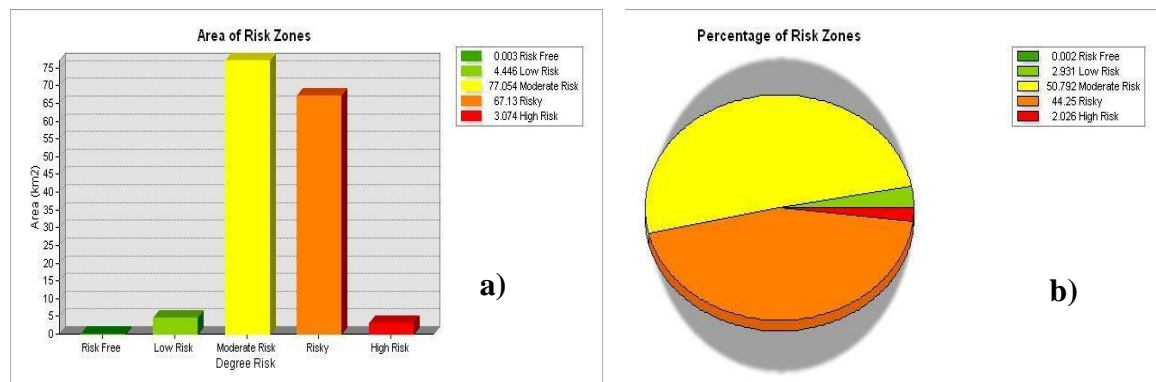
## 4. Results

The final forest fire risk map was generated based on the thematic layers associated with fire ignition and propagation (vegetation type, proximity to settlements and roads, and topography (slope, aspect,) in Meta National de Leira. Five risk classes were set exclusively for each layer, namely risk-free, low-risk, moderate, high-risk, and risky (Table 3). The forest fire map showing the fire susceptibility zones was put forth through an overlay analysis in ArcGIS. This was generated by combining the weighted values of each variable (layers) based on their level of influence or their sensitivity to forest fire risk (Table 2). According to the risk map, 2% and 44% of the study area were found to fall within the high-risk and risky zones respectively. Besides, 50.8% had moderate risk, 2.9 % had low risk and 0.002% had risk-free forest fire risk. The degree of sensitivity together with the area is presented in a pie and bar graph respectively (Figure 5).



**Figure 4. Final Forest Fire Risk Zone Map**

*Source: author's research*



**Figure 5. (a) Difference in Forest Fire Risk Zones, (b) Percentage of Forest Fire Risk Zones**  
Source: author's research

#### 4. Discussion

Climate change, human and environmental processes have had a significant imprint on multiple forest resources, functions, and ecosystem services in Portugal (ICNF, 2017). One of the most apparent phenomena of these emerging catastrophes on forest resources is forest fires. Forest fires have been known to cause significant destruction to diverse forest ecosystems (Gülçina & Deniza, 2020). Forest fires have caused permanent damage and the extinction of many biological (biodiversity) and ecological features of Portugal's forests (Botequim et al. 2017). Besides, the cultural and economic values are greatly affected as a result of severe impacts on various tree species, and agricultural lands. This has greatly altered the sustainability of the forest across the jurisdiction (Oliveira et al., 2017; Aguiar et al., 2021; Casau et al., 2022). This has led to the need to understand forest fires to help plan, restore, and manage forest resources. To do this it is imperative to identify forest fire risk zones. Available literature posits that among the forest fire management techniques, determining risk areas is the most crucial stage of all as it allows the prediction and reduction of its threat (Yang et al., 2007; Gigović et al., 2018; Naderpour et al. 2021; Nuthammachot & Stratoulis, 2021).

Our analysis enabled us to assess, predict, and understand the sensitivity of future forest fire risk in Meta Nacional de Leira after the 2017 forest fire that occurred within the jurisdiction. The finding from this study allows for a robust and realistic understanding of future forest fire risk and thus serves as an important decision tool for forest monitoring and management within the locality.

In this study, we mapped the forest fire susceptibility areas by adopting remote sensing and GIS techniques (Guney et al. 2016). Thus employing this method offers an effective and feasible understanding and identification of fire occurrence as well as mapping of potential fire risk areas (Renard et al. 2012). The forest fire risk zone map was developed based on the sensitivity of the forest area to fires. Both natural and human

factors (fuel type, slope, aspect, distance to road and settlements) responsible for fires generally and that of previous forest fires within the study area were investigated and incorporated with the creation of the potential areas of future fire maps. This strategy was adopted because the usage of past forest fire information serves as a useful guide to assess and manage possible future fires (Yakubu et al., 2013). It is crucial to note that although tree species type and crown closure serve as vital factors in forest fire risk assessment (see Akay, 2019), due to the limitation of data acquisition the study could not incorporate that into its factors. A Normalized Difference Moisture Index was conducted in this regard. This was done in line with the assertion of the critical significance moisture plays in forest fire ignition, and spread, and helping to accurately predict the behavior of fire (Dover et al., 2011). The analysis of these factors enabled the identification and fire sensitivity ratings of the fuel types, topographic features (slope and aspect), and distance to road and settlement in the study location.

Each of these factors was analyzed individually based on their level of risk to forest fires. In terms of vegetation, the amount of fuel that feeds forest fires is determined. The study revealed that the rate of fire risk increases with decreasing moisture content of available vegetation (Pereira et al. 2013). The results demonstrate that about 57.8% of the forest area is in the high moist and moist zones while about 14.85% is in the dry and very dry areas (Figure 3g). This implies a little over half of the area is moist which will equate to low fire risk in terms of fuel type. However, it is important to note that the relationship may not be always linear (McAllister et al. 2012) when other factors are taken into consideration. Analysis of topographic features (slope and aspect) revealed that the biggest portion (55.1%) of the area was on high-risk slopes (0-5 degrees) while 0.2% of it (>20 degrees) was on low-risk whereas 30.3% was observed to be on high risks aspect (southern aspect) and 39.6% on low-risk aspects (Northern) (Figure 3d). Similarly, a large section (41.5% and 39.7%) of the forest area was within close proximity to roads and settlements respectively. This indicates that a significant proportion of assessed factors that contribute to forest fires have shown to exist in a considerable portion of the area. However, to get an overall understanding of risks, a final forest fire risk map analysis was conducted.

The final forest fire risk zones were produced by combining generally the weighted score of all individual factors. A new outlook of the forest fire risk map of the study area was generated through an overlay analysis (see Figure. 4) which was then classified into 1. Risk-free 2. Low risk 3. Moderate risk 4. Risky and 5. High risk. The results indicated that a large portion of the forest area was found to be within the high and risky zones (46%) (Figure 4). As much as 50.8% of the forest area was found within the moderate risk zones and a considerable area of about 3% was classified as low and risk-free zones.

Our study found that high and risky zones are mostly located in the south-eastern and northern parts of the study area whereas low and risk-free zones were found on the eastern side of the area. A clear comparison between the final risks map (Figure 4) and the vegetation types (Figure 3G) based on moisture indices indicates that high-risk areas are mostly low moisture fuel types while risk-free areas are high-moisture forest. A

comparison with the land use map also reveals that risky areas are mainly coniferous forest which is known to have low moisture that contributes significantly to the spread of fire (Gazzard, 2012). This confirms the assertion that species-related moisture is critical to forest fire risks (Peirera et al., 2013; Akay, 2019). It was also established that the observed high-risk and risky zones could be attributed to distance to roads and settlements as areas close to these features are more prone to fire risk (Leblon et al. 2012) coupled with differences in slope and aspect. This observation is consistent with previous forest fire risk empirical studies (see Yakubu et al., 2013; Akay, 2019; Castro et al., 2020). Risk-free and low-risk portions could also be due to their high moisture fuel type, unfavorable slope, and aspect as well as farther distance from roads and settlements of the forest area. An overlap of the final risk map with that of the previous fire revealed that the majority of the areas damaged by the fire were within the high, risky, and moderate risk zones of the final risk map generated while a considerable portion was within the low and risk-free zones. These results thus suggest an increased risk of future forest fires under the prevailing conditions and a hiking potential of increased burnt areas. This is consistent with studies done by Pereira et al. (2013) which project an increased likelihood of forest fire danger, frequency, and severity within the study region (under future climate scenarios). There is therefore the need to consider proactive management and preventive plans to ensure minimum risk of fire and avert possible future fires.

## Conclusion and Recommendation

This study examines the forest fire risk in MNL through the consideration of vital factors responsible for fire ignition and propagation within the area. Through the integration of GIS approaches and data, five fire risk classes were established (risk-free, low risk, moderate risk, high risk, and risky). Although the general findings of this study did not take into account other crucial factors. The result has provided new and valuable information about future forest fire risk areas in Meta National de Leira through the forest fire risks and sensitivity assessment as highlighted in the study. Likewise, it has made available data that will enable the formulation of future forest fire strategic management and long-term forest conservation plans since the prediction and understanding of forest fire risk play a vital step in preventing unwanted fires and ensuring the sustainability of the forest ecosystem. This study with the help of the final risk map can significantly assist the forest agencies and managers within the study location in understanding and managing possible potential future fires. The spatial demarcation of risky zones can serve as a focal point for fuel management and also help forest rangers design effective preventive measures to augment the risk of fire propagation. While there has been a strategy that was drafted in 2010 outlining the required measures to fight against forest fires, among these measures are education and awareness, recovery and rehabilitation of the ecosystem, fire management, and organizational structure, and increased resilience to forest fire (AFN,



2010), however, these are not efficiently implemented (Castro et al. 2020). Based on these findings a fire management plan recommendation will be proposed;

- Given that human factors play a critical role in fire occurrence there is a need to improve social awareness: Making people aware or informed of the dangers their activities can pose to forest fires and their recurring effects on the sustainability of the forest ecosystem and functions will go a long way to proactively prevent future possible forest fires.
- To consider restricting activities that are likely to result in fires. Putting in place measures that prohibit or restrict people's activities such as extensive burning, use of cooking stoves and grills, pest control and fumigation, fireworks, etc. across designated areas of the forest will help prevent likely forest fires.
- To undertake early detection and prevention of fire using remote sensing techniques (Radar, thermal, optical, etc.): Through remote sensing (MODIS, GOES, SEVIRI, etc.) conditions critical to fires as well as active fires within the forest area could easily be identified, monitored and for quick preventive and management measures to be taken to prevent or restrict fires and its spread across broader areas.
- To incorporate a fire management plan into the overall forest management plan; The forest fire management plan should include preventive forestry operations: clearing bushes, creating fuel management strips, and using controlled fire to create discontinuity mosaics will influence the danger of forest fire, and significantly reduce it.
- To adopt an effective adaptive management approach (fuel-reduction techniques and fire prevention management of the forest). Since previous fires led to the increasing dominance of shrubs over trees in the forest, this, combined with other external factors such as climate, rise in biomass, etc., will increase the risk of forest fires. There is therefore the need to set up strategic areas of different fuel loads backed by an effective fuel management approach to ensure a more resilient landscape to the risk of likely future forest fires. Firefighting management must also be effectively prioritized.

## Limitations and Future Research

This study aimed to understand the risk of forest fire through the consideration of factors such as vegetation, slope, aspect, and proximity to roads and settlements. Although the study had a broad goal of including other essential factors such as stand structure, soil, water, etc. to understand how various species' characteristics, proximity to water, soil type, etc. contribute to forest fire risks within the study area, unfortunately, this goal was not manifested. Acquisition of needed data from concerned agencies, time, and resources at the disposal of the researchers became a backlog.

Since stand structures (species type, crown closure, age, and height of tree), soil, climate, proximity to water, and firefighting stations play a practical role in forest fire risk assessment, management, and fighting. Thus further research could examine the forest fire risk sensitivity of the area and deeply understand the relationship between the spread and intensity of fires and surrounding environmental and logistic conditions and how this could proactively be prevented or managed by considering the factors stated above.

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## INCOME TAX: THE RELATIONSHIP BETWEEN ACCOUNTING AND TAXATION

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**Abstract:** *The present research focuses on the study of income tax through the lens of accounting and the lens of taxation by establishing the interdependence links that are formed. The taxation of entities' income and profits is a particularly important component of any tax system, but also of how it is determined, calculated, recorded, and reported (by accounting) for each entity. In this context, this research addresses the relationship between accounting and taxation with regard to income tax, starting from the principles on which it is based, the reporting period, and the regulatory framework.*

**Keywords:** *income tax, accounting, taxation, accounting information, tax reporting*

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*The hardest thing in the world to understand is the income tax.*

*Albert Einstein*

### Introduction

The complexity of today's economies creates many difficulties in the management of activities carried out by legal entities and/or individuals in order to earn income. These activities directly involve tax issues, which need to be known and integrated into the decision-making process.

The issue of fair taxation has firmly established itself on the European political agenda, but it remains a difficult concept to define in a clear and generally accepted way (Accountancy Europe, p.1).

The relationship between accounting and taxation is a highly complex subject that requires continuous study, giving rise to different opinions, conceptions and attitudes and leading to complex and complicated situations that pose challenges to the enforceability of regulations.

There is certainly a lot of research on the relationship between the accounting and tax fields, which in different periods have evolved differently, sometimes by connecting, sometimes by disconnecting, and the importance of research is also determined by the fact that taxation has a national approach within each state.

As regards the analysis of bibliographical sources and authors who have studied the income tax in the Republic of Moldova both from the accounting and taxation point of

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view, we can mention Bucur V. and Graur A. (Bucur, Graur, 2017), and as a result of the application of the National Bibliometric Tool (National Bibliometric Tool) using the keywords "income tax" for the publication period 2016-2023, 15 scientific publications were identified, varying 1-2 per year and only in 2023 being 3 scientific publications; of which on the field of economics being 12 scientific publications and 3 on the field of law; of them 10 were publications in the materials of scientific conferences and 5 scientific articles in journals.

In our scientific journey, it will be presented that accounting and taxation are distinct scientific fields, but at certain stages, they are in close interaction. The study will be based on the interaction between accounting and taxation on income tax, which is a tax levied by the state on the income of individuals and legal entities, thus, broad in scope.

The existing research starts in general by addressing the objectives of accounting and taxation, the principles underlying these areas, the regulatory body for each area presented, the period for which it is presented, and last but not least, the income tax regulations through the lens of taxation and how its accounting is organised.

## 2. Data and Methodology

The present research is interdisciplinary between the fields of accounting and taxation in its approach and treatment of income tax. From the point of view of applicability, it is fundamental research that aims to broaden scientific knowledge on the approach to income tax for accounting and tax purposes, In terms of objectives, it is explanatory research that includes attempts to explain the relationship between the two fields (accounting and taxation) on the treatment of income tax in terms of its functional purpose It is exploratory research that aims to clarify the existing problems in the conditions of the treatment of income tax in accounting as well as in the treatment of income tax for tax purposes. In terms of the way of analysing the information subject to the research, it is qualitative research of both the regulatory framework related to the study and the existing research.

Based on the research, some questions were also established: what is income tax, and what is the relationship between the entity's accounting and taxation? The study used scientific research methods, such as analysis of bibliographical sources related to the regulatory framework covering the study, synthesis of information, comparison in order to identify distinctive features, and deduction of challenges, through which it was possible to present income tax both in the framework of accounting and taxation.

## 3. The Model and Findings

The state, wherever it may be in the world and whatever form it may take, uses fiscal policy to give the income/profit tax, a significant source of state activity, a significant role in the realization of its revenues (Burada, 2002, p. 144). Ensuring the effective collection of tax revenues is vital for the financing of quality public services and is a prerequisite for a fair



sharing of the tax burden among taxpayers. It also contributes to creating a level playing field for businesses and improving EU competitiveness (business taxation). Tax legislation is mainly decided by each European Union (EU) country at the national level. The European Commission can put forward proposals for tax legislation when it considers that action is needed at the EU level to make the internal market work properly (taxation).

In this context, the Tax Code of the Republic of Moldova (Tax Code) contains 11 chapters (including VII), the tax regulation of income tax is found within Title I General Provisions where the definition of basic concepts on taxes and duties and their classification is presented; Title II Income tax where all the requirements of income tax regulation are described with 81 basic articles (12-92) but also multiple supplementary articles included later, Title V Tax administration which describes the conditions of tax administration for all taxes including income tax, Title X Other tax regimes which regulates the tax regime for residents of information technology parks and with regard to income tax (Tax Code).

Within an entity, income or profit tax is an expense determined by the compensation of the macroeconomic factor.

The fundamental issue of the relationship between accounting and taxation requires a permanent connection between the norms, rules, principles and regulations of the two components of of an entity's life, which are often not congruent.

Table 1 illustrates the interaction between the two domains of accounting and taxation in this context, from general to private.

<p><b>Accounting</b> a complex system for gathering, classifying, recording, processing, generalising, and presenting data on accounting items (Accounting and Financial Reporting Act, art. 3)</p>	<p><b>Separate domains</b></p>	<p><b>Taxation</b> Tax collection system (dex.md)</p>
<p><b>Financial accounting</b> system for collection, registration, processing and generalising information concerning the existence and movement of assets, equity, liabilities, revenues and expenses, in order to draw up financial statements (Law on Accounting and Financial Reporting, art. 3)</p>		<p><b>Tax system</b> all taxes and fees, principles, forms and methods of their establishment, modification and annulment as well as all the measures that ensure their payment (the Tax Code, art. 2)</p>
<p><b>Tax accounting and reporting/ Tax accounting</b> System for calculating, recording, processing, and generalising information on taxes and duties for the preparation of tax reports and financial statements. A component of financial accounting.</p>	<p><b>Interconnection</b></p> 	<p><b>Taxes and fees</b> (Tax Code, art. 6) <i>The tax</i> is a compulsory payment with gratuitous title, which is not related to the performance of some specific and determined actions by the authorized body or the official thereof, for or in relation to the taxpayer who made this payment. <i>The duty</i> is a compulsory payment with a gratuitous title, which is not a tax.</p>

↓		↓
<b>State tax accounting and reporting</b> System for calculating, recording, processing, and generalising information on direct taxes for the preparation of related tax reports and financial statements.	↔	<b>State taxes</b> are the taxes established by Article 6, paragraph 5 of the Tax Code of the Republic of Moldova and are controlled by the state budget (Tax Code, art. 6)
↓		↓
<b>Income tax accounting and reporting</b> System for calculating, recording, processing, and generalising income tax information for the preparation of tax reports and financial statements.	↔	<b>Income tax</b> is a tax levied by the state on the income of natural and legal persons.
↓		↓
<b>Income tax accounting and reporting</b>		<b>Subjects of income tax</b>
<ul style="list-style-type: none"> <li>- from entrepreneurial activity</li> <li>- from professional activity</li> <li>- withholding tax</li> </ul>	↔	<p>a) legal entities and natural persons residing in the Republic of Moldova who are engaged in entrepreneurial activity, persons performing professional services, as well as persons engaged in professional activity in the justice and health sectors, who, during the tax period, derive income from any sources in the Republic of Moldova, as well as from any sources outside the Republic of Moldova;</p> <p>b) resident natural persons who are citizens of the Republic of Moldova and who do not carry out entrepreneurial activity and, during the tax period, obtain taxable income from any sources in the Republic of Moldova and from any sources outside the Republic of Moldova for their activity in the Republic of Moldova;</p> <p>c) resident natural persons who are self-employed and during the tax period derive income from any sources in the Republic of Moldova and from any sources outside the Republic of Moldova for their activity in the Republic of Moldova; resident individuals who are citizens of the Republic of Moldova who are not engaged in entrepreneurial activity and derive investment and financial income from any sources outside the Republic of Moldova;</p> <p>d) resident natural persons who are foreign citizens and stateless persons who carry out activities on the territory of the Republic of Moldova and derive income from any sources in the Republic of Moldova and from any sources outside the Republic of Moldova for their activities in the Republic of Moldova, except for investment and financial income from any sources outside the Republic of Moldova;</p> <p>e) non-resident natural persons who do not carry out entrepreneurial activity on the territory of the Republic of Moldova and during the tax period obtain income according to Chapter 11 of Title 2 of the Tax Code.</p>

**Table 1. Income tax: the interaction between accounting and taxation**

Source: developed by the authors based on the Law on Accounting and Financial Reporting [3] and the Tax Code of the Republic of Moldova [4]

Considering the relationship between accounting and taxation, through the prism of accounting interest and tax interest, we can regard the entity as being subject to pressures and transformations (Burada, 2002, p. 40). While accounting interest aims at obtaining a true and fair view of the financial position and performance based on general principles, tax interest is on the side of maximising budget revenues by applying the proper principles of taxation.

Thus, the underlying principles of accounting and taxation, which are presented in Table 2, serve as defining elements for each of the research areas (accounting and taxation).

**Table 2. Accounting and financial reporting principles and tax and fees principles**

Accounting and financial reporting are based on the following general principles (Accounting and Financial Reporting Act, art. 6):	Taxes and fees are based on the following principles (Tax Code, art. 6):
<b>10 principles</b>	<b>5 principles</b>
<p>a) <b>going concern</b> – assumes that the entity will continue its normal operation for at least 12 months from the reporting date, without the intention or need to liquidate or significantly reduce its activity;</p> <p>b) <b>accrual accounting</b> – provides for the recognition of accounting items as they occur, regardless of when cash is received/paid or otherwise cleared;</p> <p>c) <b>constancy of methods</b> – refers to the application of accounting policies consistently from one reporting period to the next;</p> <p>d) <b>prudence</b> – requires that the overstatement of assets and income and/or the understatement of liabilities and expenses are not allowed;</p> <p>e) <b>inviolability</b> – implies that the balance on the balance sheet at the start of the current reporting period must match the balance on the balance sheet at the end of the prior reporting period.;</p> <p>f) <b>separation of assets and liabilities</b> – requires disclosure in the financial statements only of information about the entity's assets and liabilities, which must be accounted for separately from the assets and liabilities of owners and other entities;</p> <p>g) <b>non-compensation</b> – provides for the separate recognition and disclosure in the financial statements of assets and liabilities, income, and expenses. Mutual offsetting of assets and liabilities or income and expenses is not allowed, except as provided for in this Act and accounting standards;</p> <p>h) <b>priority of substance over form</b> – this implies that the information presented in financial statements must reflect rather the core and content of economic facts, than their legal form;</p> <p>i) <b>evaluation at entry cost</b> – requires accounting items presented in the financial statements to be measured at acquisition cost or production cost, except as required by accounting standards;</p> <p>j) <b>relative importance</b> – this provides that it is not necessary to meet the requirements concerning recognition and evaluation of accounting items, concerning presentation, publication and consolidation of information related to them when the effects of meeting the respective requirements are insignificant.</p>	<p>a) <b>taxation neutrality</b> – ensuring, through tax legislation a level playing field for investors, local and foreign capital;</p> <p>b) <b>taxation certainty</b> – the existence of clear legal norms that exclude arbitrary interpretations, and ensure clarity and accuracy of terms, ways and payment amounts for each taxpayer, enabling the latter to analyze the influence of his financial management decisions on his tax obligation;</p> <p>c) <b>tax equity</b> – equal treatment of natural and legal persons operating under similar conditions to ensure an equal rate of taxation;</p> <p>d) <b>tax stability</b> – performance of any amendments and supplements to the tax legislation provisions directly by amending and supplementing the Tax Code;</p> <p>e) <b>tax effectiveness</b> – levying taxes and fees at the minimum cost, as acceptable as possible for taxpayers.</p>
General principles contribute to a true image	Principles of taxation serve the tax interest

Source: developed by the authors based on the Law on Accounting and Financial Reporting [3] and the Tax Code of the Republic of Moldova [4]

When analyzing the principles underlying accounting and those underlying taxation, it can be seen that accounting should present a picture of the financial position and performance of entities, while taxation should present the taxable amount of income, profit, etc. Thus, taxation seeks to determine a tax base, and accounting seeks to provide users with useful information for decision-making through financial statements [12, p. 301].

The regulatory bodies, highlighted in Table 3, are particularly significant when examining the connection between accounting and taxation for income tax.

**Table 3. Accounting and taxation regulatory bodies**

Accounting and taxation regulatory bodies in the Republic of Moldova	
Accounting and financial reporting	Taxation
Public Authority: <b>Ministry of Finance of the Republic of Moldova</b> (mf.gov.md)	
Accounting Policies and Corporate Sector Audit Directorate of the Ministry of Finance	Directorate-General for Tax and Customs Policies of the Ministry of Finance
	Direct Tax and International Regulations Directorate
Accounting and Financial Reporting Board under the Ministry of Finance	<b>State Tax Service of the Republic of Moldova</b>

Source: developed by the authors based on the study of the website of the Ministry of Finance of the Republic of Moldova

Both accounting and taxation are under the national public regulatory authority of the Ministry of Finance of the Republic of Moldova.

Another element related to the areas of accounting and taxation that also relates to income tax is the period covered, presented in Table 4.

**Table 4. Accounting management period and tax period related to income tax**

Accounting management period (Accounting and Financial Reporting Act, art. 24)	Tax period related to income tax (Tax Code, art. 12)
The management period for all entities that draw up and present financial statements is a calendar year, which covers the period from <i>January 1 until December 31</i> , except: a) cases of reorganisation and liquidation of entities; b) entities that apply another reporting period, which coincides with the financial reporting period of the parent entity; c) entities, for which the Ministry of Finance, depending on the particularities of their activity, sets a management period that does not coincide with the calendar year; d) newly established entities, for which the first management period covers the period from the state registration date to 31 December of the same calendar year or the last day of the management period.	(1) The tax period related to income tax is the <i>calendar year</i> at the end of which the taxable income is determined and the amount of tax to be paid is calculated. (2) For newly established entities, the fiscal period is considered the period from the registration date until the end of the calendar year. (3) For the economic agent who has adopted the liquidation decision during the calendar year, the fiscal period shall be considered: a) the period from the beginning of the calendar year up to the date of drawing up the provisional liquidation balance sheet; b) the period from the beginning of the calendar year up to the date of approval of the final liquidation balance sheet.
The tax period referred to shall be subsequently changed only if the reporting period for the preparation and presentation of financial statements is changed in accordance with the stipulations of the Accounting and Financial Reporting Act	

Source: developed by the authors based on the Law on Accounting and Financial Reporting [3] and the Tax Code of the Republic of Moldova [4]

According to the information presented in Table 4, a link presented in the tax regulations regarding income tax is the tax period, particularly the calendar year, and the change in the tax period is correlated with the change in the management period for the preparation and presentation of financial statements, which determines a strict relationship that corresponds and correlates in both areas related to income tax: taxation and accounting.

Accounting and taxation are based on normative regulations, therefore, the following will examine the normative regulatory framework of accounting and corresponding taxation with respect to income tax, presented in Table 5.

**Table 5. Income tax regulatory framework on accounting and taxation**

Regulatory framework for income tax accounting		The regulatory framework for income tax through the lens of taxation
Accounting and financial reporting law (3)		Tax Code of the Republic of Moldova (4)
<i>Entities organising their accounts based on the SNC</i>	SNC "Equity and Debt"	<p>The regulation on the recording and calculation of depreciation of fixed assets for tax purposes was approved by Government Decision No. 704 of 27.12.2019.</p> <p>The regulation on the determination of tax obligations related to the income tax of legal entities and individuals carrying out entrepreneurial activity was approved by Government Decision No. 693 of 11.07.2018.</p> <p>The regulation on the determination of tax obligations related to income tax of resident natural persons citizens of the Republic of Moldova, approved by Government Decision No. 693 of July 11, 2018, on the determination of tax obligations related to income tax.</p> <p>The regulation on non-resident income tax, approved by Government Decision No. 693 of July 11, 2018, on the determination of income tax obligations Regulation on the withholding of income tax from wages and other payments made by the employer for the benefit of the employee, as well as from payments made for the benefit of individuals not engaged in entrepreneurial activity for services rendered and/or work performed, approved by Government Decision No. 697 of August 22, 2014.</p>
	SNC "Expenditure"	
	SNC "Presentation of financial statements"	
	The general chart of accounts	
<i>Entities organising their accounting based on IFRS</i>	IAS 12 "Income Taxes"	<p>The regulation on non-resident income tax, approved by Government Decision No. 693 of July 11, 2018, on the determination of income tax obligations Regulation on the withholding of income tax from wages and other payments made by the employer for the benefit of the employee, as well as from payments made for the benefit of individuals not engaged in entrepreneurial activity for services rendered and/or work performed, approved by Government Decision No. 697 of August 22, 2014.</p>
	IAS 1 "Presentation of Financial Statements"	
	IFRIC 21 "Levies", IFRIC 23 "Uncertainty over Income Tax Treatments"	

*Source: developed by the authors based on the study of the regulatory framework related to accounting and taxation of income tax*

According to the income tax regulatory framework, in the organisation of accounting, entities that keep accounts according to national accounting standards (SNC) will be governed by the national regulatory framework, and entities that keep accounts according to International Financial Reporting Standards (IFRS) will comply with the provisions of the Law on Accounting and Financial Reporting and will apply the international regulatory framework for accounting (IAS, IFRS, IFRIC) and the national regulatory framework for taxation. Similarly, we would like to mention that there is an accounting standard in the international financial reporting framework that presents the accounting treatment of income tax, which is not reflected in the national accounting regulations.

Although accounting and income tax regulations are distinct, there are provisions in the accounting regulations that refer to taxation as well as tax regulations that refer to accounting. Given this, each area has particular interests in the other, and their interactions are crucially important both generally and in terms of income tax in particular.

The relationship between accounting and taxation related to income tax has been and is one of the most sensitive and controversial issues dealt with in accounting and tax regulations.

It is true that an income tax return cannot be prepared without the use of accounting information, but this does not imply that accounting must serve taxation at all times; rather, it only does so at particular stages in the activities it uses, applies, and provides data for.

The income tax laws in the Republic of Moldova have undergone numerous changes over the past fifteen years. These changes are still happening today, starting to become the norm. The tax code has been systematically changed several times a year for the past ten years. In this respect, making changes several times a year becomes a norm too. Thus, the large number of amendments and adjustments made has contributed to complicating the legal framework. National and international economic developments and international competition have determined and continue to determine the need for new tax concepts that require integration into the modernised Tax Code (Concept of Modernization of the Tax Code, p. 5). Updating the Tax Code of the Republic of Moldova is a crucial step, the importance of which is reflected in the need to create a comprehensive legal framework of tax rules that facilitates the understanding and application of legal provisions (Concept of Modernization of the Tax Code, p. 6). In this context, we would like to emphasise the need and importance of ensuring the stability of the tax regulatory framework, at least for a fiscal period, because the stability of tax regulations is an essential condition for the foresight of the business conducted.

At the professional level, the situation is more complicated, as the relationship between accounting and taxation is a subject of debate among representatives of the accounting (accountants) and taxation (tax specialists) professions. Accountants are well-placed to deal with the changing tax environment on behalf of taxpayers, tax authorities, and legislators. Globally, according to Accountancy Europe, the accounting profession supports tax collection by helping taxpayers deal with complex tax legislation, comply with reporting obligations, and provide independent assurance. It works with tax authorities to develop new systems that improve interaction with the taxpayer and also increase efficiency by implementing innovations such as big data analytics and artificial intelligence. These will benefit tax authorities, which often face a shortage of resources, an ageing workforce, and traditional tax infrastructure. The accountancy profession's knowledge of global tax systems helps advise legislators on how to draft effective and practical tax laws or certify tax returns (Accountancy Europe, p. 2).

According to the Federation of European Accountants, the accounting profession is a key player in the functioning of the tax system. Why? The accounting profession holds:

- A global set of ethical standards as well as a specific professional scepticism and integrity derived from professional education, standards and practise, but also subject to strong public oversight;
- Unrivalled technical expertise, covering not only tax law and practice but also accounting issues (the two are often interdependent);
- A crucial role in the functioning of the tax system by helping taxpayers cope with the increasing complexity of tax legislation and improving mutual trust between taxpayers and tax administrations;
- Ability to help grow business and investment by identifying and advising on tax exemptions introduced for this purpose and protecting taxpayers' rights; and
- Experience in analysing the effectiveness of the current tax system and offering cost-effective suggestions for improvement.

Accountants should provide tax advice based on a realistic assessment of existing tax legislation. In the case of uncertainties, the accountant should provide the client with an honest assessment of these uncertainties and the potential risks associated with them. Where necessary, the accountant should obtain appropriate additional advice to confirm the position taken (Accountancy Europe, p. 3). Accountants should provide tax advice tailored to each client. In practice, they should not promote pre-determined tax avoidance schemes but base their advice on the economic and commercial realities of their clients. (Accountancy Europe, p. 4).

There is also a growing trend for tax authorities to outsource tax compliance. In such situations, the taxpayer has a responsibility to ensure that they have adequate systems in place to ensure the generation of accurate tax returns. Where tax authorities are satisfied that systems are properly designed, implemented, and monitored, the taxpayer is usually rewarded with a relaxed tax control regime (Accountancy Europe, p. 5). In terms of tax compliance, we believe that external certification of tax accounting systems can help to increase confidence in the effective operation of the systems in place, both from the point of view of tax authorities and taxpayers (Accountancy Europe, p. 6).

Legislators and tax administrators, in turn, have a clear moral, if not legal, obligation to ensure that the law is clear and precise, thereby ensuring taxpayers' ability to comply fully and easily with their tax obligations. Only public authorities have the ability to clarify and change the rules to make their own intentions clear. They are also obliged to realise that, in today's world, there is no alternative to international cooperation and constant communication with taxpayers. As in other areas of public policy with a deep, complex, and unpredictable impact on society, tax policies and their reforms are difficult to resolve. It is to the benefit of all stakeholders, including taxpayers as well as authorities, legislators, and policymakers, that this legal framework (and any amendments to it) is clear in intent, understandable, coherent in content, and faithful to established societal principles. In this respect, the accountancy profession can and will play a key role (Federation of European Accountants, p. 4).

The accounting profession, with its knowledge and experience of the current tax system, is a key contributor to the debate on tax policy developments. The work of the



accountancy profession is vital not only in the day-to-day operation of Europe's tax systems but also in identifying the limitations of current tax systems, conceptualising potential solutions, and facilitating the transformation of governments' visions of tax reform into reality (Federation of European Accountants, p. 3).

We support the view of the European Federation of Accountants as to what the accountancy profession cannot take responsibility for: it cannot decide on the 'correct' amount of tax a client should pay; it is and always has been the legislator's job to set the right rules and determine what constitutes a 'correct' amount of tax (Federation of European Accountants, p. 3).

Perhaps nothing expresses this complex relationship between accounting and taxation more clearly than Charles Penglaou's reference in his article "On the Effect of Doctrine on Accounting Practise" in the *Journal of Political Economy*, May-June 1947: "Taxation is to accounting what snobbery is to art. We must not say too generous words about taxation, because it has done much harm to accounting. But neither should we speak too highly of it, because it has done much good for accounting" (Feleagă, 1996, p. 373).

## Conclusions

No single actor – be it authorities, legislators, accountants, lawyers, banks, or taxpayers – is responsible for the current deficiencies in tax systems, and no single actor can rectify these deficiencies alone. Instead, all actors should accept collective responsibility for improving tax systems, not only in terms of improving current shortcomings and inefficiencies but also by considering alternative means of raising tax revenues. Only in this way can we ensure that there is sustainable funding for our public services in the future. For its part, the accounting profession is ready to play its full part in developing fair and sustainable tax systems (Accountancy Europe, p. 6).

The study's findings allowed for the establishment of the following conclusions: Accounting should present a picture of the entity's financial position and performance, while taxation should present the entity's taxable income and profit; as a result, the principles governing the fields of accounting and taxation have different objectives and are fundamentally different; both accounting and tax areas are under the public regulatory authority of the Ministry of Finance of the Republic of Moldova; a connection presented in the tax regulations on income tax is the tax period, especially the calendar year, and the change in the tax period is correlated with the change in the management period for the preparation and presentation of financial statements, which determines a strict relationship that corresponds and is held within both areas related to income tax: taxation and accounting; as regards the regulatory framework for income tax, in the organisation of accounting, entities that keep accounts according to national accounting standards (SNC) are governed by the national regulatory framework, and entities that keep accounts according to International Financial Reporting Standards (IFRS) follow the provisions of the Law on Accounting and Financial Reporting and apply the international regulatory

framework for accounting (IAS, IFRS, IFRIC), and with regard to the regulatory framework for taxation, it is the national one presented by the Tax Code. Similarly, we would like to mention that there is an accounting standard in the international financial reporting framework that presents the accounting treatment of income tax, which is not similar to the national accounting regulations. As a result of the study conducted, a connection was identified between accounting and taxation with regard to income tax, and the degree of connection is given by the bilateral dependence in which each area depends on the other and each has interests in the other to achieve its own objective.

The complexity of income tax and the continuous changes in tax legislation raise many difficulties related to its correct application by entities and business management. We can mention that in the Republic of Moldova, there have been important actions in the fields of accounting and taxation in general and on the treatment of income tax by both areas in particular, and the process of improvement will continue because both at the European and international level the mentioned fields are dynamic.

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