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## **Digitalization process in exercise of the accounting profession**

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**Abstract.** *The digitalization revolution has been noticed in recent years in the global economy, as a possible solution to contemporary challenges. The accounting professional is an important part of technological progress, not only in the sense of beneficiary and user but also a decisive factor in the methods adopted and applied in the evolution of the profession.*

*The present paper proposes an analysis of the trends in the digital economy, with an emphasis on the accounting and auditing profession, to what extent accounting firms use cloud or non-cloud. The analysis carried out indicates that there is an increased interest in the field of digitalization of accounting and audit, and the researchers turned their attention in several directions. After the review, the results show that the most researched sub-area of digitalization is given by big data and data analysis, but especially how accountants need to be prepared to meet the needs of clients. Moreover, cloud computing, blockchain, digital reporting and process automation through robots are other sub-areas of interest. However, research in the field of digitalization of accounting and auditing is at an early stage and needs further development.*

**Keywords:** digitalization, global economy, digital technology, cloud accounting, accounting process, costs.

**JEL Classification:** D80, M41, M42.

## 1. Introduction

Cloud Accounting is a technology that can change the accounting profession in Romania. In recent years, substantial progress has been made in the field of Cloud computing, but at the same time, expectations regarding its features have increased. In the business world, transferring accounting systems to the Cloud is a new and innovative solution that can help save significant funds. The purpose of the article is to analyze the technological progress in finance and its impact on accounting activities. The research was carried out using systematic and comparable analyses from the specialized literature on Cloud solutions for accounting systems used in Romanian companies (Defelice and Leon, 2010; ACCA, 2013).

For a company that operates in a competitive and dynamic business environment, elements such as access to information, the speed of their transmission, the speed of decision-making, mobility and flexibility are increasingly important. As information technology has evolved extremely rapidly in the last decade, the decision to change accounting software is an important one and can have a major positive impact on the business (Radu, 2009).

A Cloud Accounting application is an accounting application that is accessed from anywhere there is an Internet connection, without having to be installed and managed on its servers. Cloud development is fueled primarily by economic reasons: large economic operators flatten their cash flow and do not need large investments to cover load peaks, and small ones can now afford high-performance IT services (Beckham, 2010; Geambașu, 2012).

In an extremely dynamic and competitive national and international business environment, the main objective of an economic organization is to generate benefits through access to information, and the speed of its transmission. Also, important elements are speed of decision-making, staff mobility and flexibility in managing accounting activities (Low et al., 2011).

## 2. Literature review

According to the international encyclopedia, “Cloud computing is a modern concept in the field of computers and informatics, representing a distributed set of computing services, applications, information access and data storage, without the user needing to know the location and physical configuration of the systems that provide these services.”

A Cloud Accounting application is an accounting application that is accessed from anywhere there is internet access, without having to be installed and managed on its servers. Benefiting from all the advantages offered by “cloud” technology, it represents a real solution for increasing the efficiency and competitiveness of a company (Ionescu et al., 2013; Ionescu-Feleagă et al., 2022).

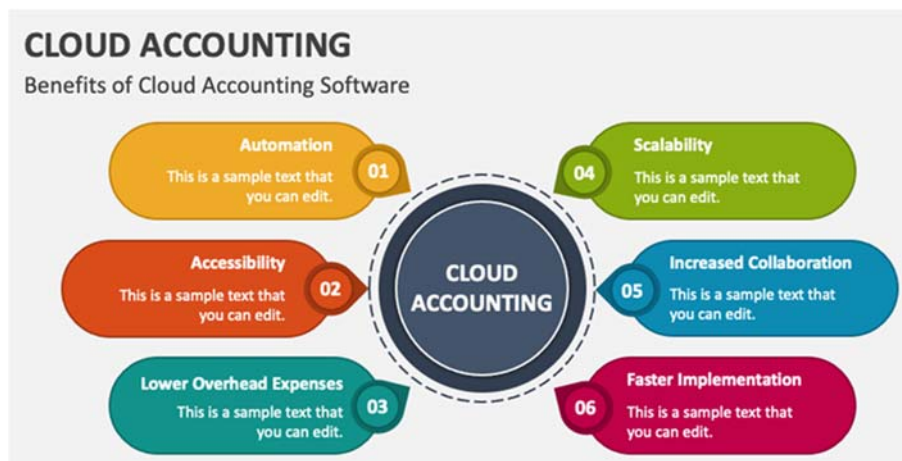
In other words, the user uses computer applications without them being installed on their servers, and accesses, and processes data from where there is access to the Internet, through any type of terminal, desktop, laptop, tablet, smartphone, etc. In the conditions of fierce competition between companies in all fields, these advantages can be the key to the success

of a business. Significantly lower costs, accessing information in real-time from anywhere there is internet access, and short implementation time, are just some of the advantages of this technology, which can no longer be ignored (Munteanu and Fotache, 2010).

The benefits of Cloud Accounting applications are presented in Figure 1 and the main reasons to use such an application are:

- The investment for the purchase of licenses, servers and other equipment for the IT infrastructure can be very expensive, and choosing a solution based on “cloud” technology reduces these costs to a minimum.
- The responsibility for the optimal functioning of the applications rests entirely with the “cloud” service provider company. There is no need to allocate financial, time and human resources for server administration, update, upgrade, and backup.
- Security: although the security of data stored in the “cloud” is often presented as a weak point of this technology, in reality, things are different, the companies that offer "cloud" services have implemented strict procedures and rules for data security.

**Figure 1.** *Benefits of Cloud Accounting Software*



Source: <https://www.collidu.com/media/catalog/product>

- Short implementation time: this is one of the most important advantages of cloud technology. The deployment time is much less compared to the time required to deploy an application running on the company's servers.
- Scalability (the ability of an application to correctly support a larger volume of data): for an application running on the company's servers, increasing the volume of activity above a certain level can cause major additional investments in hardware and software equipment. In contrast, cloud technology offers greater flexibility; without additional investment in equipment or infrastructure, this technology enables the management of a larger volume of data by supplementing the demand for cloud services with minimal additional cost, as you only pay for what you consume.
- “Cloud” technology offers mobility and independence data and applications can be accessed from anywhere there is internet access.

### 3. Research methodology

Analysis of Cloud technology in computerized accounting, from the perspective of the impact on the flow of accounting processing, was the basis of the definition of this research (Figure 2). In the first stage of carrying out this research, was used documentation. To collect the necessary information, articles published in international databases such as Proquest, RePEc, Elsevier, ScienceDirect, Springer, and EBSCO (Academic and Business Source) were consulted.

At the same time, specialized books were consulted, as well as publications of specialized international companies such as IDC, Gartner, and Forrester or national, European, or international bodies (Christauskas and Miseviciene, 2012).

The research method was adapted according to the nature of the information, being sometimes of the type of narrative-descriptive, and sometimes critical-evaluative. The research methodology will be qualitative-quantitative-deductive. The applied techniques will be analysis of works containing qualitative and quantitative research, as well as comparative analysis.

**Figure 2.** *Cloud accounting*



**Source:** <https://www.collidu.com/media/catalog/product>

The research methodology used is of a fundamental type, analyzing data and previous research from the specialized literature, which aims to verify a hypothesis according to which part of the accounting processing can be moved to electronic platforms in the Cloud. These Cloud Accounting platforms allow accounting firms to relieve themselves of certain operations and accounting processing, which can be passed on to the exclusive responsibility of their clients, up to a threshold where the flow of computer processing overlaps with the operations performed by traditional accounting programs (Tănase and Petre, 2020).

One of the purposes of the research is to identify certain phases of the accounting flow to be taken over by the clients by "outsourcing" some accounting work and moving it to the Cloud. The research does not propose the idea of substitution, of moving the responsibility of accounting processing from the sphere of the accounting profession to an area independent of accountants but highlighting a solution to reduce processing costs by transferring responsibility to the client, where it is feasible (Coman et al., 2022).

Currently, the digitization and virtualization of businesses constitute an omnipresent reality of economic-social phenomena and activities in human society. The evolutionary trend of accounting is noted, from the level of proto-accounting to digital accounting (digital accounting), as a high-performance information system for users of financial-accounting information in decision-making (Radu and Tabirca, 2019).

In the business world, the transfer of accounting systems to the Cloud is a new and innovative solution that can help save significant funds. Accounting firms go through the entire accounting flow of data processing every month, from the collection and storage of supporting documents from clients to the preparation of trial balances, centralization, and the transposition of data into tax returns.

#### **4. Research results**

For many companies, accounting is a cumbersome and resource-consuming process. Collecting and recording data, organizing information, reconciling accounts, and generating reports can prove to be laborious, costly, and error-prone activities. This is most often due to the use of an outdated accounting system from the point of view of information technology, which makes information not provided in real-time, affecting the ability of the organization to react to the competitive business environment, and determining that the business operates below an optimal level. Traditional accounting systems prove to be ineffective in the technological alternatives in the market (Radu et al., 2020).

Companies are motivated by the cost and efficiency advantages of the new technology. A study carried out by the Aberdeen Group, a research and market studies company (as early as 2013), shows that Cloud-type applications implemented in the accounting processing flow led to an immediate increase in productivity by 25%, a 50% reduction in costs of invoice processing and a 91% improvement in customer satisfaction.

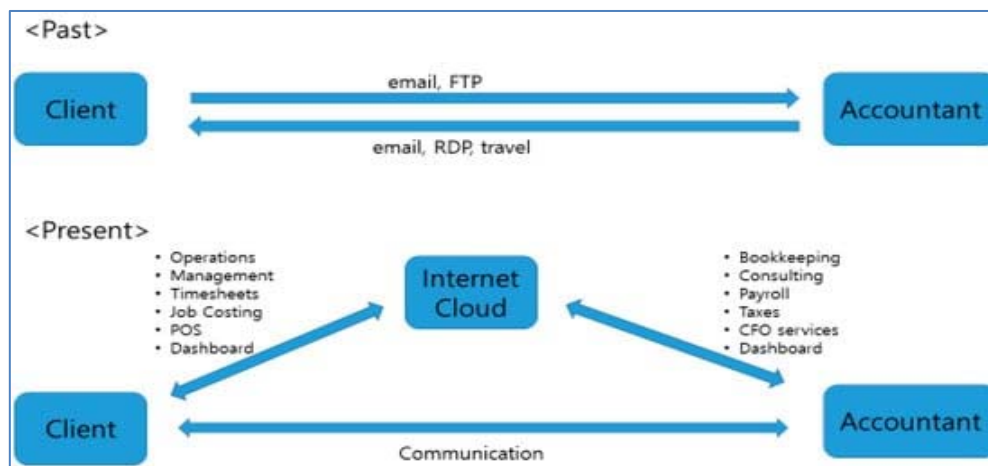
Online accounting software in the Cloud offers managers and employees the possibility of global data access, being able to update the information when they want, regardless of location. The Cloud is also defined as a simple method of capturing meaningful data content and account management. The most motivated option in choosing Cloud implementation is that of cost reduction.

Cloud technology promises users easy access to resources through a self-service subscription method, thus reducing the cost of system administration. Cloud technology requires minimal investments in hardware equipment, and maintenance (installation of upgrades, troubleshooting incidents, backup) is provided by the supplier, without additional costs. As a rule, the costs involved in using Cloud applications are lower than those of applications running locally on their equipment.

With the increasing importance and responsibility of decision-making at the level of a company, Cloud Accounting can provide applications that meet business needs. Thus, at the operational level, Cloud Computing has functions that support accountants for an efficient and secure processing and storage of data on receivables accounts, debts, taxes, and bank accounts. At the tactical level, as the basis of the reporting process, the accountant has dashboards, journals, and cash flow analyses through automatic access to financial data. At a strategic, management level, permanent access to data by carrying out activities on the other levels of responsibility creates the opportunity to prepare reports, budget planning and efficient management of a company's internal controls.

A report made by the company Harshman Phillips, which offers accounting services in the USA, brings a more in-depth picture of the advantages brought by the Cloud at the operational level of a business, in the financial-accounting activity. In this way, the financial relationship of business partners can be much improved in the sense that time- and resource-consuming activities can be dispensed with, such as the physical exchange of data and information between the client and the accountant. The more efficient alternative allows access to data in a common workspace, real-time collaboration, secure and online storage of information and permanent access, regardless of location and from any electronic device with an Internet connection. Cloud Computing is slowly but surely transforming the accounting industry by offering the possibility of streamlining accounting processes, reducing costs and adopting services that add value to a system that works on a subscription basis. Such services may include tax planning, profitability advice, cash flow forecasts and real-time handling of scanned invoices.

Through the Software-as-a-Service (SaaS) platform, accounting professionals will be able to offer services innovatively. SaaS is the most widespread form of Cloud, which involves the use of applications managed by a third party without the need to install additional applications. The Cloud is also characterized by other forms such as Platform as a Service (PaaS), which is the most complex form of Cloud and offers the possibility to develop your applications, or Infrastructure as a Service (IaaS), through which resources can be accessed of infrastructure, storage, or networking services (Figure 3). Major accounting firms and professional accounting bodies have responded to the growing use of cloud-based technologies in accounting by providing an advisory guide to adopting cloud services. This change is not considered to be easy, as it will also involve a change in culture/mentality and attitude. Accountants are not only adopting Cloud Computing, but they must also incorporate a new way of working that will reduce repetitive administrative processes and that will ultimately free up individuals so that they can exercise their knowledge and experience in other fields.

**Figure 3.** Past vs. present models of communication

Source: Phillips, 2012.

Transposed into the accounting environment, we believe that the time spent processing invoices and other financial documents can be reduced through the possibility of electronic records. Thus, accounting documents can be uploaded online directly by the client, eliminating the stage of transmission to the accountant and subsequent uploading in the system by him.

The software collects the transaction data from the source documents, records the information in the accounting journals and posts the data to the account sheets. Invoices can be scanned and posted automatically in the accounting system, after which the accountant can check and validate the record. Scanning documents reduces the processing cost, as invoices can be scanned in a large volume or by each customer. Through Cloud Accounting, accounting firms can compete with those that offer bookkeeping services at a much lower cost. By encouraging customers to scan related invoices daily, the accountant can have real-time information that can be used to generate adjacent services to bring added value.

Thus, compared to traditional accounting, the Cloud accounting system can make the transition from basic accounting records to developing real-time business analysis, using large amounts of resources to understand customer needs, buyer behaviour, supply chains, and so on. The automation of processes allows the collaboration of the financial department with the other internal functions of a company by facilitating access to data and providing business units with analysis tools. This improves the decision-making process and enables managers and executives to perform their tasks much more efficiently, with the help of real-time information, without compromising data integrity (Andrei et al., 2018).

## 5. Discussions

Following the analysis carried out, from a chronological perspective of the evolution of accounting in the context of the evolutionary leaps of society, was noted both the instruments and the technological supports that influenced the accounting technique in each

period of the development of human society. It was found that the accounting technique was directly influenced by each stage of social development by incorporating various technologies related to the evolutionary period (Sunyaev and Sunyaev, 2020).

Concerning digital accounting, it is known that in the current technological context, digital accounting manifests itself as Cloud Accounting, as a result of the incorporation of Cloud Computing technology into the accounting information system of entities. This form of accounting is used among accounting professionals globally. The current technologies used in the field, including Web and Internet Services, Mobile Devices, Cloud Accounting, Business Intelligence (BI), Enterprise Architecture & Enterprise Application Integration, Business Process Management (BPM), and Big Data, each bring advantages to the accounting field (Castellina, 2012).

We cannot fail to notice, as a trend of the current society, the penetration of artificial intelligence in all fields of the information society. At this stage, it is predicted that artificial intelligence will equal human intelligence and that in the future, artificial intelligence will surpass human intelligence, reaching the emergence of artificial knowledge, which will be amplified by self-transformations of the genetic code and, probably, by couplings with microelectronic and nanoelectronics computer systems and Internet networks (Tabirca et al., 2020).

## 6. Conclusions

The research conclusions substantiate a guide for situations in which the decision to replace used accounting programs must be made:

- Using multiple non-integrated software applications for your business. In this situation, there is a high risk of errors and additional costs. The business operates with a low level of competitiveness.
- The accountant does not have control over the information entered and provided in/from the application, he does not have access to information directly from the application. The consequence is that information is received late, there is a risk of making erroneous decisions, and control over business activities is low.
- The accounting application used is outdated, it has not been adapted, or improved, with the development of the business. Unlike the start-up period of the business, the accounting application responds to current needs by allocating additional human, time, or financial resources, as a result, the implementation of a new application is required to effectively support the business.
- The intention to use, for business growth, the latest technology (smartphone, tablet). If a modern cloud accounting application easily allows integration with the latest technology, with classic accounting applications a certain dependence on certain software solutions and outdated equipment is maintained, which limits the growth potential of the business.
- The intention to develop in several geographical areas or the expansion in other fields of activity. In this situation, managing an accounting application on the company's servers could require large investments in equipment and implicitly additional maintenance costs. Instead, choosing a cloud accounting solution, through flexibility and scalability, offers obvious advantages.



- Change of the management team. Often, new managers coming into companies want to implement more integrated applications, capable of quickly providing accurate information at a lower cost, and cloud accounting applications offer these advantages in full.

Considering the next advantages of adopting Cloud Accounting applications:

- Automation of the data collection and processing process.
- Improving the accountant-client relationship.
- Eliminate duplicate information, prevent errors and increase data accuracy.
- Secure access, control, and authorization.

Based on these advantages the main conclusion of the research is that cloud accounting will change the accounting profession. It will lead to a considerable improvement in the way financial activities are carried out, the interaction with customers and the speed and efficiency of responding to their needs.

Accounting processes are to be highly automated, supporting transparent information, which makes accounting professionals reconsider their position and perceive analysis and consulting as the basis of their role. Also, the study undertaken by us and presented in this paper analyzed the possibility of moving some operations specific to the flow of accounting work (monthly, semestrial and annual) to the Cloud.

The results of the study demonstrate that most accounting processes, regardless of whether they are monthly, semestrial or annual, can be moved to the Cloud and that some of them can be left under the control of customers, under certain conditions.

With the new technology, an accountant can provide real-time reports and consulting services on business profitability, cost analysis or decision support. Motivated by greater efficiency and customer satisfaction, the decision is no longer one of "if", but of "when" Cloud Accounting technology will be implemented.

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## **GlobalBox.world's impact on the e-commerce industry, online sales and marketplaces**

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**Abstract.** *As the world continues to become more and more digital, businesses have had to adapt to the new market conditions (demand-supply-price) and set their sights on an online market presence by applying marketing strategies and techniques. GlobalBox.world is a platform for providers of goods and services (individuals or companies) to make their presence visible on a global scale, thus reaching customers worldwide. The company's platform benefits small businesses that do not have the resources to establish a physical presence in different countries, which helps expand their customer base and increase revenue. The platform is easy to use, GlobalBox.world has developed an intuitive interface that is easy for businesses to navigate, even if they have limited experience with online sales, allowing them to more easily set up their online store and start selling their products quickly. The company offers analytics tools that allow businesses to track their sales and understand customer behaviour, and this information can be used to make data-driven decisions about marketing, product development and customer engagement. Starting in 2021, in Romania, the company is helping providers of goods and services to reach a global audience, expand their customer base and increase revenue. In a digital world, we believe GlobalBox.world will play an important role in the online retail and marketplace space both nationally and globally.*

**Keywords:** GlobalBox.world, digitalization, e-commerce, online marketing, online sales.

**JEL Classification:** O3, O30, O31, O36.

## 1. Introduction

Electronic commerce (E-commerce), mobile commerce (M-commerce) and Facebook commerce (F-commerce) are now the most modern ways in which the global economy and business are manifesting themselves. A few decades ago these methods of commerce were viewed with disbelief, as something that was virtually impossible to achieve at that time, but thanks to technical progress and the rapidly evolving development-innovation process as well as economic, social and medical developments, today we are witnessing these techniques manifesting to a degree we would have thought possible. These tools provide additional sales opportunities for businesses and consumers can shop on the go and from wherever they are, it can help reduce operating costs for businesses by allowing them to sell their products without the need for a physical sales space, and Facebook commerce can help build a community of loyal customers and provide businesses with valuable data about customer preferences and buying behaviour.

GlobalBox.world was established in 2015 with founders Mike Ivanof and Pushpraj Singh Chouhan, and the goal of the business was to achieve the three modern business tools: e-commerce, mobile commerce and Facebook commerce. The company entered the Romanian market in 2021, with the pandemic being a factor that accelerated the process of implementation and realization of the platform.

What is GlobalBox.world? GlobalBox.world is a company that provides a platform for providers of goods and services (individuals or companies) to make their presence visible both locally and globally, so that the goods and services they produce and sell can reach customers around the world. The company's platform benefits small businesses that do not have the resources to establish a physical presence in different countries, which helps expand their customer base and increase revenues. It is a "Google-like" search engine for any economic agent wishing to sell, buy or provide services.

Relationships between economic agents are interdependent, from consumer to entrepreneur, entrepreneur to consumer, consumer to consumer and entrepreneur to entrepreneur. GlobalBox.world aims to become the world's first organisation to facilitate trade and commerce across national borders in every city around the world. The company provides analytics tools that enable businesses to track their sales and understand customer behaviour, and this information can be used to make data-driven decisions about marketing, product development and customer engagement.

The main service that GlobalBox will offer is the listing, and subsequent search and prioritization of products and services offered by global sellers in one "uber"-convenient place (the ease and convenience of accessing any type of product, service or promotion that a customer may be looking for at any time and place on the planet). The listed products will then be segmented, grouped or sorted based on keyword relevance, price levels, location, category, most viewed, etc.

The platform is primarily a facilitator, without the company actually becoming a buyer and subsequently a reseller of goods, products and services. The global marketplace will become a one-stop shop for all manufacturers, wholesalers, retailers and even individual sellers, who will be able to display all their products and sell them locally, regionally and

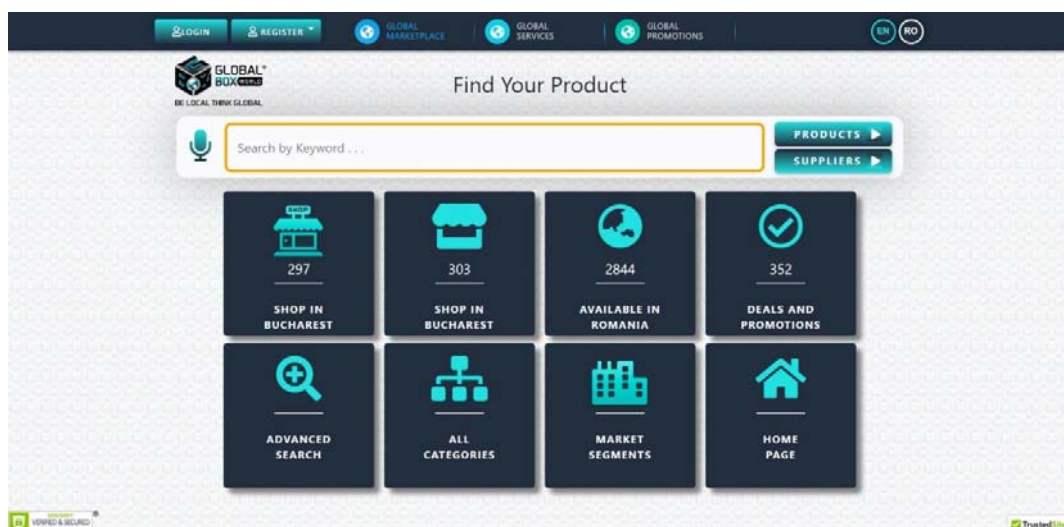
globally, without the sellers incurring any costs whatsoever in the process. The system automatically generates a seller's own online store, without the seller having to build a website, perform marketing, SEO (Search Engine Optimization), connect with payment gateways, handle logistics (shipping products worldwide) and all other aspects that need to be developed and maintained when a seller operates an online retail presence.

What are the advantages of the GlobalBox.world model? This commerce model is different from other models because the vendor or service provider has absolutely no costs associated with presenting and selling their products, and GlobalBox.world offers several premium features that will allow additional revenue to be generated (these features are entirely optional). The Global Services segment of the platform will simply make it easier for all service providers to present their services in a Global Yellow Pages type structure

For the Global Promotions segment, GlobalBox will provide the most convenient platform on a global scale for sellers to post and showcase any promotions or sales for their items, pretty much anywhere in the world sellers can post unlimited ads for free in the Global Marketplace, Global Services and Global Promotions ALL the main facilitator of the development and implementation of the "Law of One Price" concept by completely eliminating all middlemen from the sales/trade process, thus any corporation will be able to reach any consumer segment in any geographic location, amplifying the globalization process.

GlobalBox offers three distinct functionalities: Global Marketplace which allows sellers to sell any type of products to consumers anywhere in the world; Global Services and the Global Services functionality will be similar to that of the Global Yellow Pages; Global Promotions provides an integrated place for any organization in the world to showcase discounts or promotions they have for their products.

## 2. Example home page – GlobalBox.world



The platform offers its users a multi-functional home page where they can access a variety of products and services according to their needs. On the top left of the home page are the login and registration icons. The platform allows users to register as 3 entities: seller, buyer and affiliate. Depending on the role each user plays when logging in the platform offers different opportunities. On the home page we see an example of how the algorithm used shows potential buyers the number of products and shops that are located near the location or area where they access the page. On the home page the three functionalities are visible: marketplace, services and global promotions. In the search bar, customers can search for a product by exact product name, product type, supplier or region where they can buy the products or services. Initially, the platform provides information about the products or services searched locally or regionally, if they do not find the product in the local coverage area, the GlobalBox platform, directs them to the next geographical area where the product can be found, if the product is not found, the platform gives the answer that the product could not be found.

## 2. SWOT analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>▪ A truly exceptional management team</li> <li>▪ Unique algorithm;</li> <li>▪ The entire site is coded with a proprietary code (developed by GlogalBox);</li> <li>▪ Superior knowledge;</li> <li>▪ Understanding of web-based platforms and digital commerce;</li> <li>▪ Potential for significant growth;</li> <li>▪ Strong focus on customer service and satisfaction;</li> <li>▪ Acof with GFF (Global Freight Forwarding), FEDEX and CITC (Confederation of International Trading Companies) to provide global logistics services - shipping any item between two points on the planet</li> </ul>	<ul style="list-style-type: none"> <li>▪ Relatively limited human and financial resources;</li> <li>▪ Not enough staff;</li> <li>▪ Time constraints;</li> <li>▪ Does not own a distribution network (an impossible task given the scale of operations);</li> <li>▪ Lack of brand recognition and reputation;</li> <li>▪ Need to develop well-defined trust with consumers;</li> <li>▪ Have not yet developed an integrated online payment platform worldwide.</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>▪ F-commerce, as a substitute for E-commerce and M-commerce, is truly the "next" wave in global commercial transactions between all market participants; sellers and buyers;</li> <li>▪ It is still a relatively young industry - in 20 years time, this field will probably reach its full development potential;</li> <li>▪ Relative ease of entry into the industry, with low barriers to entry;</li> <li>▪ The total costs required are still extremely low compared to traditional sailing spaces, both for development and ongoing operations;</li> <li>▪ The demographic element is a tremendous advantage as the younger generation is changing their shopping preferences away from "hitting the wheels" concepts in favour of convenience, speed and reliability;</li> <li>▪ No inventory to manage;</li> <li>▪ No infrastructure and logistics required;</li> <li>▪ No shipping boxes;</li> <li>▪ Very large long-term potential.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Online business environment can be attacked by hackers;</li> <li>▪ Upcoming changes in government regulation;</li> <li>▪ Loss of net neutrality, which could lead to challenges for both sellers and buyers;</li> <li>▪ Full integration with one or more logistics companies: FEDEX, DHL, UPS, as well as several national logistics companies in countries around the world, due to dependence on their services to ship products;</li> <li>▪ Larger competitors may be better positioned to offer customers discounted services;</li> <li>▪ Defending customers from competitors (although this may also be an opportunity for company).</li> </ul>

The unique algorithm used by GlobalBox to display items in their countries of origin and national currencies makes this platform truly exceptional. It is the first platform to offer the convenience of aggregating and converging data, products, sellers and customers from around the world into one extremely convenient and easy-to-use platform. In the long term, metadata analytics will further enhance the company's ability to identify the most profitable geographic regions as well as the most profitable market demographics. As a result of this

analysis, the company will be in an excellent position to conduct accurate marketing and provide consumers with information that is 100% relevant to their needs and wants. This is, in fact, what Google is currently doing and, as is well known, Google is currently the largest company in the world by market capitalisation.

### 3. GlobalBox's business strategy

The company is committed to a simple but effective competitive strategy and is easily contained in 4 Os: Outrun, Outsmart, Outperform, be Outstanding! GlobalBox has a tremendous competitive advantage, and this relates to its ability to be agile in its approach, so depending on market conditions the company can change its focus at a moment's notice, which requires constant awareness and situational vigilance. It employs a constant resource fluidity tactic in reallocating/redirecting resources (human, financial and other) to areas where they can produce the greatest positive impact for the company. GlobalBox will provide an unparalleled level of customer service and continually strive to improve the customer experience. It is committed to making significant contributions to society and the environment and will fully embrace the Kaizen concept of continuous improvement based on the idea that small positive changes can make significant improvements to business, business, society and the environment. The company will create a brand that will inspire confidence, competence and comfort for customers around the world and makes a commitment that annually: 5% of company profits will be distributed to social causes and 5% of company profits will be distributed to environmental causes.

In terms of market entry and growth strategies, once the platform became fully operational (January 2018), each potential supplier was approached and flagged in an existing database to explain the benefits of selling and promoting their products and services through GlobalBox (existing databases include over 500 million potential customers worldwide). Through back-office operations the company continues to constantly approach hunters and customers who are currently active on other e-commerce and mobile commerce sites and proactively seeks collaborations with strategic partners around the world, seeking representation in absolutely every country in the world. It will strengthen its market position and create a competitive advantage by achieving its stated goals and objectives and by delivering exceptional service through hard work and performance.

### 4. Economics, profitability and harvest potential

The company estimates a 100% annual growth rate for the first 5-10 years of business, followed by a 50% growth rate per year indefinitely into the future. The long-term goal for GlobalBox.world is to file for an IPO (Initial Public Offering) in 2022 or 2023 and raise over \$10 billion, with an actual target of \$25 billion.

**Table 1.** First 5 years of GlobalBox's operation

Year 1	Year 2	Year 3	Year 4	Year 5
<ul style="list-style-type: none"> <li>▪ USD 10 million traded;</li> <li>▪ USD 1 million revenue from all sources;</li> <li>▪ 1 million customers (sellers, buyers, affiliates) in 5 distinct geographic groups: Canada, United States, United Kingdom, Europe and India</li> </ul>	<ul style="list-style-type: none"> <li>▪ 20m USD traded</li> <li>▪ 30 million cumulative;</li> <li>▪ \$2 million revenue from all sources;</li> <li>▪ \$3 million cumulative;</li> <li>▪ 2 million customers in the 5 geographic clusters mentioned above plus Australia, New Zealand;</li> <li>▪ 3 million cumulative customers</li> </ul>	<ul style="list-style-type: none"> <li>▪ USD 50 million traded;</li> <li>▪ Cumulative amount of USD 80 million;</li> <li>▪ USD 5 million revenue from all sources;</li> <li>▪ Cumulative \$8 million;</li> <li>▪ 5 million customers in the above geographic clusters, plus China, Singapore, Malaysia;</li> <li>▪ 8 million cumulative customers</li> </ul>	<ul style="list-style-type: none"> <li>▪ USD 100 million traded;</li> <li>▪ Aggregate amount of \$180 million;</li> <li>▪ \$10 million revenue from all sources;</li> <li>▪ Cumulative \$18 million;</li> <li>▪ 10 million customers from all previous geographies plus South America; Brazil, Argentina, Peru, Chile, etc.</li> <li>▪ 18 million cumulative customers</li> </ul>	<ul style="list-style-type: none"> <li>▪ USD 200 million traded;</li> <li>▪ Cumulative amount of \$380 million;</li> <li>▪ USD 20 (twenty) million revenue from all sources;</li> <li>▪ Cumulative amount of USD 38 million;</li> <li>▪ 20 million customers from all previous geographies plus Middle East; Saudi Arabia, UAE, etc.</li> <li>▪ 38 million cumulative customers</li> </ul>

#### Break-even analysis in the first year of operation

Month 1: 1,000 customers with an average transaction per person of \$10 >> \$10,000.

Month 2: 1,500 customers with an average transaction per person of \$10 >> \$15,000.

Month 3: 2,500 customers with an average transaction per person of \$10 >> \$25,000.

Month 4: 5,000 customers with an average transaction per person of \$10 >> \$50,000.

Month 5: 10,000 customers with an average transaction per person of \$10 >> \$100,000.

Month 6: 20,000 customers with an average transaction per person of \$10 >> \$200,000.

Month 7: 40,000 customers with an average transaction per person of \$10 >> \$400,000.

Month 8: 60,000 customers with an average transaction per person of \$10 >> \$600,000.

Month 9: 100,000 customers with an average transaction per person of \$10 >> \$1,000,000.

Month 10: 150,000 customers with an average transaction per person of \$10 >> \$1,500,000.

Month 11: 250,000 customers with an average transaction per person of \$10 >> \$2,500,000.

Month 12: 400,000 customers with an average transaction per person of \$10 >> \$4,000,000.

Total customers in first year: approximately 1 million

Total dollar transactions: approximately \$10 million

#### 5. Description of the target market

GlobalBox will appeal to anyone and everyone. The framework they are currently developing is potentially responsive to any market, so the company is ready to facilitate any business or transaction from any country right at the launch of the platform, but initially 5 markets were prioritised, namely: **Canada**, being the home country of one of the founders (Mike Ivanof) and is the base for the company's global operations; **USA**, a key global economy, the US dollar being the international currency for business, thus the online retail sector has seen an impressive 15.4% growth with sales exceeding \$300 billion in 2014; **India**, represents one of the major economies on the BRICS watch and is one of the fastest growing e-commerce markets in the world with an e-commerce sector of \$16 billion in 2015. India has over 150 million internet users and a significant proportion of the population currently buys items through platforms such as FlipKart and Snapdeal. This first platform FlipKart has managed to acquire over 20 million users in less than 4 years of operation in India alone! It should be noted that India's total population is now approaching



1.3 billion and is expected to surpass China; **the UK**, a market that recently saw a 14% growth in online retail in 2014 when a total of £104 billion was spent online. Online retail now accounts for 24% of all retail markets, with a projected growth of 12% and an estimated £116 billion to be spent online; **Europe** offers an advantageous environment for doing business due to a number of factors, such as the use of a single currency: the euro, the ease of trade within the union and a total population of over 742 million, which is our potential audience in the European market. In terms of the e-commerce sector, €156.28 billion was spent online in 2014, with an expected growth rate for the sector of 18.4% for 2015 (Capgemini.com, 14.01.2015).

## 6. Marketing plan and publication strategy

The company's objective is to provide a platform that facilitates the convergence of sellers and consumers on an absolutely global level and is accessible to anyone who wants to access the platform. Database marketing will be the most important strategy used in the attempt to acquire new customers. As of January 2018, GlobalBox has acquired databases of potential users with memberships in excess of 800 MILLION (over 1/10 of the world's population) individuals and businesses.

The system automatically generates a seller's own online store without the need for the seller to build a website, perform marketing, SEO (Search Engine Optimization), connect with payment gateways, handle logistics (shipping products worldwide) and all other aspects needed to be developed and maintained when a seller operates an online merchant presence. The platform will primarily target small and medium sized businesses to give them full access to a global marketplace

In terms of pricing, market penetration with a 10% service fee (this service fee is only charged to buyers as part of the purchase price), and on the platform sellers can post an unlimited number of ads for the three functionalities: marketplace, services and global promotions. No fees will be charged to sellers! Service fee is significantly lower than those of main competitors (Amazon: 13-30%, eBay: 14-18%, Alibaba high annual fees between 5,000 and 30,000 USD, Alibaba annual fees between 5,000 and 30,000 USD).

The company applies an ongoing process of compiling lists of vendors from around the world and even though 5 initial markets were initially specified, the company takes a proactive stance on sellers and a persuasive stance towards buyers from around the world, and when the site became fully operational, the company sent out informative invitation emails to all sellers in the database. The list of users will be drawn from feasibility studies conducted within the target markets listed above, as well as from networks within personal and professional connections, and this is to build a more impressive market offering when the company approaches users outside our association networks. In the first few months, information emails (300,000 emails) were sent to potential suppliers on our lists inviting them to sign up to the company's platform via dedicated teams for each market and to highlight the company's global image.

Competition can be extremely fierce, however, GlobalBox is determined to overcome any difficulties by adopting a proactive growth strategy, which will allow it to grow organically

by developing its own networks, but also an aggressive poaching strategy, which will likely lead to customer acquisition from established organisations. Given the nature of the business, which is 100% internet related, we are also acutely aware of the potential issues around the possibility of the site being pirated. Therefore, the company will invest a significant amount of money from the outset in developing outstanding security for the site, and a substantial amount of resources will be dedicated to the issue of security thereafter as operations continue. It is expected that a team of experts will be consulted on the initial development of security, which - although relatively expensive - will ultimately result in substantial cost savings, preventing major damage to the company's assets.

## 7. Conclusions

The e-commerce space has relatively low barriers to entry, in that virtually anyone could build an internet-based platform and start offering a trading platform. However, gaining global recognition and relevance is certainly not an easy task, as one of the key success factors is brand reputation and reliability. In this respect, there are 6 key issues that GlobalBox considers in terms of competitive forces: demographic factors, socio-cultural influences, technological developments, macro-economic impact, political/legal pressures, and global trend issues. These issues are important because they indicate current market trends that will influence the evolution of e-commerce in the future. E-commerce will grow steadily due to the use of the internet and mobile devices, as well as the development of payment technology and online security information, and GlobalBox.world incorporates all these aspects into a 100% digital platform that is constantly being developed and improved. The company aims to provide a personalised user experience, adapt to shoppers' needs and preferences, and ensure sustainability and social responsibility.

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## **Digitalization – Threat or opportunity for human resources capital**

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**Abstract.** *Digitization has seen an impressive evolution in recent years, felt at the level of all industries and activities. The processes managed until recently by human capital have started to be digitized, a transformation that can be perceived both as an opportunity and as a threat to the human resources involved in carrying out those activities. The current work aims to summarize the impact that digital transformation has had and still has on activities, as well as the ways in which the automation of some processes can be transformed from a threat into an opportunity, with a direct impact on increasing competitiveness and productivity, on streamlining processes, as well as reducing the incidence of human errors. Also, daily activities performed by human resources are influenced by digitalization, therefore we will focus also on threats and opportunities for people in their personal live.*

**Keywords:** digitalization, people, human resources, threat, opportunity, impact, digital targets.

**JEL Classification:** L2, M15, O3.

## Introduction

Digitization has been the watchword of recent years, regardless of the companies' field of activity and regardless of the degree of development of the world's economies. The COVID-19 pandemic thus accelerated a series of processes and hastened actors from all over the world to adopt new technologies to be able to function in the new normality, but this process, that of digitization, is a continuous one and thus the investments are far from being concluded, but instead, the initiatives started at the level of the European Union strengthen the approach of the member countries towards digitization and support the efforts.

In this paper, we proposed to approach the digitization process by defining this concept, setting the current framework both at the European Union level and at the national level, with the subsequent expansion of the analysis on the impact that this digital transformation has on resources human, both as threats and as opportunities. In conclusion, we have completed the perspectives that can be seen for the next years in the digitization area, so that we can fully outline the image of the process and its extent in a time interval.

## Digitalization process

In recent years, we have witnessed an extensive process of transformation of the processes we were used to in most areas of our life and work. This digitization process can be analyzed from several perspectives, thus identifying different points of view.

The delimitation principle of the opinions refers to the impact that this process has on human resources, thus, for part of the population, digitalization represents an evolution of the workplace that creates new opportunities for career development, through the prism of professional development, while on the other hand, digitization is perceived as a potential danger from the perspective of replacing people with robots or automated processes, thus reducing the number of jobs.

Based on this second approach, human resources specialist Sorina Faier affirms that any job that can be automated can be replaced in the future. Roles with a high degree of replacement risk are mainly those that are repetitive or that can be done more efficiently and cheaply by robots or software. In general, we are talking about unskilled worker roles, in manufacturing, retail, call centers, couriers, security guards, but also specialized roles, banking consultants, accountants, designers, architects, translators, civil servants and even certain IT jobs (Sarbu, 2023).

Also, the same specialist has the opinion that the labor market has been facing radical and irreversible changes for many years. All this opens up new opportunities for companies and employees, but also comes with a series of risks that must be managed in order not to accentuate inequalities and create a very large discrepancy between highly skilled and unskilled employees. Just as 20 years ago there were no many of today's jobs, it will be the same in the future, we will have fields and jobs that today still do not exist. For these changes not to be a burden for employees and the labor market, the right approach must be one with an emphasis on pragmatism, flexibility, learning programs, retraining and

reintegration measures. This is the only way we can have a transition with as few risks as possible (Sarbu, 2023).

Digital transformation was perceived as one of the trends that will influence society and companies, both soon and in the long term (Tihinenand and Kääriäinen, 2016).

The impact of this transformation will be notable and will be felt at the level of all industries, numerous authors treating this subject from the perspective of a new revolution (Schwab, 2015).

In specialized literature, digitization or digital transformation is defined by E. Stolterman and A. C. Fors as being represented by "the changes associated with the application of digital technology in all aspects of human society" (Stolterman and Fors, 2004). Likewise, digitization can also be defined as "the ability to transform existing products or services into digital versions, thus offering advantages over tangible products" (Henriette et al., 2015).

O. Gassmann et al also pointing out that ideally, the digitization of a product or service is realized without harnessing the value proposition which is offered to the customer. In other words: efficiency and multiplication by means of digitization does not reduce the perceived customer value (Gassmann et al., 2014). Another perspective holds that digitization refers to "the adoption or increased use of digital" or information technology by an organization, industry, country, etc." (Brennenand and Kreiss, 2014).

Trying also to define digitalization, Parviainen et al. (2017) considered that digital transformations defined as changes in ways of working, roles, and business offering caused by adoption of digital technologies in an organization, or in the operation environment of the organization (Parviainen et al., 2017, p. 64)

Trying to resume the definition of digitization in a few words, this process can be described as the conversion of analog processes or contents into a digital form, without losing the returned value of the analog process.

The digitization process can be defined as representing the change in the ways of working, the roles and the way the business is carried out, determined by the application of new digital technologies both at the organizational level and at the level of the environment in which it activates, thus being forced to adapt in order to counterbalance the competitiveness determined by the evolution of competing companies

## **2.1. Digitalization process in European Union**

The digitization process represents a subject of high importance at the level of all the member states of the European Union, so that, the European Commission has been monitoring Member States' digital progress through the Digital Economy and Society Index (DESI) reports since 2014. The report it is being structured on 4 representative pillars, respectively: Human capital, Connectivity, Integration of digital technology and Digital public services and each year, DESI includes country profiles which support Member States in identifying areas requiring priority action as well as thematic chapters

offering a European-level analysis across key digital areas, essential for underpinning policy decisions.

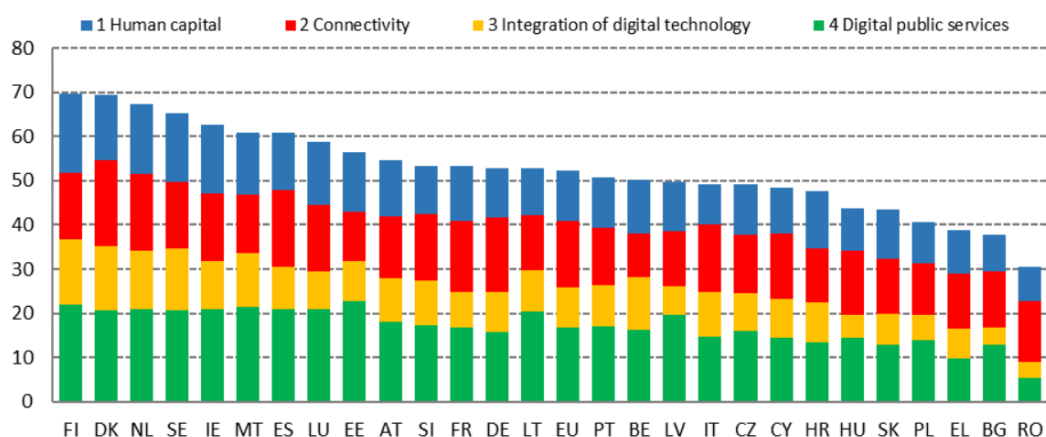
The last DESI reports, issued in July 2022, reports are based mainly on 2021 data and tracks the progress made in EU Member States in digital. During the COVID-19 pandemic, Member States have been accelerating in their digitalization efforts but still struggle to close the gaps in digital skills, the digital transformation of SMEs, and the roll-out of advanced 5G networks.

The general DESI report it is also based on the four dimensions, each of them having equal importance, which is reflected in the equal weights of each dimension, weights being also assigned at the sub-dimension. General figures for these four areas were centralized in Figure 1 (DESI Report, 2022).

The Human capital dimension assesses both internet user skills of citizens and advanced skills of specialists, with focus on basic skills, ICT specialists and Female ICT specialists. In the last report, obtained results has shown that While 87% of people (aged 16-74) used the internet regularly in 2021, only 54% possessed at least basic digital skills. The Netherlands and Finland are the frontrunners in the EU, while Romania and Bulgaria are lagging behind. A large part of the EU population still lacks basic digital skills, even though most jobs require such skills (DESI Report, 2022).

The next dimension, connectivity, analyze both fixed and mobile broadband with indicators measuring the supply and the demand side as wells as retail prices. Based on last figures included in DESI Report, while the EU has full coverage of broadband, only 70% of households can benefit from fixed very high capacity network (VHCN) connectivity with the potential of offering gigabit speed. And that it is mainly because the large gap between rural and national figures. Malta, Luxembourg, Denmark, Spain, Latvia, the Netherlands and Portugal are the most advanced Member States on total fixed VHCN coverage (all with more than 90% of homes covered). By contrast, in Greece, only 1 in 5 households have access to fixed VHCN.

**Figure 1.** Digital economy and society index results, 2022



Source: DESI 2022, European Commission.

The Integration of digital technology dimension is made up of 3 sub-dimensions: digital intensity, take-up of selected technologies by enterprises and e-commerce. In 2021, only 55% of small and medium-sized enterprises (SMEs) reached at least a basic level in the adoption of digital technologies. Sweden and Finland have the most digitalized SMEs (86% and 82% having a basic level of digital intensity respectively), while Romania and Bulgaria have the lowest rates of SME digitalization.

In the meantime, the Digital public services dimension describes the demand and supply of e-government as well as open data policies, latest results showing that Estonia, Finland, Malta and the Netherlands have the highest scores for Digital public services, while Romania and Greece have the lowest.

## **2.2. Digitalization process in Romania**

Analyzing digitalization in Romania using the same framework applied in DESI Report, there were obtained results also for the four areas, general status being that Romania ranks 27<sup>th</sup> of the 27 EU Member States in the 2022 edition of the Digital Economy and Society Index (DESI).

The country is lagging behind for several indicators in the human capital dimension, with a very low level of basic digital skills compared to the EU average, but maintaining its high rankings in the proportion of female ICT specialists in employment (ranking 2<sup>nd</sup>) and ICT graduates (ranking 4<sup>th</sup>). A significant change of pace in Romania's digital skills' readiness is crucial for the EU to reach the Digital Decade target on basic digital skills and ICT specialists. Romania performs comparatively well on connectivity, which is the dimension where it scores best. The take-up of at least 100 Mbps fixed broadband (57%) and fixed very high-capacity networks coverage (87%) surpasses the EU average. This is also important in the light of the Digital Decade target of 100% coverage of all households by gigabit networks until 2030. However, the country's performance in the integration of digital technologies and digital public services is poor compared to the other EU Member States. The share of SMEs with at least a basic level of digital intensity (22%) and the percentage of enterprises sharing information electronically (17%) is the lowest in the EU. The low level of digitalization and the relatively slow progress is preventing the Romanian economy from taking full advantage of the opportunities offered by digital technologies. This is further aggravated by the very low level of digital public services for both citizens and businesses (DESI Report, 2022).

## **3. Human capital consideration**

### **3.1. Threats**

The digitization and technologization of activities have dethroned manual flows, society is changing them at an alert pace, affecting almost all aspects related to the individual and the environment in which he carries out his activities, whether we are talking about the work area or anything that is in daily use.

The advantages of digital technology are that devices become smaller, lighter, and more permissive in terms of specifications and with more and more additional functions whose main purpose is to improve time efficiency. Also, the accessibility of data has grown surprisingly, devices can now store huge amounts of information, both locally and remotely, their administration being easily done from any corner of the world.

With all these advantages, also come a series of threats, risks and negative effects that any member of society must consider, because now most of the population owns the latest generation phones, smartphones, being able to easily take photos, videos, which they can share with the members of the communication either through mobile applications or through the social networks to which they have easy access. Therefore, the control of personal information has become quite difficult and sometimes impossible to manage, because people risk that their data will be retrieved, stolen, or even sold.

Also, people's preferences have adapted to the new conditions and they prefer to spend more time virtual, to the detriment of the time spent in the real world, in nature. Also, spending time in the virtual space causes people to have distorted expectations compared to what they find in real life, on social media platforms the positive aspects of other lives are mainly promoted, thus creating unrealistic expectations. At the same time, people tend to compare themselves with other people who promote their stories on social networks, people tending to adapt to a lifestyle that might not suit them.

Moreover, social networks and online communication platforms have become a new addiction for people, being noted cases where, in regular meetings with people with whom experiences, thoughts and feelings can be shared, phones find their place and capture attention from time to time, changing the focus of the meeting from face-to-face discussions to checking activities on social networks, e-mails or other information, applications or games that can be accessed with the help of gadgets.

Combined, all these aspects determined a social disconnection of individuals, thus causing psychological disorders such as depression and other forms of ailments, with the predominant cause being the excessive use of social networks and the lack of human contact. Also, the manipulation of masses of people is much easier to apply by using data available online and media editing tools. Thus, fake news can be spread much more easily among the users of social networks.

Another negative impact of increasing digitalization rate will be the challenge to ensure a proper cyber security system. Therefore, companies should invest much time and resources in order to avoid or to defend against informational attacks. A recent report (Veeam Software, 2023) launched by Veeam Software, leader in modern data protection, reflects that companies are facing more complex hybrid IT environments and are consequently increasing their budgets to avoid cyber-attacks and keep pace with the continued diversification of production environments in the clouds. Furthermore, the report surveyed 4,200 IT managers and implementers worldwide and from all types of companies on a variety of data protection factors, challenges and strategies and it shown that decision makers in IT departments do not feel that the organization's data is sufficiently well protected. A priority for organizations this year is increasing the reliability and success of



backups, followed by ensuring that the protection of IaaS and SaaS environments goes hand in hand with the protection they rely on for data center workloads. Also, the report concludes with major data protection trend of this year.

The first area relates to modern data protection and the necessity for business survival: four out of five organizations believe they have a gap - or a sense of dissatisfaction or unease - between the expectations of the business area and what IT services can deliver. 82% have an "availability gap" between how quickly companies' systems need to be recovered in the event of a loss and how quickly their IT department can actually recover them. 79% also cite a "protection gap" between how much data can be lost and how often the IT department can protect that data. Such gaps are one of the reasons why 57% of organizations want to change their primary way of data protection in 2023, but also increase their data protection budgets.

The second area consist in increasing budgets for data protection. Globally, organizations expect to increase their data protection budget by 6.5% in 2023, a significantly larger percentage than the total of all other planned increases in other IT areas. Of the 85% of organizations that plan to increase their data protection budget, the average planned increase is 8.3% and, in most cases, in line with increased investment in cybersecurity tools.

The same report refers to cyber-attacks, these causing the most significant disruptions to organizations in 2020, 2021 and 2022. According to the report, 85% of organizations were attacked at least once in the past 12 months, up from 76% last year. Data recovery is a primary concern, with organizations reporting that only 55% of their encrypted/destroyed data could be recovered from attacks. According to the survey, the most important aspect organizations look for in a modern data protection solution is "integrating data protection into a cyber preparedness strategy".

Also, the report conclude that ransomware is the biggest obstacle to digital transformation. As a result of the strain it puts on budgets, as well as the workforce, ransomware and the current state of cyber security are high on the agenda of IT teams. This makes the IT resources and budgets originally allocated for digital transformation initiatives go more towards prevention. Not only do cyber-attacks drain operational budgets to cover ransoms and recovery efforts, but they also reduce the ability of organizations to modernize for future success. Instead, companies must pay for prevention and reducing the status quo.

As a general approach for cyber security systems, decision makers in IT departments face a double challenge. They are building and sustaining increasingly complex hybrid environments as the volume and performance of cyber-attacks grow. This is a major concern as leaders increasingly think about how they can effectively manage and recover business operations in the event of any type of business interruption. Old backup approaches won't cope with modern workloads, resulting in unstable and slow data recovery just when it's needed most. This is one of the things that IT managers focus on when laying the foundations of their cyber resilience plan. Therefore, even if some processes are digitalized and people are not any more required for those flows, the focus on involving human resources it is switch to other areas such as data protection.

Another threat that seems to be already present in our lives consist in excessive reliance on gadget and addiction caused by using them. As gadgets are used to control contacts, photos, documents or any personal information, people become dependent on the gadgets that give them access to this information. The accessibility of this information and the generous storage capacity comes with the disadvantage of the vulnerability of this information, the risks and inconveniences caused by the loss, failure, or virus infection of the devices. This demonstrates excessive dependence on devices. Another example is how elementary things, such as obtaining information to reach a certain point, have transformed from a human interaction, in the sense that people asked the locals what the way to that point is, into an action dependent on the device that has GPS functions useful for location and for obtaining the necessary instructions.

What's more and maybe more interesting, is that this digitalization, together with fast access to information, accessibility and so on, also brings the facility to avoid physical effort in activities such as going to a shop to buy needed things, to pay bills, to buy presents or to bring flowers to someone. Nowadays, it is very easily to order or to perform all the things you need, without doing any effort for this, and this behavior it is also augmented by the low fees for these services.

### **3.2. Opportunities**

As we mentioned before, digitization has determined the emergence of two perspectives regarding the impact that will be felt at the level of the workforce, on the one hand considering that the digitization and automation of processes will cause the reduction of jobs, while on the other on the other hand, it is argued that the jobs will not be reduced, but the weight of those who have as their object of activity repetitive, redundant activities will be reduced, the emphasis being shifted to the jobs where creative skills are required, to prepare some information, adopting decisions and innovating processes.

Thus, the premises are created for outlining some opportunities for the people involved in the introduction of automation, in the implementation of digitization and technology flow projects, because people remain the ones who direct the entire process and plan everything to obtain surprising results.

Usually, at the beginning of a transformation process, leaders and employees start with a positive emotional state, characterized by curiosity, interest and enthusiasm.

In successful transformations, leaders invest time and effort right from the beginning to ensure support mechanisms for employees, both at a rational level (for example, establishing and communicating the process, success indicators, necessary resources, etc.), as well as at emotional level (for example, by formulating the goal and implementing mechanisms for managing employees' concerns and questions). As the transformation process progresses, although the pressure and stress increase, they become motivating for employees, support the accelerated pace of learning and performance of people, so that in the end the transformation energizes the entire organization. And this outcome is due to the rational and emotional support mechanisms implemented at the beginning of the transformation (Dincă, 2022).

In an unsuccessful transformation, the process starts from the same positive emotional state. Due to insufficient investment in building rational and emotional support mechanisms for employees, inherent stress and pressure are potentiated by negative emotions: insecurity, unpredictability, nervousness, and overwhelm. Thus, leaders detach themselves from the ongoing transformation, employees lose confidence in the process, and the transformation does not fulfill its objectives. Moreover, such a transformation has long-term effects: employees associate organizational changes with staff reduction, threatening job security, so future changes are rejected (Dincă, 2022).

Another opportunity that digitalization brings to human resources consist in reducing bureaucracy, which in turn can lead to the efficiency of the working apparatus of the institution where the implementation takes place. Reducing the degree of bureaucracy through the implementation of digitization can only be achieved by adopting a strategic plan that adapts the institution for the digital environment. Bureaucracy is a direct result of the administrative development of the state, which involves the increase in the number of officials and operations that must be carried out in order to achieve a single goal, officials and operations that require the allocation of considerable financial resources from the state budget. The implementation of digitization, although expensive in the initial phase, is a long-term investment; initial costs are amortized by reducing salary costs with civil servants. Thus, one of the principles of the implementation of digitization in the public administration is the principle of saving public funds, which aims to modernize the administration; at the same time, the interoperability of databases is a central element of this vision (Olaru and Răvdan, 2022).

Another opportunity that is beginning to be felt among people consists in the efficiency of processes, each business trying to identify the fastest way to deliver products and services to users, thus reducing the time elapsed from identifying the demand for the product, until offering the offer and even the product or service. Digitization and automation of processes comes to the aid of companies and offers them transparency and fairness in relations with clients, the efficiency of flows being determined both by the reduced time to complete a task, as well as by the effort and cost required.

Moreover, we can consider an opportunity of digitization the much easier possibility of having access to qualitative, diversified, innovative products, which appeared as a result of digitized production flows. The digitization of production flows has the main result of increasing productivity, reducing operational costs and human errors.

By digitizing production flows, companies ensure that each operation is performed in a consistent manner, resulting in high quality and reliable results. And with quality assurance and consistency, as well as time and efficiency benefits, you can start designing higher-quality, more feature-rich products with little or no increase in production time and cost.

At the same time, both companies and the beneficiaries of products and services stand to gain from digitization because when repetitive manual processes are automated, employees are freed from monotonous workloads and allowed to focus on more challenging and innovative initiatives that will help the business run more efficiently.

Another opportunity that brings advantages to both companies and human resources is the fact that human error is reduced with business process automation systems, tasks can be performed faster and with fewer mistakes. Ultimately, automating processes allows employees to make better use of their time at work. When operations are automated, the likelihood of human error is greatly reduced.

Automating repetitive processes represents an opportunity for the human resource involved in that process because when employees are asked to focus on repetitive manual tasks, it reduces their ability to learn, develop and advance professionally. Employees benefit from digitization as it automates these repetitive activities, allowing them to engage in more meaningful initiatives and thus boosting their morale (Malak, 2022).

#### **4. Digitalization perspectives and digital targets**

Being a topic with high importance for Europe Union, digitalization goals are very precisely defined and establish for the next period. UE will pursue a human-centric, sustainable vision for digital society throughout the digital decade to empower citizens and businesses.

Digital society and digital technologies bring with them new ways to learn, entertain, work, explore, and fulfil ambitions. They also bring new freedoms and rights and give EU citizens the opportunity to reach out beyond physical communities, geographical locations, and social positions (European Commission, 2021).

Now we are in the digital decade and Europe's targets for 2030 can be summarized in 4 points:

- a digitally skilled population and highly skilled digital professionals;
- secure and sustainable digital infrastructures;
- digital transformation of businesses;
- digitalization of public services.

Details for all these areas were mentioned in the Official Journal of European Union issued on December, 2022, which establish the Digital Decade Policy Program 2023. Based on this document, The European Parliament, the Council, the Commission and the Member States shall cooperate with a view to achieve the above-mentioned targets in the Union by 2023.

For the first area, the targets will consist in at least 80% of those aged 16-74 have at least basic digital skills and also increasing the number of ICT specialist to at least 20 million of employees within the Union, while promoting the access of women to this field and increasing the number of ICT graduates.

The second area of digitalization, the one related to ensuring a secure, resilient, performant and sustainable digital infrastructures, has the following targets:

- all end users at a fixed location are covered by a gigabit network up to the network termination point, and all populated areas are covered by next-generation wireless high-

speed networks with performance at least equivalent to that of 5G, in accordance with the principle of technological neutrality;

- the production, in accordance with Union law on environmental sustainability, of cutting-edge semiconductors in the Union is at least 20% of world production in value;
- at least 10.000 climate-neutral highly secure edge nodes are deployed in the Union, distributed in a way that guarantees access to data services with low latency (i.e. a few milliseconds) wherever businesses are located;
- the Union has, by 2025, its first computer with quantum acceleration, paving the way for the Union to be at the cutting edge of quantum capabilities by 2030.

The third component it brings in our attention the digitalization of businesses and has as targets that at least 75% of Union enterprises have taken up, in line with their business operations, cloud computing services, big data or/and artificial intelligence. Also, another target for this area is that more than 90% of Union SMEs reach at least a basic level of digital intensity and also, the Union facilitates the growth of its innovative scale-ups and improves their access to finance, leading to at least doubling the number of unicorns.

For the last, but not the least, digitalization of public services will have as targets that there is 100% online accessible provision of key public services and, where relevant, it is possible for citizens and businesses in the Union to interact online with public administrations. The second target of this area will be that all union citizens will have access to their electronic health records and also will have access to secure electronic identification (eID), meaning that they will be recognized throughout the Union, enabling them to have full control over identity transactions and shared personal data.

All these areas will bring benefits for people and will have as a target a safe and secure digital world, cybersecurity offered by all organizations accessibility for all the people, therefor everyone can participate in digital opportunities, access to data for small businesses and industries, digital tech access for start-ups and SMEs, convergence of innovative infrastructure and work and easily availability of public services.

Also, people are viewed as the beneficiary of this digitalization, therefor the digital rights and principles includes concepts like people at the center, freedom of choice, safety and security, solidarity and inclusion, participation and sustainability. Explaining these approaches, we can say that digital technologies should protect people's rights, support democracy, and ensure that all digital players act responsibly and safely, people should benefit from a fair online environment, be safe from illegal and harmful content, and be empowered when they interact with new and evolving technologies like artificial intelligence. Also, the digital environment should be safe and secure, therefore all users, from childhood to old age, should be empowered and protected and also, Digital devices should support sustainability and the green transition, which means that people need to know about the environmental impact and energy consumption of their devices. In the same time, technology should unite, not divide, people: everyone should have access to the internet, to digital skills, to digital public services and to fair working conditions. Moreover, citizens should be able to engage in the democratic process at all levels and have control over their own data (European Commission, 2022).

Monitoring the digitalization progress will be performed by European Commission, following towards the general objective and also the digital targets that were mentioned before. Each year, a new DESI Report will reflect the general progress and also the progress of each Member States.

## 5. Conclusions

Digitization, as we outlined in the present paper, is a term that we have heard more and more about recently and whose perspectives are impressive. Thus, digitization at this moment is no longer an option, a trend, to which people and companies have the opportunity to switch, but it represents a necessity in the conditions where all companies want to be competitive in a competitive environment, and the population he wants to benefit as much as possible from the developments in each field, both in his professional life and in his personal and everyday life.

Digitization, as I described above, does not mean changing processes, but adapting them so that the benefits of digitalization of processes come to the aid of people and companies.

For the human factor, digitization comes with advantages and disadvantages, with opportunities and threats, but overall, the benefits that the digital transformation has at the level of society are superior to the negative effects, most of which can be managed with a rational approach and use balanced. Digitization, as I outlined towards the end of the paper, represents an ongoing process, with a major impact on the entire society, the period in which we find ourselves representing the beginning of the digital decade in which we will take part. Seen as a fourth revolution (Schwab, 2015), digitization will significantly change the lives of people, society and companies, and the way it is perceived can be a decisive factor in the success of applying digital transformations.

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## **Digital labour as an indicator for national economy development**

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**Abstract.** *Most job reforms in terms of digitalisation stem from technology and information. The changes and developments that take place in this sector of activity subsequently determine what will be the changes in the labor market for all bald areas of activity (Aleksynska et al., 2019). Thus, there can be no discussion about the digitalisation of agriculture itself as an individual sector, nor about other isolated areas. Digitalization takes place among employees, the workforce and acts in the direction of changing the job description of a particular profession (De Stefano et al., 2018). Digitalisation does not depend only on the way of automation and technology of technical processes (Asmer et al., 2022). It also largely depends on the ability of individuals to adapt and educate themselves digitally (Veselko and Gaurav, 2021). In this way, jobs do not change only as a structure, but are modernized and make way for the emergence of new jobs, new specializations that require training from several fields of activity or a greater deepening of a certain field (Graham et al., 2017). The statement is valid for all fields of activity, starting from the financial sector of activity where the activity is aimed at processing large databases, to activities specific to the humanities, sociological field (Horton et al., 2017). This paper is concerted on the interpretation of those elements that alter a certain structure of the labor market, as well as the way in which these changes propagate.*

**Keywords:** labor market, digitalisation, ITC, job description, dependency.

**JEL Classification:** J40, J49, J50, J54, J63.



## 1. Introduction

While more and more disruptive elements for the labour market such as policy decisions, the decision to govern and organizations through the grips they form and represent are appealing to the digital workforce as a modern and predominant strategy within the visions they have (Asmer et al., 2022). Thus, it comes more and more important for the average individual to understand the approach of the free market, but also of the authorities that are responsible for maintaining a social and economic balance for the market (Aleksynska et al., 2019).

This article focuses on the factors that mainly determine the adoption of digital work by the main organizations and presents a way to observe the correct way of interpreting digital work in order to be able to develop a direct proportional relationship between the degree of development of the economy in question and the level of adoption of technical and digital tools by economic agents to integrate these factors into their lucrative processes (Fuchs, 2015).

From the point of view of the economy, workers and their work has always been indispensable to the level of economic development of a country, which is why it becomes normal to start an analysis using the working capacity used at the macroeconomic level to establish a certain level of regional or national development (Fuchs, 2015). The difficulty arises when the technological factor, digitalization, must be classified in a category of factors. It can be considered either complementary or substitutable with the classical workforce (Horton et al., 2017). What creates the difference is the type of activity and the way the company has preferred to act on the implementation of these processes (Graham et al., 2017). Predominantly, in order for a company to have the ability to implement these processes, it needs relative stable capital and a high profit to access technology.

Thus, a vicious circle is formed through which one of the elements of this certain tend to determine the power of action of the following actions, and on the other hand they are influenced by the level of quality of the previous actions (De Stefano et al., 2018). For example, the implementation of new technological processes in the framework of lucrative activities is a phenomenon that has constantly appeared in human society and has altered the economy (Asmer et al., 2022). Starting from the invention of tractors that have reduced the involvement of people in physical activities (Fuchs, 2015). At the time, most individuals in the field felt threatened by the fact that the new machine would take over their jobs and they would have nothing to work for, but history has shown that people have reoriented themselves to more important areas, to more cost-effective and efficient activities, being a scenario in which technology was a complementary asset to the human factor in the labor market.

## 2. Literature review

Within this new reality that digitalization imposes on companies and authorities, the main target of the authorities is to increase the standard of living in a country, to increase the quality of life and to benefit from the opportunity to recover the gaps that history has caused

(Kavesa and Mbali, 2017). Basically, digitalization provides the necessary tools to increase the level of development at such a high rate as to compensate with the reduction of economic evolution between emerging and already economically developed countries (Horton et al., 2017). Increasing the standard of living means increasing the efficiency of the resources used and as a result a clear distinction must be made between the new digital processes that lead to an increase in the unemployment rate and those that have the capacity to increase competitiveness and the ability to increase the quality of work (Veselko and Gaurav, 2021).

Economic development based on investment and on the basis of advancement in R&D may result in the recovery of losses already caused by certain sectors due to preponderant orientations towards consumption (Ciobanu et al., 2021). However, increasing efficiency implies the majority of the effect resulting from the effort, increasing resource efficiency with the help of the workforce available in the market, being not only about acquiring and implementing new technologies, but also about educating and forming a sufficiently well-trained labour market to alleviate the new instruments and cope with the financial developments that are occurring in the economy.

However, there are two aspects of the process of technology and digitization of activities. There is the technical, physical part that helps individuals to process data, digitize activities and increase the efficiency of activities (Graham et al., 2017). On the other hand, we are dealing with the Internet, with the digital and automated environment that has the ability in some cases to fully take over the duties of some people, which changes the paradigm and decisively affects the quality of the employee within a company (Ciobanu et al., 2021). But the widespread use of the digital environment has changed much of the processes of recruiting and upskilling people employed in the labour market, as well as for those to be integrated at national level.

The increase in the digital workforce occurred as a result of two major trends (Aleksynska et al., 2019). The main one, valid for the largest share of economic sectors at international level, is about non-employment and underemployment in certain areas, which has also led to the need for companies to adopt digitized processes, to invest in some cases massively in these activities, and on the other hand to an immobilization of the inactive workforce. This process in most cases has decisive effects (Veselko and Gaurav, 2021).

Companies that end up being able to afford to adopt such automation processes will no longer need to hire the workforce that they initially needed and as a result they won't even be interested in taking it over for a price below market level because they will first need a certain amount of time to be able to recover (Graham et al., 2017). Pay off investments already made (Aleksynska et al., 2019). Thus, the possibility for policymakers to catch up with this gap in the labor market is gradually becoming smaller and more difficult to recover (Kim and Lee, 2021). This need to seize staff shortages has resulted in what the second point of the discussion means, namely the formation of new jobs as a result of the development of technology (De Stefano et al., 2018). More and more sectors of activity are characterized by the rapid change of connectivity, society evolving in terms of the information they have at their disposal, but especially also in terms of the ability to change jobs with an alternative that is tangential to the previous one.

As a result, new sectors adjacent to or within the same sectors appear jobs that become complementary to the integration of new technologies and thus come to note the need to cover these vacancies, new ones created in the economy in which they did not exist in the approved past and which are not well defined even today (De Stefano et al., 2018). One of the main approaches of companies that need certain services that they cannot afford internally are those tasks that can be outsourced and that end up being the object of activity of distinct companies, such as accounting, taxation or consulting for different fields (Fuchs, 2015). The waves of outsourcing also entail changes in the market of small and medium-sized enterprises, that is, those organizations that end up serving those services that companies do not want to process within companies (Kim and Lee, 2021).

With the help of new software and technologies, these companies specialize and get to manage certain fields with the help of a limited number of jobs compared to the involuted periods of technology, which is why they have the ability to operate on the market in a competitive manner (De Stefano et al., 2018). However, every wave of outsourcing of a company also entails a change in the market for these services. The shifting of the workforce entails in this market a much more transparent competitiveness and in response to the market, a reduction in income for the new entrants to this sector (Asmer et al., 2022).

The areas in which these companies operate are those in underdeveloped economies, given the ability of some companies to reduce the total costs of services by accessing resources that are cheaper in certain areas than their competitors internationally (Malik et al., 2021). Thus, with the help of technology, there is the possibility to assign the accounting activity to a company in the Eastern European area that has more competitive prices compared to the economic agents in Central Europe due to the cheaper resources to which access (De Stefano et al., 2018). Basically, the level of competitiveness and the ability to maintain services in a certain market are elements strictly related to the mobility of factors of production, here we are talking about the possibility of intriguing new technologies to different economic agents (Malik et al., 2021).

### **3. Data analysis**

The success of a competitive economy lies mainly in the field of research and alignment with the most cost-effective and efficient resources at its disposal (Aleksynska et al., 2019). Thus, the most important resource may consist in the framework of these processes in the time one, coming about a simultaneous conditioning of three key elements for the economic development of a country: the level of investments made by the authorities (by granting funds, reducing the taxes or any kind of policy that allows companies to keep a larger part of the usual profit at the end of the year of a financial year), the ability of companies to implement new technologies specific to automation and digitization (be it SaaS, PaaS or IaaS) and ultimately the factor that is most difficult to control and mobilize for implementation, namely the human labor resource (Kocher, 2021).

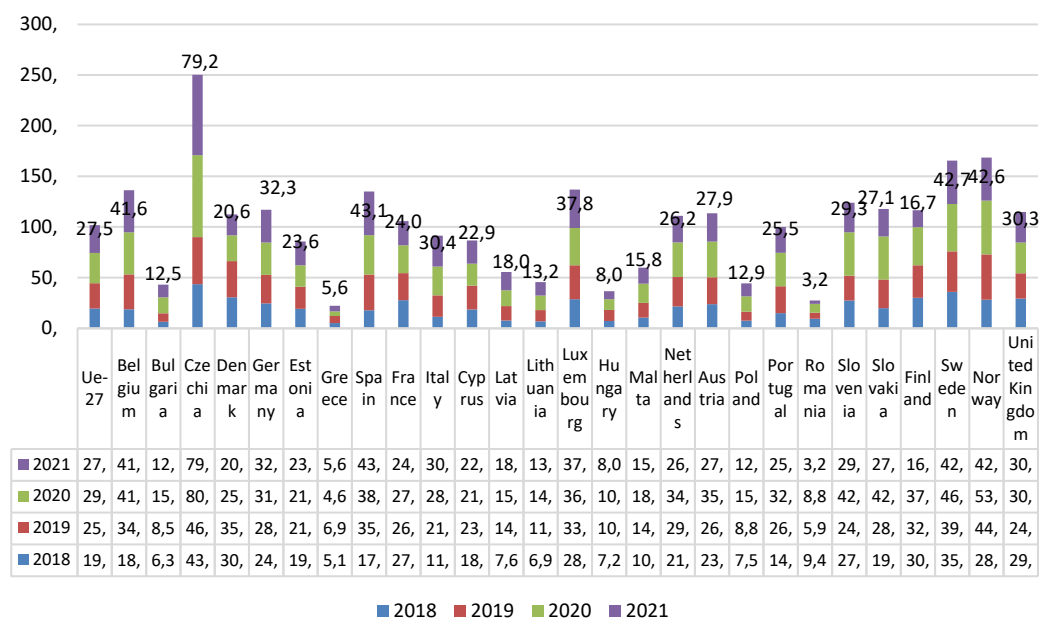
However, the sums of money allocated to save a sector or to mobilize a particular economic area, the increase in resources, labor and capital are elements that depend more on the use of knowledge and its complement to the processes that organizations already have in place

(Ciobanu et al., 2021). Thus, it becomes imperative to align the education processes specific to educational organizations to develop the next generations the resources that the economy offers and that it will need in the near future (Fuchs, 2015). Moreover, in order not to increase the costs of social assistance and so that companies do not have to give up the workforce for which they have already invested money, reformation, retraining, reorientation of individuals who are in the category of people at high risk of poverty and social exclusion are needed (Asmer et al., 2022).

As shown in fig.2, the need for people to comply with the new market requirements has become an increasingly valid, uniform and general phenomenon within the Member States of the European Union (Ciobanu et al., 2021). The values capture the percentage of individuals who bear from their own pockets the costs of reformation, of specialization courses in areas that are currently needed and in demand. Places with them higher values are the geographical areas that offer the least possibility of on-the-job training (Kocher, 2021).

Low-value countries are divided into two categories of economies (Graham et al., 2017). Emerging ones such as those in the Eastern Part of Europe that have a developing market and companies are willing to train individuals in the workplace because of the need to cover the deficit that they are facing and the countries that are predominantly part of the Central European area and that already have a very well-established system of training and are only focused on increasing the market share at international level, locally, it is a relative balance and a hierarchy already formed in terms of the power that companies have in the market (De Stefano et al., 2018).

**Figure 1.** Participants in CVT courses (% of persons employed in all enterprises)



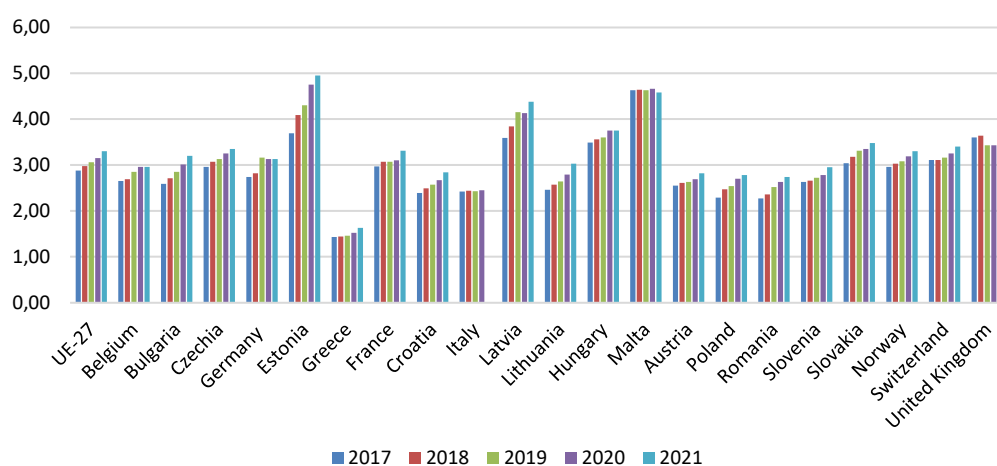
**Source:** Authors own processing of data from Eurostat database.

The level of economic development of a country is closely related to the level of investment of companies and at the macroeconomic level, which in turn are determining factors in the process of increasing social well-being (Aleksynska et al., 2019). However, the increase in labor and financial capital depends mostly on the level of use of knowledge and technology, rather than on the mere existence of employers' professional training organizations or educational institutions (Fuchs, 2015). Thus, it is much more important who operates the technical machines than the investments in new and modern equipment (Horton et al., 2017). These statements lead to the principle that the level of digital development and the quality of human resources are complementary to the economy and do not overlap with each other (Ciobanu et al., 2021).

Getting out of the training system and generating superior added value in the field of research does not generate beneficial effects for the company (Kim and Lee, 2021). As a result, the formation of the necessary conditions for infrastructure is essential for national policy and for the development of the necessary elements such as the right framework, the uniform transition from traditional to digital approaches (Veselko and Gaurav, 2021).

The shift from the free market economy to the digital economy and especially to the technological process of the processes specific to the consumer goods manufacturing sector will further increase employment (De Stefano et al., 2018). In fig. 2 it is noted that the share of people working in the ICT sector increases representatively from year to year on average at the level of the European Union. The activity itself comes as a result of two factors that lead to an increase in employment in the economy (Asmer et al., 2022). Firstly, the formation of new jobs is the equivalent of opportunities for people who are not qualified for the activities that are currently in demand (Ciobanu et al., 2021). The emergence of new jobs with an auxiliary specific coincides with the lack of experience of new employers at the same time and as a result the level of development of specialists translates into the level of knowledge that individuals are supposed to have, which is tangential to zero.

**Figure 2.** Percentage of the ICT personnel (% of total individuals employed in economy)



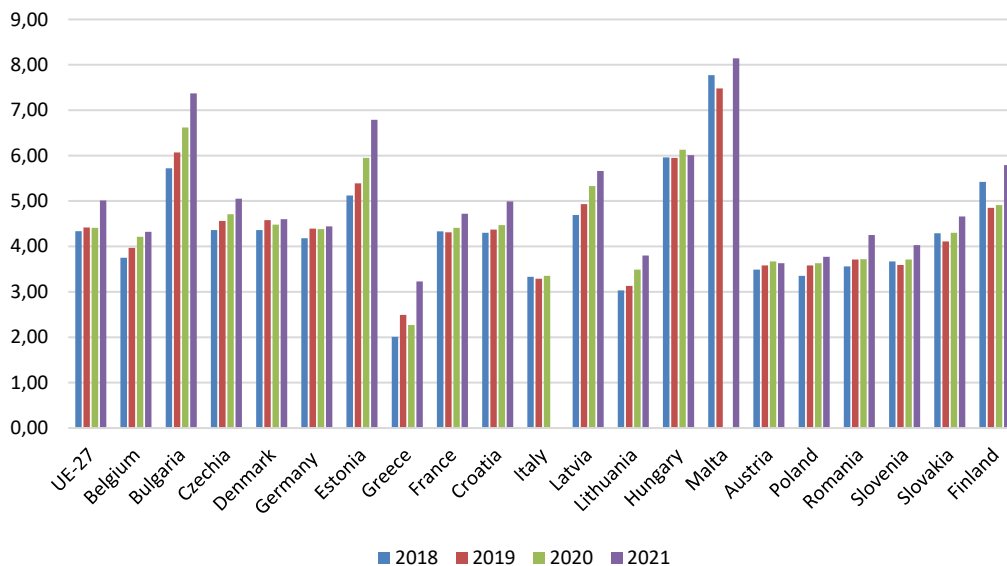
**Source:** Authors own processing of data from Eurostat database.

The emergence of new ICT jobs is entirely due to the development of the sector of activity as a result of the increase in market demand. So it is not only jobs in this area that must and can be seen as a benchmark for the economic development of a country and to observe the level of well-being of society, even if it is only for a certain category of people (Aleksynska et al., 2019). Competitiveness is observed at the international macroeconomic level, at which point the development of the ICT sector within a country determines the capacity to serve the demand in the domestic market (Malik et al., 2021).

The development of in-house solutions and services reduces the cost, increases the level of capitalization and leads to greater capacity to serve the demands of the foreign market. There are a number of several factors in this area that can determine the level of competitiveness in ICT and to lead to the economic development of a country (Aleksynska et al., 2019). These elements include policy factors, the exchange rate, the capacity for production and the level of education of the population (Ciobanu et al., 2021). Reducing the level of taxation for employees in the ICT and especially IT field is a measure that leads to increased competitiveness due to the reduction of budgetary tensions.

Moreover, among the most expensive elements within a company are the employees in the ICT or IT field, whose value in the market has increased considerably due to the discrepancy between the demand and the job offer (Ciobanu et al., 2021). It can be seen in fig. 3 as the contribution of the sector is reaching increasing levels in GDP from year to year, which is why we can conclude that the level of development has not yet reached maturity and that the market is increasingly based on this sector (Asmer et al., 2022).

**Figure 3.** *Percentage of the ICT sector in GDP*  
(% from all ICT sectors and integrated activities regarding the sector)



**Source:** Authors own processing of data from Eurostat database.

Increasing the efficiency of TCI and IT-specific activities leads to the concentration of the labor market towards those areas where resources are used more cost-effectively and efficiently than in a traditional manner (Fuchs, 2015). Each country wants to keep up with the fierce development, which is why in some parts, governments have supported the solidarity economic policy by attracting investments, high-quality specialists and measures aimed at facilitating the implementation of technologies in the fastest and most uniform manner possible.

The measures adopted by the authorities are different from one country to another, but that common element representative of all this is the creation of an appropriate and relevant legislative basis for the environment in question, for the formation of an infrastructure necessary for the development of the digital sector (Ciobanu et al., 2021). Some of the aspects aimed at the bilateral digitization of the production and consumer sectors is the formation of an adequate system on the part of the authorities for the early training of the staff needed to operate the new procedures, and on the other hand, the on-the-job training of employees by employers to take over unformed but viable resources available on the free market.

#### **4. Conclusions**

Every economy tries to keep up with the accelerated and dynamic development of digital technology. As a result, the authorities have an obligation to analyze and implement coercive measures to line up the forms of education of the workforce (De Stefano et al., 2018). Looking at economic development as the main method of increasing efficiency in terms of the more cost-effective use of resources, we can conclude that increasing the level of technological development also entails the automatic need for staff training to manage and operate new technologies (Ciobanu et al., 2021). Basically, the higher the level of digitalisation in a given economy, the higher the level of ICT knowledge will become as a result of market need (Horton et al., 2017). In addition, the increase in yield will lead to economic development as a whole, which will generate an increase in the degree of competitiveness that a company presents on the free market (Ciobanu et al., 2021). The nature of these new processes has a high degree of flexibility and mobility, which increases competitiveness and leads to the need to develop more and more specialists and the need to develop those who are already working in the field.

While the digitalisation process is currently a global phenomenon, it identifies differently depending on the approach of private organizations and authorities and their vision of digitalisation (Aleksynska et al., 2019). The alignment of needs with market requirements cannot be viewed only through the prism of the invested capital, but must most of the time take into account the human resources attracted in the production process. These aspects can have positive effects on economies and society as a whole.

The level of employment requiring ICT, IT or just some basic concepts of the digitalisation process are perceived as having long-term beneficial effects such as reducing the costs of information on availability on the labour market, most of the labour mobility rate (due to the ability to carry out a certain task remotely and as a result of contracting several

companies in depending on the specificity and the need of the firm, individuals being able to expose themselves to their true value anywhere in the market without paying costs related to time or search), maintaining a more coherent balance on the labor market taking into account the demand and the existing offer (Kavesa and Mbali, 2017).

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## **Digital transformation of the Romanian pre-university education system**

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**Abstract.** *Due to the dramatic spread of information and communication technologies tools increased by the forced lockdown, the digital transition of all economic sectors has become a prime concern for all European countries. Not only that having digital skills and competences was a question that swiftly turned into a priority, but also developing a well-equipped smart infrastructure capable of reducing the digital exclusion of socially disadvantaged groups.*

*Taking into consideration the profound impact of digital technologies on the educational environment, the main objective of this paper is investigating the digital transformation of the Romanian pre-university system after a decade paved with numerous regulatory changes, a global pandemic crisis, and a refugee crisis generated by the recent Russian invasion of Ukraine up to the Romanian borders. At the same time, the paper highlights a comparative overview of key indicators for the education sector of Romania, Bulgaria and the Republic of Moldova.*

*In order to create resilient education systems, all European countries must urgently adopt and implement sustainable standards that place digital education on top of their priorities. Therefore, regulators and policymakers must focus on their key role in translating the European Commission's ambitions for the digital compass 2030 in concrete measures.*

*The research is based on both qualitative and quantitative methods that study the positive impact of ICT on education, but also the challenges that need to be repressed in an effort to reduce the digital exclusion. With the sudden conversion of didactic activities into the digital universe, the negative repercussions of e-learning affected primarily the teachers and students in rural areas with poor/no access to Internet, but also digitally unequipped. The findings of this research show positive premises for the Romanian educational pre-university system to recover the digital gap in relation to the best education systems in Europe.*

**Keywords:** digital economy, digital education, digital exclusion, digital skills, ICT, pre-university education.

**JEL Classification:** I21, I24, I25, O15, O38.

## 1. Introduction

The Fourth Industrial Revolution has evolved at an exponential pace with an unprecedented impact on every field of activity, including the educational sector. Thus, the current technological breakthroughs have remodelled our societies, but also the way people interact and communicate with each other. Hence the key role played by education in preparing society for a technology-driven world and equipping children with a high level of digital skills (Schwab, 2016).

One of the main focal points regarding the quality of education is the resilience of education systems, which refers to the ability of schools to adjust in a constructive fashion to risks or crises (Apostu et al., 2016). For its part, Romania has made remarkable progress in recent years to reform its education system and enhance student learning outcomes. Still, the digital transformation of the Romanian education system contrasts with that of other European countries, which have invested important resources for digitization over the last decade.

Moreover, the education system enables too many Romanian students to progress through school without mastering basic competencies, but also a large number of children leave education prematurely before completing upper secondary education (Kitchen et al., 2017). In consonance with the Digital Education Action Plan 2021-2027, the digitization of education aims to overcome two major challenges: the generalised use of a wide and growing range of digital technologies, and the necessity to provide learners with a comprehensive set of digital competences that are mandatory in a world driven by the digital revolution (President of Romania, 2021).

With the purpose to create a more equitable distribution of financial, material and human resources to schools in rural areas whose students face a high risk of school dropout, the Presidential Administration of Romania has initiated the Educated Romania project since 2016. In addition, after Romania's request of support from the European Commission, the Structural Reform Support Service has awarded a grant agreement to the OECD in order to assist the preparation of a set of policy briefs in four thematic areas of the Educated Romania project.

Taking into account the focus on educational equity, the policy brief addressed the three main priorities that proved to be effective in closing achievement gaps in other countries: improving levels of functional literacy, reducing early school leaving, and developing support measures to help early school leavers return to school (OECD, 2016). Hence, the project puts forward a set of goals to increase access to quality education for all social groups, and in particular students from disadvantaged and underrepresented groups, which should be implemented until 2030.

Additionally, the Educated Romania project benefits from financial support from the National Recovery and Resilience Plan (3.6 billion euros), but also through Renovation Wave (405 million euros) which targets the renovation of state pre-university education units with the objective of ensuring safety standards. Among the many targets for the education area, the National Recovery and Resilience Plan from June 1, 2021 pursues the achievement of many objectives meant to reshape the digital transformation of the

educational system, such as: equipping 909 computer labs in professional and technical schools, 10.000 laboratories and school offices, and 1.175 SMART LABs; developing digital skills training 100.000 teachers; modernising 6.176 school computer labs; creating a network of 200 green schools and provide them with 1.800 electric minibuses; non-competitive grants for the prevention and reduction of school dropout for 2.500 educational units (Government of Romania, 2021).

## **2. Building a sustainable future education: an overview of theoretical debates**

In order to adapt to the Fourth Industrial Revolution, the education sector has already begun an extensive transformation from the focus on development of skills dominant last century, to the development of human capabilities that are less likely to be perfectly reproduced by autonomous systems (Kolade and Owoseni, 2022). Whilst UNICEF recommends that states prioritise boosting the resilience of the education system (UNICEF, 2020), many students from disadvantaged backgrounds face various challenges when accessing and experiencing digital technologies (UN, 2020).

The research of Holmes reveals that housing is an important factor in digital exclusion experience, as it can limit the use of the Internet and restrict access to tangible online opportunities (Holmes, 2022). Regarding the Covid-19 pandemic's impact on the level of digital exclusion, the recent studies show that it has profoundly augmented the digital divide between students from advantaged socioeconomic status (SES) and their peers from disadvantaged SES backgrounds who have poor ICT skills (Werfhorst et al., 2022; Grishchenko, 2022). Besides, authors suggest that a strong digital dependence in the economy, employment, or services is only possible due to a vast development of digital technologies, which, in times of crisis, can amplify the digital divide (Grishchenko, 2022). As a result, people from disadvantaged backgrounds who would benefit the most from socially inclusive use of the Internet are those who are least digitally included (UNESCO, 2021; Ragnedda et al., 2022). This paradox emphasises the key role of the level of digital inclusion in reproducing social inequalities.

According to the United Nations, digital inclusion should aim to deconstruct existing structural social inequalities and boost well-being for all, by offering an equitable, meaningful, and safe access to use, lead, and design of digital technologies, services, and specific opportunities for everyone (UN, 2020). Since the digital divide can impact the individual outcomes such as health, education, or even finding a job, many individuals from marginalised communities are left behind.

For digital education to be successful for each student, it is extremely important that schools focus on enhancing students' digital skills (Werfhorst, 2022). Thus, teachers play a particularly big role in digital media education, which helps students learn more about educational content, develop good media habits on a daily basis, and link digital media education to other curricular areas (Gui et al., 2023).

On one hand, although a certain amount of digital technology is mandatory in school (Internet access, laptop/PC for every teacher, projector etc.), authors conclude that

teachers' basic digital skills and technology-related teaching skills are crucial (Sailer et al., 2021). Since older teaching professionals have weak digital skills, they also present negative beliefs about technology and are less inclined to use digital tools and software in their teaching practice (Hämäläinen et al., 2021; Antonietti et al., 2022). In addition, the teaching staff has limitations in two of the areas mentioned by INTEF Common Framework: creation of digital content and security (Basantes-Andrade, 2022), while subject teachers in lower secondary education possess a higher level of digital skills than their counterparts in primary school (Saikkonen et al., 2021).

On the other hand, academic effects of the use of digital skills learned in classes can consolidate a habit-based approach in media education and result in the form of new digital routines used by children (Gui et al., 2023). For instance, using Minecraft as an educational tool for learning a subject-specific skill has proved to trigger collaborative learning processes, but also to smooth the development of 21st century skills in math classes (Andersen and Rustad, 2022). Previous studies concluded that game design learning activities force students to engage in seeking knowledge during their recreational activities, but also enhance their self-efficacy, attitudes and practices regarding schoolwork or enrollment in new game design courses (Laakso et al., 2021). Moreover, provided they benefit from an age-appropriate instructional design, children could develop early concepts and skills of computational thinking, as well as other related skills such as communication, collaboration, and problem solving (Jiahong and Weipeng, 2023). Furthermore, AI teaching systems can dramatically improve teaching and learning in early childhood education (ECE) by providing learning goals based on individuals and instant feedback of children's cognitive, emotional and behavioural states (Jiahong and Weipeng, 2022).

Overall, building a sustainable future education system should assume a creativity-focused technology fluency approach to digital learning with the purpose of developing competencies needed in the digital era, such as managing complexity, thinking critically, envisaging possibilities, tolerating uncertainty, displaying self-efficacy, and communicating skillfully (Cropley, 2019).

For the case of Romania, the lack of continuity in education policy has been a barrier to all important programmes initiated since the 1990s, while the resources allocated to the development of effective data-based evaluation systems were very limited (Kitchen et al., 2017).

### **3. Methodology**

In this study, we investigate the extent to which the Romanian pre-university system encapsulates the digital transformation of both teaching and learning activities through a chronological analysis of the key performance indicators for teaching, learning, and school administration over the last decade. Additionally, the research aims to identify best practices for the digitalization of the educational system through a comparative analysis of key indicators for education between Romania and its eastern European neighbours, Bulgaria and the Republic of Moldova. In order to identify the opportunities benefiting the

Romanian state, as well as the challenges it must overcome in order to reduce digital exclusion, this study is based on both qualitative and quantitative research methods.

First of all, it was assumed that a higher level of digitalization and a higher infiltration of ICT into the economy, society, administration, employment and infrastructure leads to a higher digital transformation of the pre-university education system. Consequently, the following hypothesis is formulated in the study:

Hypothesis 1: There is a positive relationship between the level of digital development of a country and the digital transformation of the education system. H1 will be supported if there is a significant relationship between high educational digitalization and the level of a country's digital development.

Secondly, the levels of digital exclusion (digital behaviour, digital outcomes/advantages) varies among countries due to the profound impact of social and economic factors. This led us to formulate the following research questions aiming at both identification of best policies and investigation of tangible effects of digital inclusion:

RQ1: What is the impact of education policies on the level of digital transformation of the pre-university education system?

RQ2: How can digital transformation of the pre-university education system of Romania be achieved by overcoming existing barriers and benefiting from ICT opportunities?

Thirdly, this research employs key performance indicators of the education system from the Eurostat database and National Institutes of Statistics of Romania, Bulgaria, and Republic of Moldova from 2011 to 2022. All data are compared with the digital compass objectives of the EU for 2030.

#### **4. Findings**

Romania is continuing its long-term policy reforms to improve digital education and strengthen digital skills, as computer science and e-learning are an important part of both the Educated Romania project and Romania's National Resilience and Recovery Plan (NRRP). Also, with the support of the European structural funds, several measures to promote digital competence have been taken, such as: the CRED project 2017-2022 which financed the creation of nearly 6800 open-access educational resources), and the ROSE project 2015-2024 that provided digital equipment to schools from disadvantaged areas (European Commission, 2022).

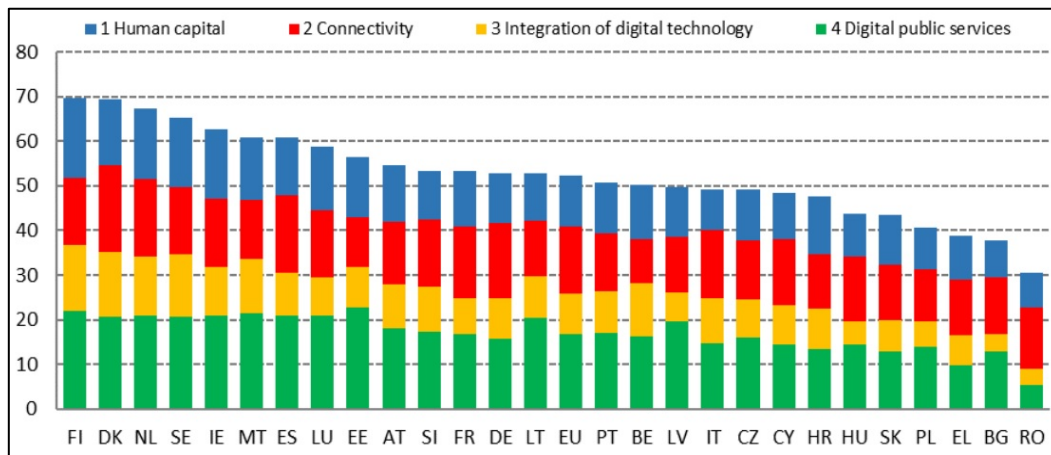
However, the transition from traditional to digital education at the level of the pre-university education system has pointed out many weaknesses that regulators should consider in order to assure an inclusive and equitable educational environment for every child in Romania. For instance, there is no common understanding of what quality educational content means in the digital age, nor does the Ministry of Education have its own policy on standards for the open educational resources. Moreover, the acquisition of resources for the digitization of education throughout the pandemic included tablets delivered after the students returned in classes, an equipment that not only is not compliant

with the quality digital education standards, but also proved to be a total waste of funds (Pup, 2022).

The European Union has an important impact on the Romanian national education policy, with Romania receiving a large amount of EU funds to address several policy challenges including education. Besides, the European Social Fund is co-financing the retraining of teachers for a new competence-based curriculum and the UNICEF project “Social inclusion by providing integrated services at the community level” offered support for access to education (European Commission, 2022a).

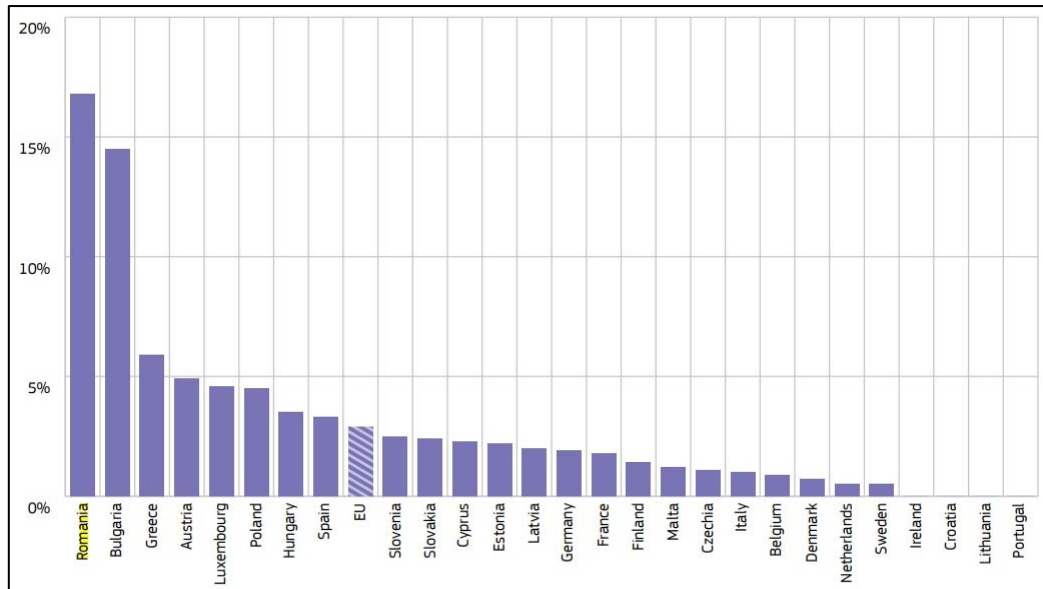
Considering the negative impact of the high level of digital exclusion manifested on the rural environment and households, Romania’s economy is considered to be an “outsider” due to the insufficiently exploited digital potential for a more comprehensive digital transformation process. The aftermath of the Covid-19 recession, the magnitude of the 2021 economic recovery process, and the refugee crisis have had various dismissive repercussions on the educational sector, whose budget has been reduced annually, up to 2.1% of GDP in 2023, despite the Education Law no. 1/2011 - Art. 8 that provides for a minimum allocation of 6% of GDP (Education Law no. 1/2011, 2018). Similarly, Bulgaria’s government expenditure on education has also decreased up to 4% of GDP in 2020 (UIS, 2021). As a result, according to the socio-economic status captured by the OECD’s index for economic, social and cultural status, Romania and Bulgaria are the lowest performing countries of EU-27 (Figure 1).

**Figure 1.** Digital economy and Society Index 2022



Source: DESI 2022, European Commission.

Thus, in both countries about half of the 15-year-olds in the lowest socio-economic situation do not have good results in reading, mathematics and science. This difference is 19.3 percentage points on average throughout the EU, with students with low socio-economic status (SES) 5.6 times less likely to achieve higher education than students with high SES. Romania and Bulgaria also yield significant shares of out-of-school young people (15 years-old), scoring once again the lowest performance (16.8% and 14.5%) out of all Member States (Figure 2).

**Figure 2.** Share of 15-year-olds not enrolled in the national education system of EU-27

**Source:** Eurostat database (UOE, 2020).

According to the Eurostat database (Figure 2), the least significant share of 15-year-olds not enrolled in the national education system was scored by Portugal, Lithuania, Croatia, and Ireland.

Nonetheless, the Member States continue to work to improve access to ECEC by introducing legal rights or compulsory ECEC. Romania is committed to reducing the compulsory education age to 4 years by 2023 and 3 years by 2030, while Bulgaria's pre-school education for children aged four will be compulsory in 2023-24.

Besides, Romania continues its long-term political reforms to improve digital learning and strengthen digital skills, but also to overthrow its position among last EU countries for teenagers' digital skills (European Commission, 2022b). That implies that in 2021 only 50% of Romanian adolescents aged 16-19 had basic or more basic digital skills, which is below the EU's digital decade target of 80% in 2030. By contrast, the EU average is 69% of this age group with basic or advanced digital skills (Figure 3).

Also, the average EU level percentage of participants in early childhood education has slightly increased from 91.8% in 2011, to 93% in 2021, while in both Romania (from 84% in 2011 to 78% in 2021) and Bulgaria (from 83.4% in 2011 to 80% in 2021) has decreased (Figure 3).

With regards to the tertiary educational attainment (age 25-34), Bulgaria's performance (33.6%) is higher than the progress scored by Romania (23.3%), but still under the EU-level average (41.2%) from 2021 (Figure 3). Another concerning indicator for the Romanian educational sector is the share of early leavers from education and training (age 18-24) which is almost two times higher (15.3%) than the European average of 8.5%.

**Figure 3.** Comparison of key indicators for education of Romania, Bulgaria and EU-level targets over a period of a decade (2011 versus 2021)

			Romania		Bulgaria		EU	
			2011	2021	2011	2021	2011	2021
<b>EU-level targets</b>			<b>2030 target</b>					
Participation in early childhood education (from age 3 to starting age of compulsory primary education)	≥ 96 %		84.1%	78.2%	83.8%	80.1%	91.8%	93.0%
Low achieving 15-year-olds in:	Reading	< 15%	40.4%	40.8%	41.0%	47.1%	19.7%	22.5%
	Maths	< 15%	47.0%	46.6%	47.1%	44.4%	22.7%	22.9%
	Science	< 15%	41.4%	43.9%	38.8%	46.5%	18.2%	22.3%
Early leavers from education and training (age 18-24)	< 9 %		18.1%	15.3%	11.8%	12.2%	13.2%	9.7%
Tertiary educational attainment (age 25-34)	≥ 45 %		22.5%	23.3%	27.2%	33.6%	33.0%	41.2%
<b>Other contextual indicators</b>								
Equity indicator (percentage points)			:	39.0	:	38.3	:	19.30
Early leavers from education and training (age 18-24)	Native		18.1%	15.3%	11.9%	12.2%	11.9%	8.5%
Upper secondary level attainment (age 20-24, ISCED 3-8)			79.7%	83.3%	86.7%	86.3%	79.6%	84.6%
Tertiary educational attainment (age 25-34)	Native		22.5%	23.2%	27.2%	33.5%	34.3%	42.1%
Education investment	Public expenditure on education as a percentage of GDP		4.1%	3.7%	3.4%	4.0%	4.9%	5.0%
	Public expenditure on education as a share of the total general government expenditure		10.4%	8.8%	10.0%	9.5%	10.0%	9.4%

Sources: Eurostat (UOE, LFS, COFOG); OECD (PISA).

**Source:** Eurostat database, OECD (PISA).

Another significant point is that Romania, Germany and Croatia reported learning outcomes for digital competences only to lower secondary education. Yet, the great majority of European education systems have explicitly included learning outcomes in all areas of digital competence.

In terms of similarities, basic education in both Romania and Bulgaria is provided free of charge and most students learn in public schools. As in the case of Romania, upper secondary education in Bulgaria is divided into two stages, with stage two (Grades 11-12) not mandatory. The process of selecting students into upper secondary school is partly based on students' results in a national examination taken after Grade 8 in Romania and Grade 7 in Bulgaria (Bergseng, 2019; OECD, 2021; UIS, 2021).

In addition, almost all schooling is provided through the public sector (88% in 2021/22 for both countries) and only 12% of students attend private schools (Table 1). In terms of structure, the Romanian education system counts a total of 7.015 educational units, while the number of school units from Bulgaria is 4.536.

**Table 1.** Evolution of the number of educational institutions from Romania and Bulgaria by ownership from 2017 to 2022 (% of total)

School year	ROMANIA		BULGARIA	
	Private education	Public education	Private education	Public education
2017/18	11.15%	88.85%	13.44%	86.56%
2018/19	11.31%	88.69%	13.60%	86.40%
2019/20	11.38%	88.62%	12.74%	87.26%
2020/21	11.00%	89.00%	12.20%	87.80%
2021/22	11.83%	88.17%	11.99%	88.01%

**Source:** Data extracted from UIS Stat, NIS 2022, Ministry of National Education of Romania, 2021.

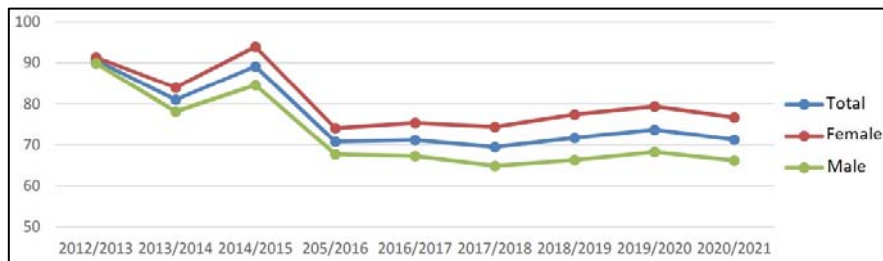


During the Covid-19 pandemic, the evolution of the number of private educational institutions from both countries has been somewhat divergent. Compared with 2020/21, the number of private schools from Romania increased by 67 units, while twelve private units were closed in Bulgaria. Taking into account the costs implied by private education, as well as their high-technologized school infrastructure, it is highly unlikely that their teaching staff lack digital competences, when digital abilities are one of the mandatory conditions for employment.

In terms of professional training for digital education, only 69.000 Romanian teachers from the public pre-university system were trained throughout the epidemic crisis, which means almost 67% of educators still need to be included in courses to acquire digital skills and competences in the field of digital pedagogy (Ministry of National Education of Romania, 2022).

Furthermore, the high school graduation rates of Romania have been strongly influenced in the last ten years by the educational measures adopted. Consequently, the value of this indicator has oscillated between a minimum 69.5% in 2017/18 and a maximum of 73.7% over the last six school years (Figure 4). In 2020/21, the high school graduation rate was 71.3%, down 2.4 percentage points compared to the previous year.

**Figure 4.** Evolution of Romania's high school graduation rate between 2012/13 and 2020/21



**Source:** Data extracted from Romania's National Institute of Statistics, 2012-2022.

Due to the lockdown, all educational activities were conducted online in the school year 2020-2021, a context that should have positively contributed to the development of the level of general digital skills of not only teachers and students, but also the students' families. Still, only 9% of the Romanian population had general digital skills above basic level in 2021, and 19% of them had basic general digital skills (Figure5).

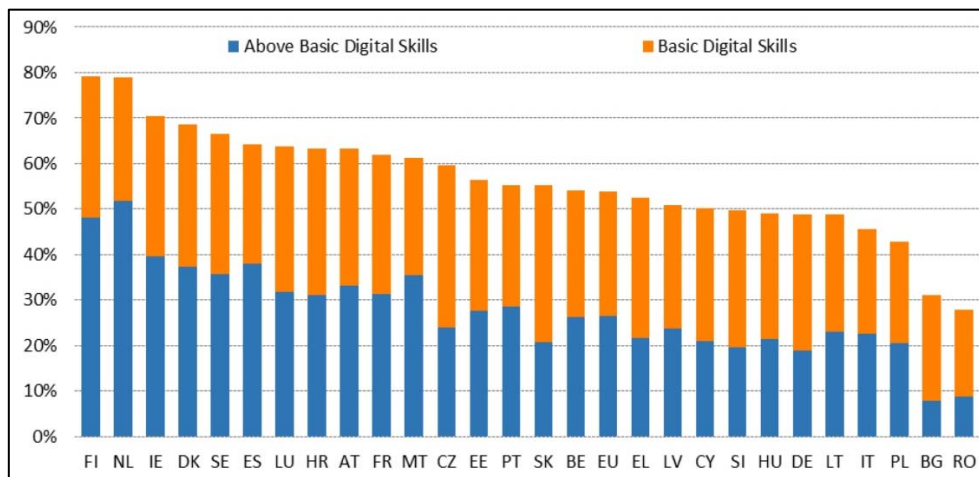
**Figure 5.** The distribution of the Romanian population in 2021 according to the level of general digital skills



**Source:** Data extracted from Eurostat database.

In 2022, 54% of Europeans had at least basic digital skills, which was 26 percentage points below the European target. While some countries like the Netherlands and Finland approached the target with 79% of people with at least basic digital skills in 2021, the lowest performing countries were Romania and Bulgaria with just 30% of individuals having at least basic digital skills (Figure 6).

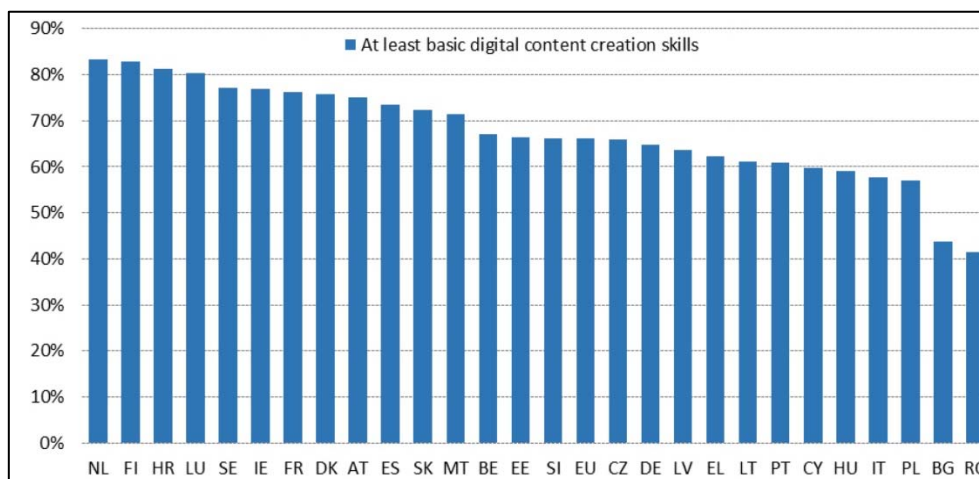
**Figure 6.** Basic and above digital skills among EU-27 (% of individuals), 2021



**Source:** Eurostat database.

The skills of individuals in the creation of content, another key indicator of DSI 2.0 included in DESI, are diverse. The Netherlands and Finland are leaders in digital content creation at least in basic skills, followed by Croatia and Luxembourg with scores of more than 80 per cent. Romania, Bulgaria, Poland and Italy have the lowest proportion of people who by 2021 will at least be able to create basic digital content (Figure 7).

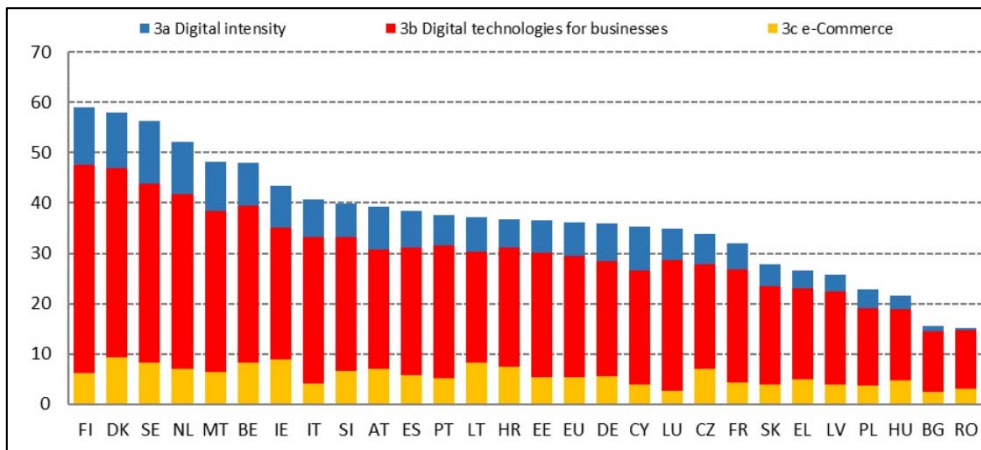
**Figure 7.** At least basic digital content creation skills among EU-27 (% of individuals), 2021



Source: Eurostat database.

In terms of integration of digital technologies, the top performers among the European countries are Finland, Denmark and Sweden, while Romania, Bulgaria and Hungary present the weakest performance (Figure 8). As a result, both countries present a very feeble integration of e-commerce, digital technologies for businesses, and the lowest digital intensity amidst all Member States.

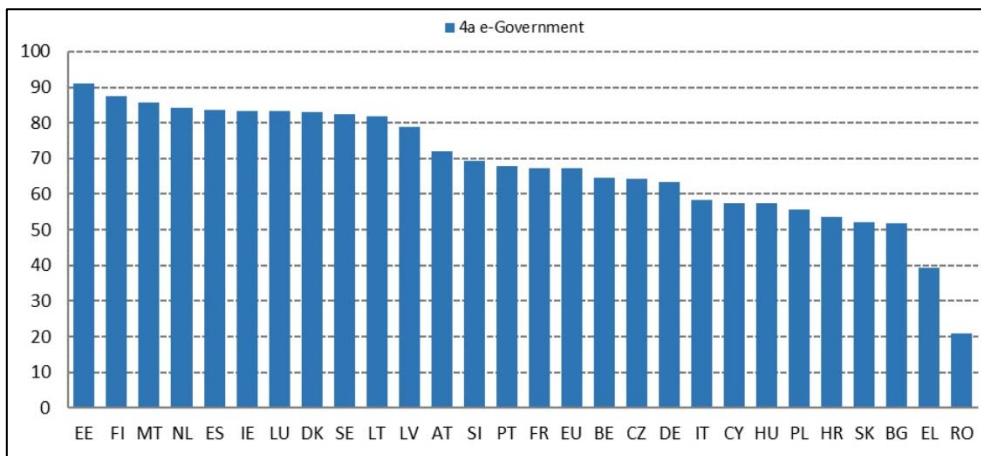
Figure 8. Integration of digital technology among EU-27, DESI 2022



Source: European Commission, DESI 2022.

Achieving the full potential of digital technologies in the education sector can only be accomplished through an effective e-government that targets all key public services for people and businesses. Even if almost all European countries have successfully implemented digital technology solutions for more than 50% of their public services, Romania and Bulgaria have the lowest score (Figure 9).

Figure 9. Integration of digital public services among EU-27, DESI 2022



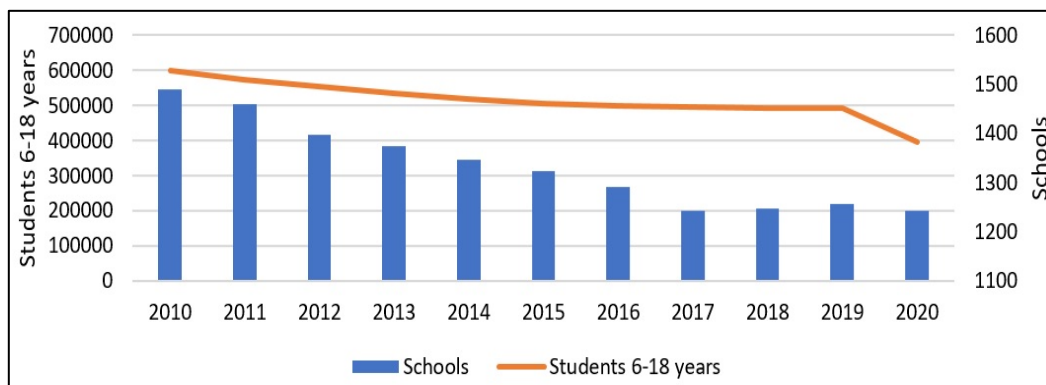
Source: European Commission, DESI 2022.

Regarding the digital transformation of the education sector, a trilateral collaboration between the governments of Romania and the Republic of Moldova, and the companies Microsoft and UiPath was signed in December 2022 with the purpose of developing innovative digital solutions in the interest of citizens on both banks of Prut (Electronic Government Agency, 2022).

Compared to Romania, Moldova has a solid basic education system that guarantees the foundation of advanced professional digital skills and makes significant efforts to establish an enabling environment for the digital inclusion of women and girls. Also, digital tools are integrated into all levels of education across Moldova, with teachers using them to enrich their teaching skills and abilities. Moldova's digital transformation is supported by an important number of programs and initiatives to support digital skills development, such as: "Digital Moldova 2020" Strategy, the National Digital Literacy Program for Teachers, "Future Classroom Lab", "Tekwill in Every School" etc. (Rajasekaran and Casap, 2022).

Moreover, according to the National Bureau of Statistics, Moldova's school-age population has decreased by over a third since 2010, with less than half a million students enrolled in the education system in 2020 (Figure 10).

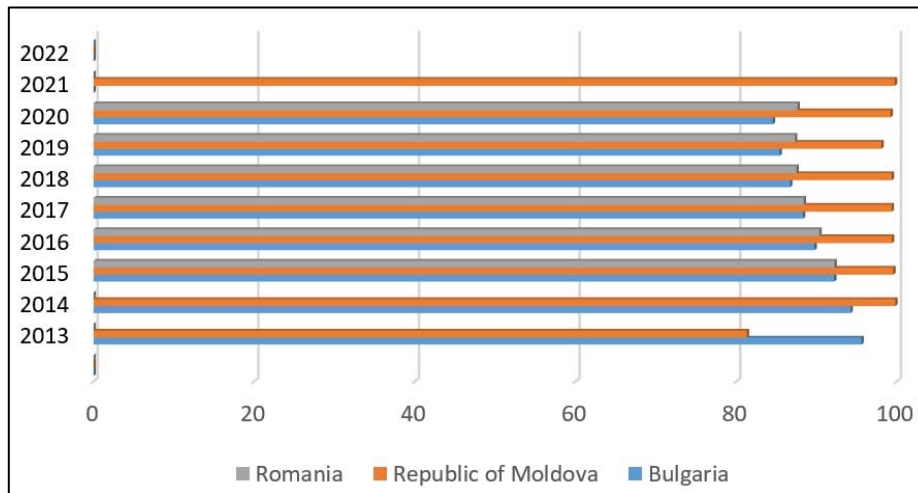
**Figure 10.** School network and student population from the Republic of Moldova



**Source:** National Bureau of Statistics, Republic of Moldova 2021.

Concerning the evolution of the total net enrolment rate of students in primary education from 2013 to 2022, the indicator has annually dropped for both Romania and Bulgaria, while the net enrolment rate of primary school students from Moldova has continued to rise up to 99% in 2021 (Figure 11). But even with the widespread use of the Internet and the ownership of ICT devices, the quality and affordability of access to some vulnerable groups (women and rural areas individuals) can be identified as challenges, limiting their ability to access certain services and hampering the comprehensive development of the digital economy.

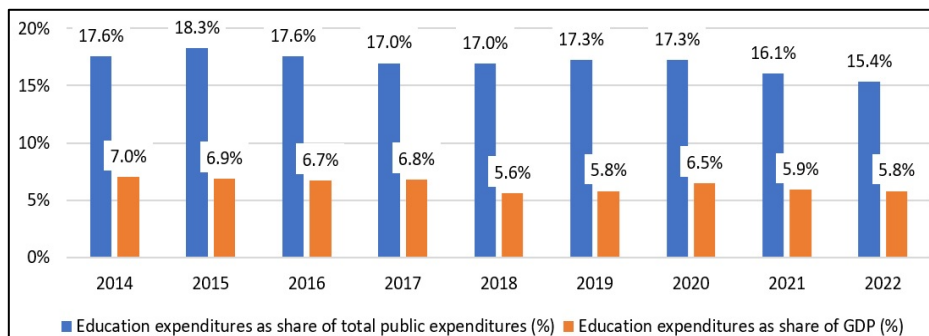
**Figure 11.** Total net enrolment rate in primary school for Romania, Bulgaria, and Republic of Moldova (from 2013 to 2022)



**Source:** Data extracted from UIS Stat, NIS, National Bureau of Statistics of Republic Moldova.

The decrease of Moldova’s school-age population, the recent refugee and energy impact, as well as the recession, have left their mark on the government's decision to invest in education. Consequently, the education expenditures of Moldova as a share of GDP fell by 0.1 per cent in 2022 from the previous year (Figure 12).

**Figure 12.** Education expenditures of Republic of Moldova as a share of GDP and total public expenditures



**Source:** Ministry of Finances, Republic of Moldova 2023.

Despite the fact that Moldova is not included in the DESI report because of its non-membership status, the Global Innovation Index 2022 ranks the country 56th out of 131 countries, while Romania ranks 49th and Bulgaria 35th. Also, the Global Entrepreneurship Index 2019 for Moldova is 94th out of 137 countries, and Moldova ranks 86th out of 141 countries in the Global Competitiveness Index 2019 (ITU, 2021).

One central question of our study was to what extent educational policies affect the level of digital transformation of the Romanian pre-university education system. When considering teachers’ digital readiness in terms of their digital practices on a daily basis

instead of their digital skills, the educational policies and reforms are the key solution for equipping teachers with the general set of digital practices, and schools with a functional digital infrastructure.

The second question of our paper sought to identify a set of solutions to adopt with the aim to overcome existing challenges of digital education from Romania. The forced digitalization process of Romanian education due to the Covid-19 lockdown has only accentuated the digital divide with an increase of the level of digital exclusion. Our findings suggest that policy makers have the most important role in assuring the equity and quality of digital skills and infrastructure, by supporting the monitoring of digital training and adequate financing of digital education. Recently, the Romanian government decided to invest 2.1 percent of GDP in education, which represents three times less than the Education Law No. 1/2011 provides. Moreover, quality education implies a significant investment in this field, as well as the adoption of national standards in this matter.

## 5. Conclusions

This research paper sought to evaluate the digital transformation of the Romanian pre-university education sector by offering not only an overview of the key performance indicators for Romania, but also a comparative analysis with both European and non-European states. Because of its geographical position in the eastern European region, Romania's performance in terms of digital outcomes and skills was compared with its neighbouring countries, Bulgaria and Moldova.

Nonetheless, limitations of this study must also be acknowledged. One limitation is the relatively small number of studies regarding the level of basic digital competences of educators and students from Romania. In addition, the lack of standardisation for the concept of quality digital education has only confused teachers that wrongly included the use of tablets and/or smartphones among the variables of formal digital education.

Another limitation is related to the data collection, because data hasn't been available for Romania and Bulgaria for all the selected period of time - missing data for 2013 and 2014 for the Romanian educational sector, but also for Bulgaria's education from 2021. A further limitation is that Moldova is not included in the European statistics concerning the Digital Economy and Society Index, which monitors a country's overall digital performance and tracks its level of digital competitiveness.

Firstly, equipping Romanian students for digital learning activities with tablets that they received after the pandemic ended turned out to be totally inefficient, but also a waste of money. By contrast, the most important factor influencing the teachers' decision to use technology-related activities in their classroom is the level of their basic digital skills. Indeed, a minimum amount of digital infrastructure is needed in every classroom, but it's the teacher's responsibility to decide when, how, and by whom are digital technologies to be used.

Secondly, the negative impact of the pandemic crisis spread over all dimensions of the education systems of all three countries analysed. The current energy crisis, increasing

inflation and indirect consequences of the Ukrainian war have affected the economic growth of these countries that all adopted a decreasing budget allocation for the education sector than the previous year.

Thirdly, it is very important to emphasise that the education sector in Moldova is characterised by a rapid digitization process, supported by the Estonian authority since 2019. Estonia is considered to be a model in the field of digital education because it has successfully integrated ICT into education and found some solutions that support remote learning and reduce the digital divide. Similarly, a National Center for Digital Innovations in Education was created, intended to train teachers from the Republic of Moldova on the application of modern pedagogical methods and the use of digital technologies to make the teaching process more efficient. Besides, Moldova disposes of several digital tools for educational purposes, such as: the Management Information System in Education, the platform [www.educatieonline.md](http://www.educatieonline.md) which offers students only educational content approved by the Ministry of Education of Moldova, the platform [www.invat.online](http://www.invat.online) developed by teachers, or the free digital platform [www.studii.md](http://www.studii.md) developed by the business environment.

To conclude, Romania benefits from high broadband connectivity and wide coverage of Internet connection, but lacks in implementation of digital solutions for an equitable and inclusive digital education transformation. Further research should focus on the identification of best practices for effective digital content creation that can improve the quality of education, as well as on the impact of the business environment on the integration of digital competences in teaching and learning activities.

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## Digital transformation in the organization – change caused by the COVID-19 pandemic

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**Abstract.** *Digital transformation has changed the economy and society, having an increasingly powerful impact on everyday life. However, before the COVID-19 pandemic, its impact on education and training was much more limited. The pandemic has shown that it is important to have an education and training system ready for the digital age. This article aims to highlight the impact of digital transformation on school organizations.*

**Keywords:** digital transformation, change, the educational environment, the COVID-19 pandemic.

**JEL Classification:** M15, O15.

## 1. Introduction

Regarding education, recent years have favored the development of practices based on modern means of teaching and learning. Today, one can teach an interactive lesson with the help of an interactive whiteboard, one can connect at any moment to an Internet network to find the necessary information. The era of digitization and technology allows teachers to be more creative than ever, technological means giving us the freedom to improvise, to be original. We can say that the lessons thus become personalized and even acquire a unique character, the teacher's creativity and originality playing an essential role in defining the specifics of a lesson. Quality and innovative digital learning can be engaging and interactive, thus complementing traditional methods and providing platforms for collaboration and knowledge creation (Christopoulos et al., 2020, p. 317).

To achieve maximum efficiency and sustainability, innovation must be supported by well-trained teaching staff and must be integrated into clear teaching objectives. So digitization means, for teachers and school managers, the openness to learn, to accept new things and to integrate technology in education (Sibley et al., 2020, pp. 618-630). The digitization of education represents more than the provision of high-performance equipment. It is necessary to implement integrated, personalized solutions that respond to the challenges of the moment regarding: internet access, cyber security, training of teachers for the 100% use of educational software and the creation of interactive lessons, which ensure easy communication between teachers and students (Liu et al., 2019, pp. 126-137).

The use of new digital technologies is the direct way to make school more attractive for students, more adapted to their needs and lifestyles, more effective in developing skills, generating lifelong education (Chen et al., 2020, pp. 142-147).

ICT and digital tools open the way to interactive distance learning and personalized education, adapted to the needs of each student. The use of modern technologies can contribute to facilitating access to education for young people who would otherwise be unable to attend lessons (Martinez and Broemmel, 2021, pp. 139-132).

## 2. Research methodology

Digital transformation can be understood as a continuous process, which has flexible objectives, which can change, adapt, modify or eliminate, depending on a lot of other factors (technological innovations, economic development, change of strategic priorities, crisis situations) (Ashforth, 2020, pp. 1763-1766).

The research study wants to answer the question “What is the impact of digital transformation on school organizations?”.

The survey unit is represented by teachers from the observation school units, respectively high school units, from Dâmbovița County. The study was conducted on a sample of 50 teachers. Data processing was carried out with the help of the SPSS program (Statistical Package in the Social Sciences).

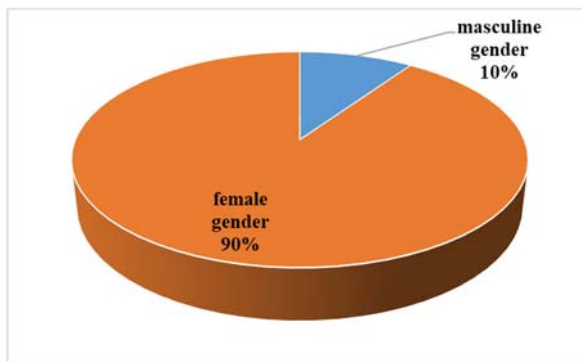
In order to create an overview of the surveyed sample, the collected personal data were processed (gender, age, school status, residence environment).

### 3. Research results

Analyzing the data from the processed questionnaires we can highlight a series of results of the study.

In Graph 1 it can be seen that 90% of the respondents are female and only 10% are male.

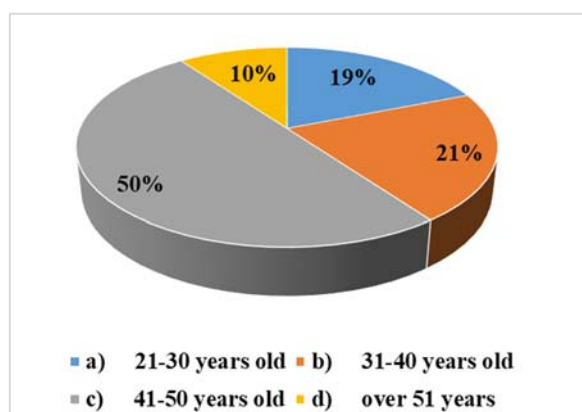
**Graph 1. Gender of respondents**



**Source:** developed by the author.

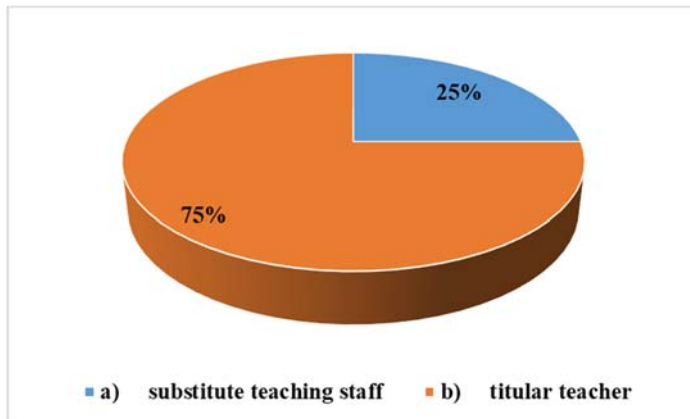
Analyzing Graph 2, we observe the age of teaching staff, as follows: respondents aged between 41-50 years have the highest percentage (50%) and the over 51 age category the lowest percentage (10%).

**Graph 2. Age of respondents**



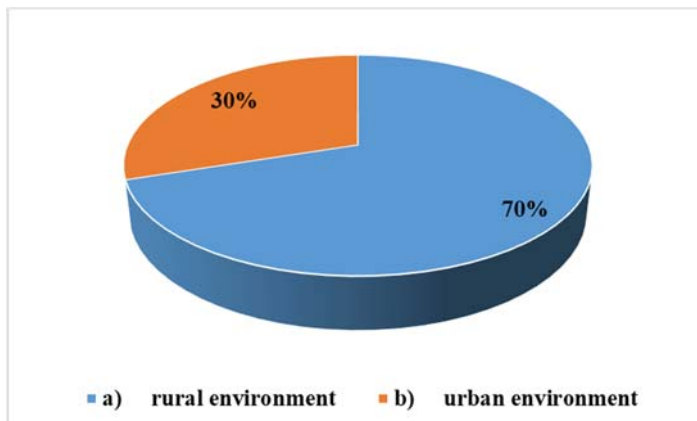
**Source:** developed by the author.

Graph 3 shows the status of the respondents within the school unit. In this study, the percentage of full-time teachers is 75% and 25% are substitute teachers.

**Graph 3.** Status of respondents in school units

**Source:** developed by the author.

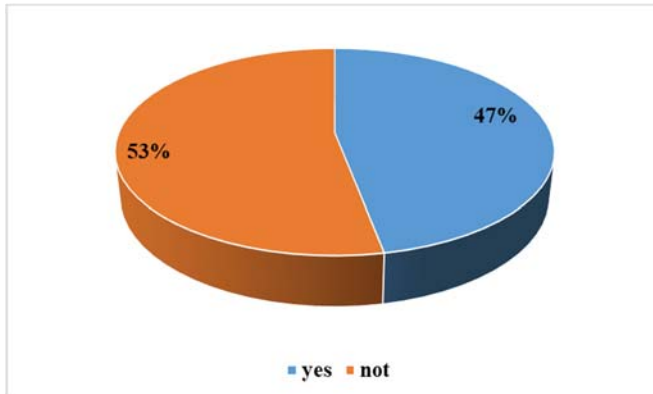
Analyzing Graph 4 according to the variable “environment of residence” it is observed that 70% of teachers live in rural areas and 30% live in urban areas.

**Graph 4.** Residence environment

**Source:** developed by the author.

From Graph 5 it can be seen that 53% of respondents believe that digital transformation has a positive impact on school organizations.

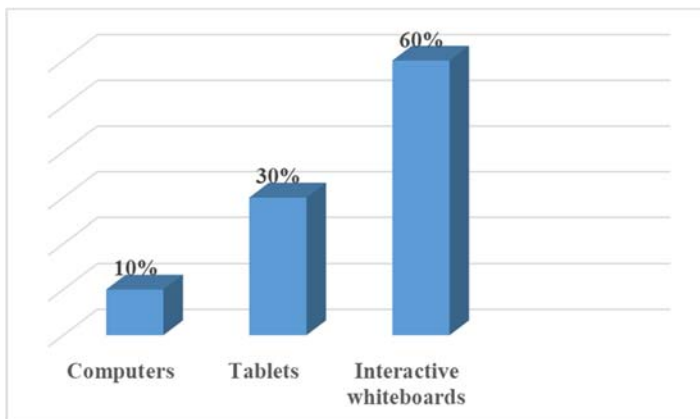
**Graph 5.** *Digital transformation has a positive impact*



**Source:** developed by the author.

Analyzing Graph 6, it can be seen that the tools used by teachers during school activities are: computer (10%), tablets (30%), interactive whiteboards (60%).

**Graph 6.** *Tools used by teachers in the school*

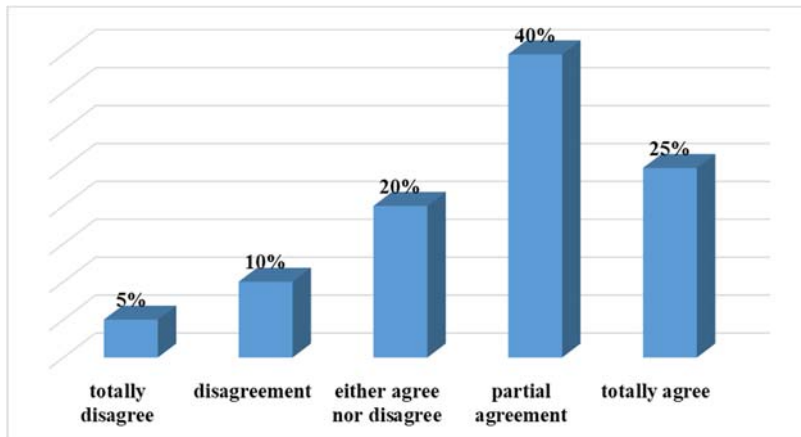


**Source:** developed by the author.

From Graph 7 it can be seen that 40% of respondents partially agree with the statement that digital technologies used by teachers help to personalize educational materials according to the individual needs of students.



**Graph 7.** Digital technologies personalize educational materials according to the individual needs of students



**Source:** developed by the author.

It can be seen from Graph 8 that the respondents believe that the main challenges of integrating artificial intelligence in education are: ethical responsibility (40%), high costs (35%) and necessary skills (25%).

#### 4. Conclusions

In the 21st century, technologies occupy an increasingly important place in everyday life, and the technologicalization of the educational process is inevitable. This process has been accelerated in the past year by the COVID-19 pandemic and the shift to online education. In a slower, or more alert step, the use of digital technologies in the educational process led to change and improvement of the educational system (Arora and Srinivasan, 2020, pp. 43-56).

Technology encourages children to delve into subjects they find interesting. There is a strong connection between creativity and curiosity, and nowadays access to information is available to anyone who wants to look for it. For example, a geography lesson about minerals and rocks could be supplemented by a virtual tour of a geology museum, thus giving the child a much more complete picture of what they are learning at school. Using educational apps while preparing a project for school can give a child the chance to experience as many ways as possible to express themselves, thus developing both their creativity and critical thinking. Currently, all indications are that digital tools will be an increasingly important presence in the learning process (Beycioglu and Kondakci, 2020, p. 20).

Technology provides tools and resources for education – often useful and effective, sometimes novel, attractive and engaging. It is the role of pedagogy and the teacher to select them and give them meaning (Sepasgozar, 2020, p. 4678).

## Acknowledgements

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## The impact of digitalization on consumer behavior

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**Abstract.** *Over time, technology continued to evolve, creating a favorable environment for the development of digitalization. In crisis situations, such as the COVID-19 pandemic, it has served as a bridge between consumers and businesses. This paper aims to study how consumer behavior has been influenced in the pandemic through the use of different digital tools. It also highlights the uncertainty that has arisen in the context of the pandemic and how this has led to limited consumer rationality. Using data from specialized institutions, the impact of digitalization on Romanian consumer behavior in the context of the COVID-19 pandemic was analyzed. At the same time, within this study, correlations were made to better understand the results.*

**Keywords:** digitalization, behavioral economics, limited rationality, COVID-19, technology.

**JEL Classification:** O10.

## 1. Introduction

The development of digitalization had an important impact on the socio-economic system, which led to the emergence of new economic opportunities (Novikova et al., 2022, pp. 223-234).

Digitization can be defined as those combinations of technologies that help the development and innovation of the business environment. Along with the evolution of technology, customer requirements also increase, and innovation through digitalization allows companies to keep up with customer requirements (Tartarin et al., 2020, pp. 115-131).

Over time, the digital environment has continuously transformed, especially in the last decade. However, with the emergence of the COVID-19 pandemic, the year 2020 represented a real challenge both for the business environment and government institutions, but also for people's households in terms of adapting to the respective situation and at the same time incorporating digitalization into the work style and life (Zeverte-Rivza et al., 2021, pp. 42-51).

The COVID-19 pandemic affected the lives of people all over the planet and at the same time had negative effects on economic relations. Many companies had to temporarily stop their production, supply and commercial processes. Also, another aspect implemented during the pandemic was work from home, where companies were forced to apply to this measure in order to carry out their activity, but over time it turned out that through digitalization it was a choice from which both parties had to gain, and more and more employees prefer it even now. Also, online shopping has grown considerably and many businesses have switched to the online environment. It was easier for the countries that already had a digitalization system implemented to face the challenges of the pandemic, and the migration from the offline to the online environment was much easier. All these things continue to play an important role even after the end of the pandemic (Lanshina et al., 2020, pp. 91-114).

## 2. Literature review

It has been observed that the COVID-19 pandemic has affected the way organizations operate, but it has also led to the failure of many companies. All the social distancing measures, the lockdown, the impossibility of traveling to certain countries due to the fact that certain borders were closed and the uncertainty created by the pandemic forced many companies to change their way of operating and adapt to the new conditions. This was achieved in two ways, externally and internally. Externally through the interaction between the company and the client, and internally, through the connection between the company and the employees, respectively the relations with them (Amankwah-Amoah et al., 2021, pp. 602-611).

The COVID-19 pandemic had a devastating impact on lifestyle, but also on business. During the pandemic, it was noticed that there is a digital discrepancy between the poor and the rich category, but also at the rural and urban level. A consequence of COVID-19 is

the fact that many companies include digitalization in their business model and make the transition from offline to online stores. Also, during the pandemic, many industries have registered changes, as well as consumer behavior, where a preference for switching from the offline to the online environment has been observed. On the other hand, this digitalization has helped sellers to discover certain patterns in consumer behavior through statistics related to the online environment, something that was not possible in offline stores (Amankwah-Amoah et al., 2021, pp. 602-611).

Compared to previous pandemics, research focused on preventive behavior, while consumer behavior played a secondary role. In the case of the COVID-19 pandemic, the situation was different, and consumer behavior is often analyzed in the scientific literature. The previous theoretical research helped to create a global and general perspective in the case of consumer behavior during the COVID-19 crisis. Thus, the difference between old consumption habits and current ones was studied (Cruz-C'ardenas et al., 2021).

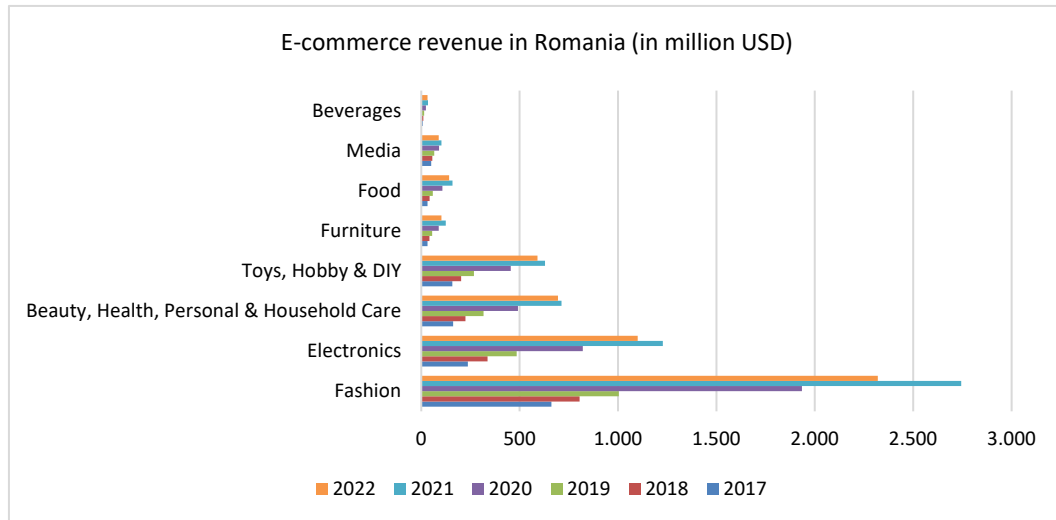
Also, consumer behavior is influenced both by crisis situations, whether they are social or economic, but also by natural disasters, such as earthquakes, hurricanes and so on. All these disasters bring damage to society, from the perspective of infrastructure, economy and people's lives, leading to the influence of consumer behavior. Many disasters were anticipated, the most frequent being hurricanes. This led to influencing the consumer behavior, who stockpiled products. On the other hand, in the case of those tragic events that cannot be anticipated, such as earthquakes, the consumer's life is affected by the trauma suffered at that moment, which can be either the loss of a loved one or important assets, such as a house. All these things lead the consumer to make impulsive purchases, with a therapeutic role (Cruz-C'ardenas et al., 2021).

### 3. Methodology

The purpose of this paper is to observe the impact of digitalization on consumer behavior. In order to better understand this, there were used data from the Statista platform. The interpretation was made through graphs and correlations.

### 4. Discussions

Figure 1 shows the evolution of e-commerce revenues from 2017 to 2022 in Romania. The products from the fashion range have been among consumers' favorites over the years, the highest value was recorded in 2021, with revenues of 2744 billion dollars. A fact that also coincides with the COVID-19 pandemic. Due to the restrictions of that period, many people had to work from home, thus there was an increase in comfortable clothes instead of office ones. Also, the years 2020 and 2021 for the fashion industry illustrate the exact moment when the COVID-19 pandemic started and a significant increase in the purchases of these products can be observed. The next two places are occupied by electronic and beauty, health, personal & household care products, where likewise, the impact of the COVID-19 pandemic illustrates significant increases in 2020 and 2021.

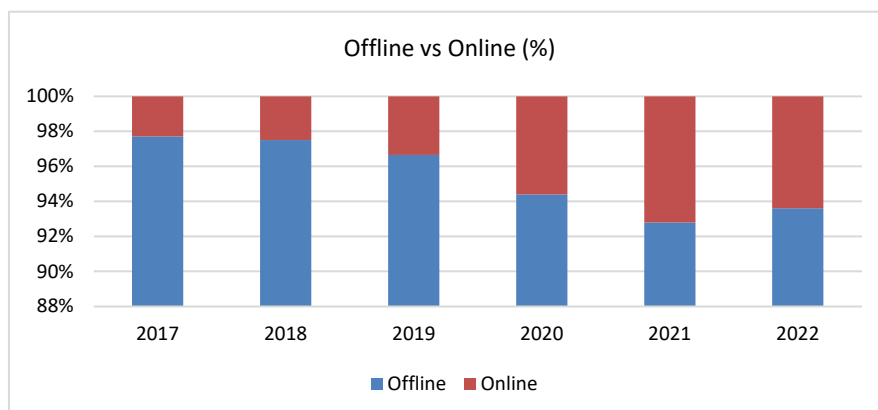
**Figure 1.** E-commerce revenue in Romania from 2017 to 2022

**Source:** Statista Digital Market Insights.

Also, the consumer's behavior was influenced by the lack of freedom caused by the pandemic and many started to redecorate their home, a fact that is evident from the increase in income for furniture. Also, those who have children bought more toys during the pandemic than in previous years and invested in hobbies.

Food, despite the fact that it is at the bottom of the ranking, since 2020 has registered exponential increases compared to the period before the pandemic. For example, the revenues recorded in 2020 were 108 million dollars compared to 2019, where there were only 59 million dollars.

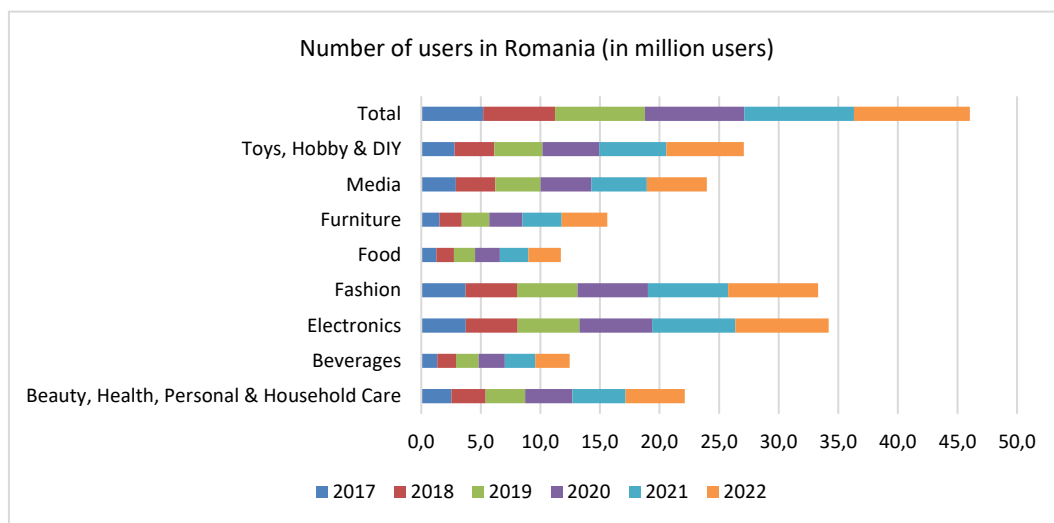
The last places are occupied by media and beverages, but also in their case the pandemic has brought increases, but at a lower level compared to the other previously stated areas.

**Figure 2.** The evolution of the offline and online environment

**Source:** Statista Digital Market Insights.

In figure 2, it can be observed that the offline environment started to decrease with the start of the COVID-19 pandemic. Thus, digitalization had a particularly important role in the case of consumer behavior, because many stores were forced to move their activity online, thus the needs of consumers could still be satisfied. The biggest increase in the online environment was in 2021, where it registered a percentage of 7.2.

**Figure 3.** Number of users in Romania (in million users)



**Source:** Statista Digital Market Insights.

The most users in Romania were found in the field of electronics, followed by the fashion industry. Starting from 2018 and until 2022, the electronics industry recorded an increase in the number of users, compared to the fashion field. Despite the fact that the revenues from the fashion industry are higher than those from the electronics industry, the number of users also includes people who do not buy, but only follow a certain product or look for certain specifications. At the opposite pole are the food users, having the smallest number, but an increase from year to year can be observed, which leads to the development of the field.

## 5. Conclusions

The role of digitalization is fundamental for the good development of society. It has been observed that in crisis situations, the online environment can be not only useful, but even the only method by which companies' activity can be carried out, and consumers can purchase products or services.

Also, the online environment was a bridge between companies and consumers during the pandemic. Consumers had the opportunity to work from home, shop online, watch movies, all these things were possible due to the evolution of technology.

Moreover, in crisis situations, a behavior with a limited rationality of the consumer was observed, making certain purchases only to obtain a therapeutic effect. Regarding consumer preferences, they focused on the fashion field, this being also a way of adapting to the COVID-19 context, where they switched to working from home. Also, the online environment is growing and will continue to develop along with the number of users.

In conclusion, digitalization has helped both consumers and companies to face crisis situations and continues to play a crucial role in the development of countries.

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## **Thinking for the future – Artificial Intelligence and the financial services**

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**Abstract.** *Accounting and the entire financial field are among the fields with an extreme degree of exposure to human error. Although there are procedures to limit these errors, the accountant is subjected every day to unforeseen situations. These challenges value his expertise and capabilities, but, very often, rather his endurance and patience are put to the test, as there is an overwhelming number of tasks that could ideally be automated, limiting the range of errors.*

*Artificial intelligence, already used in various fields, has an undoubted potential to streamline the processes of data extraction, expense prediction, and customer flow management synchronously.*

*On the other hand, by paying more attention to the branch of artificial intelligence in the financial field, it is natural that data security will be improved, behavior forced by the fact that we will have to store and handle huge amounts of confidential data, and cyber security will not be a choice or a higher level, but a necessity.*

**Keywords:** financial services, Artificial Intelligence, data security, accountant’s efficiency.

**JEL Classification:** G00, G15, O10, O16.

## 1. Introduction

Today, we cannot imagine life without Artificial Intelligence (AI) solutions. Selfdriving vehicles are real and part of our lives. Smartphones can understand our speech, while we write a text they can assist us and complete the words (Makridakis, 2017). Thanks to the efforts of computer scientists, AI has made progress unimaginable a decade ago. Starting with Deep Blue, moving to the Watson computer, then AlphaGo and DeepMind, AI is improving thanks to deep learning algorithms and big data science. These state-of-the-art computers can teach themselves based on a "software writing software" principle (Parloff, 2016, p. 3). We can say that the concept of AI dates back to the 1950s, but many of the technological breakthroughs occurred later in the 1980s and 1990s. AI applies to any technique that allows computers to imitate human intelligence, and includes machine learning and deep learning as its subset (Parloff, 2016).

## 2. The hypothesis

AI systems will replace accountants in some routine functions because they can perform them faster and more accurately than humans. There is, however, minimal risk of increased unemployment within the profession if accountants develop new skills and competencies related to their changing role in the organization. The successful strategy will be to accept technological challenges and adapt to the new business environment and management requirements. Humans and machines can work together efficiently and effectively, and artificial intelligence will never replace human intelligence, especially in more creative tasks. Education and professional training will play an important role in preparing accountants for this new field.

## 3. The impact of Artificial Intelligence

### 3.1. Will the AI industry support robotics laws?

Stephen Hawking, Elon Musk, and Bill Gates are probably the most quoted men of distinction today with their arguments against the inherent risks in AI technologies. We can hardly get past their warnings of the end of humanity. Some of the followers claim that the existential threat is real and that humans may be replaced by robots in the near future. They will make better, faster and unbiased decisions. It seems that the "singularity", the moment when AI will match human intelligence, represents the moment when the dark end of humanity will begin (Kontzer, 2015).

British theoretical physicist Stephen Hawking warned us in an interview with the BBC that "The development of full AI could spell the end of the human race." His message that "humans, who are limited by slow biological evolution, could not compete and would be outmatched" sounds like a prophecy and is echoed in many subsequent arguments and discussions (Cellan-Jones, 2014). The main point in this call is actually the big impact of Artificial Intelligence on unemployment.

Founder, CEO and lead designer at SpaceX and co-founder of Tesla, Elon Musk, shared with students at the Massachusetts Institute of Technology his fears that AI is a real threat

to the existence of mankind. A few years later, at the World Government Summit in Dubai, he explained one of the threads of AI dominance, saying that "people have already started losing their jobs to machines" (Sulleyman, 2017) and new roles for those people should be discovered. In his view, the real problem is that the process of labor displacement is very fast and disruptive.

Rob Enderle, a well-known Silicon Valley analyst and member of the Futurist Council and the Social Factors Council of the non-profit Lifeboat Foundation, supports these concerns about Artificial Intelligence. According to one of three scenarios, developed by the Foundation, AI will replace all human jobs, "resulting in global economic catastrophe, revolutionary war, famine and the like" (Kontzer, 2015).

Jeff Burnstein, president of the Robotics Industries Association, argues that the negative effects in this scenario are greatly exaggerated and will be offset to some extent as new AI technologies create or enable new jobs. In fact, this is the view of economists.

### **3.2. What is the economic theory's explanation of AI's impact on employment?**

According to this theory, technologies have a positive effect on employment because they increase the productivity of companies by changing their work patterns and create new opportunities and types of jobs (Mensel and Tholl, 2017).

But these theories could hardly explain the Great Depression of the 1930s and more precisely its destructive impact on employment. The then prevailing idea that full employment is automatically ensured by the self-balancing mechanisms of free markets could not explain the world economic collapse.

In response to the inadequacy of contemporary economic thinking, the British economist John Maynard Keynes, considered the founder of modern macroeconomics, introduced some revolutionary ideas, stating that the government should intervene through public policies to moderate business cycles in order to achieve employment. His followers believe that during periods of economic recession demand is inadequate due to a decrease in consumer spending due to uncertainty, followed by less business investment and long periods of high unemployment. But these theories could hardly explain the Great Depression of the 1930s and more precisely its destructive impact on employment. The then prevailing idea that full employment is automatically ensured by the self-balancing mechanisms of free markets could not explain the world economic collapse.

In their model of economic activity, the response of wages to changes in supply and demand is slow, resulting in large fluctuations in unemployment. The only way to stabilize the economy is through government intervention. After the Second World War, there followed the period characterized by both inflation and slow economic growth. These ideas were abandoned because they could not provide adequate measures to overcome the crisis. The revival of Keynesian thinking came with the Financial Crisis of 2007-2008. Harvard professor N. Gregory Mankiw told the New York Times that the only economist who could help us understand the current economic problems would undoubtedly be John Maynard Keynes (Jahan et al., 2014). But what about Artificial Intelligence and how might its effect on unemployment be explained as technologies replace humans?

Nobel laureate economist Joseph Stiglitz (2014) has argued that innovations actually introduce an economic paradox. People who lose their jobs or suffer pay cuts due to technological innovations cannot save money and reduce their spending on goods, which causes deflation. Owners of capital become less inclined to make new job-creating investments due to reduced customer demand. The dilemma is actually caused by the following interdependence – the greater the drop in demand, the more efficiency is needed on the supply side to offset the negative effects of the premium (Dirican, 2015; Hirst, 2014).

Big companies are inclined to continue to accelerate innovation, which spurred by the upward shift in the money supply leads to low interest rates. As an impact, lower-skilled workers will be replaced by high-skilled employees, and according to the Stiglitz (2014) survey, inequality between people and unemployment levels will exceed the socially desirable level.

Innovations and AI in particular are changing economic models and societal well-being. These effects have already been observed and investigated by researchers. It seems that modern economic thinking should reconsider AI technologies and their augmented applications.

**Table 1**

The four AI scenarios Scenarios	General implications	AI impacts on employment
Optimistic (utopian)	<ul style="list-style-type: none"> <li><input type="checkbox"/> An era of nanotechnology, genetics and robotics;</li> <li><input type="checkbox"/> People use to the highest possible extend computers' capacities;</li> <li><input type="checkbox"/> Genetics enables changing of humans genes to avoid diseases and extend humans lives.</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Robots fully substitute humans at their work;</li> <li><input type="checkbox"/> Humans spend their free time on leisure activities and work what they actually want.</li> </ul>
Pessimistic	<ul style="list-style-type: none"> <li><input type="checkbox"/> Machines take control over the most important decisions;</li> <li><input type="checkbox"/> Humans become endangered species;</li> <li><input type="checkbox"/> Complex societal problems occur.</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Humans are reduced to second rate status and are fully substituted by computers;</li> <li><input type="checkbox"/> People are not motivated to work and leave all important decisions to computers;</li> <li><input type="checkbox"/> Full labour displacement by computers.</li> </ul>
Pragmatic	<ul style="list-style-type: none"> <li><input type="checkbox"/> Control over AI technologies and their strict effective regulation;</li> <li><input type="checkbox"/> People manage to stay a step ahead of AI.</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> People exploit the power of computers and augment their skills and human decision making.</li> </ul>
Doubting	<ul style="list-style-type: none"> <li><input type="checkbox"/> AI never become threat to humanity;</li> <li><input type="checkbox"/> Computers never achieve human ability to be creative.</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> In all tasks requiring creativity humans keep clear priority over the computers.</li> </ul>

Source: Makridakis, 2017, pp. 50-52.

The ideas behind these scenarios are quite challenging and can be the result of our fears and imagination. We can hardly test their objectivity. Our main concern is whether or not there is a real threat to AI and financial services.

At first glance, financial services fall into the risky category because the probability of their computerization in the near future is 0.94. These findings are in contradiction with the research conducted by Baldwin, Brown and Trinkle in 2006. Following the research, they argue that accounting tasks comprise a variety of structured, semi-structured and unstructured decisions and, due to the risky environment and limited information, the decisions and audit and assurance reviews could be classified as unstructured. In conclusion, they say that due to the complexity and importance of many audit tasks, AI applications in auditing are insufficient. The existing gap between the fields of business and accounting and the fields of computer science and AI should be bridged through more interdisciplinary research.

In this context, it is quite logical to ask the question about the future prospects of the accounting and auditing professions, considered in the risky category. Creative and social intelligence is required to perform some of the job duties. There are also many routine tasks that could be computerized thanks to the vast development of AI technologies. More than 400 individual audit tasks were identified following substantial research.

Some of them are characterized as less structured, because they are based on uncertain and incomplete information, and are considered unsuitable for AI applications (Abdolmohammadi, 1991). Accounting tasks also need detailed analysis to distinguish non-routine from routine ones. In conclusion it is stated that more AI solutions should be investigated for accounting and auditing decision aids (Baldwin et al., 2006) in the current risky and uncertain environment.

Despite these efforts, due to the complexity of the business world and the importance of accounting information for management decision-making, there is a minimal risk of an increase in the unemployment rate among the accounting profession due to the high level of computerization of its work tasks.

Certainly, the strong influence of AI will bring some changes in the role and functions of the profession. The successful strategy will be to embrace technological challenges and adapt to new business and management requirements by developing a new set of skills and competencies. And the education system should play a key role in preparing the profession for this rapidly changing environment.

Bakhshi, Frey, and Osborne (2015) were able to examine 702 different occupational categories in the US and 366 in the UK using multiple data sources. Their growing concern about the future of employment stems from recent technological advances in machine learning and mobile robotics, enabling AI to replace humans in performing multiple non-routine manual and cognitive tasks. Certainly, the strong influence of AI will bring some changes in the role and functions of the profession. The successful strategy will be to embrace technological challenges and adapt to new business and management requirements by developing a new set of skills and competencies. And the education system should play a key role in preparing the profession for this rapidly changing environment.

They alerted us to a time when jobs, currently considered creative, may not be. According to their estimates, 21% of the US workforce and 24% of the UK workforce are highly creative, and a large proportion of the occupations behind these percentages (86% in the US and 87% in the UK) are is at low or even no risk of automation. One of the serious findings concerns accountants and auditors. Their creative probability is calculated to be 3.4, and the computer-estimated probability is 77.4. The former is too low and the latter is considerably high. Considering that creative skills will become more important with the expansion of technological innovations, as Bakhshi, Frey and Osborne (2015) concluded, it is crucial for the future of the accounting profession to maintain its competitive advantages.

#### 4. Conclusions

Some leading professional organizations are starting to ask the right questions: how can accountants benefit from using AI capabilities and increasingly improve the quality of their work, what will be their new roles in the organization and the new skills needed to fulfill. Many of the current job tasks and decisions will be automated, yet accountants can be equipped with powerful new capabilities to meet all the challenges and opportunities of the future.

AI is reshaping the future of many occupations, and the accounting profession is one of the most. Many opportunities for important new roles and jobs arise when considering Artificial Intelligence as a complement to human intelligence. The threat of labor displacement now seems more like a myth than a future prospect. We are experiencing a shift from concerns about automating accounting tasks to the adoption of AI capabilities by the accounting profession for its benefits. Accounting roles are increasingly closer to the management functions of companies.

As AI has and will further impact the accountant's role, there is a call for accountant educators to change their mindset and develop the necessary skills and competencies related to intelligent technologies and their applications. Much work remains to overhaul accounting programs and prepare graduates for successful careers.

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## **Hybridization of jobs: digitalisation as a complementary tool for jobs**

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**Abstract.** *Ideally, the education and training system offered by the private or public environment offer high flexibility in the labor market. However, forecasts of skills needed in the labor market in the future are not complementary to the current system, but rather substitutable in several respects (Akyazi et al., 2022). Although digitalization is seen as a singular process, separate from other sectors of activity, this process is not a uniform one in all economic sectors. There are people whose occupations place them in the high-risk category of people with a high probability of losing your job as a result of the digitalization process (Bhatnagar and Grosse, 2019). Thus, this paper focuses not on the individual side of the digitization process, but analyses the competitiveness of different scenarios within different sectors of activity (Heyman et al., 2021). Prior to a thorough research to determine which tasks and skills are most likely to take a certain category of labour out of the market, it is necessary to determine which areas are most likely to be affected by digitalisation in the near future, as well as what are the effects of people working in that field (Bhatnagar and Grosse, 2019). Digitalization can be seen either as an exogenous phenomenon for industries, which is why we must focus on changes specific to a certain segment, an approach specific to economic interests related to profitability (Peña-Casas et al., 2022). At the same time, it can be focused on the way of influencing a profession in particular, a specific approach to the social, human and professional side, a vision specific to social policies and humanistic orientations (Lilja, 2020).*

**Keywords:** scenario, macroeconomy, digitization, mobility, uniformity.

**JEL Classification:** J60, J62, J69, J83, J89.



## 1. Introduction

The transformations caused by the impact of digitalization have led to the development of the economy, to the increase of the companies' capital, to the increase of the productivity of the factors of production, all this being valid for a very wide range of economic fields of activity (Akyazi et al., 2022). The contribution to innovation in production processes led to an increase in the profits of economic agents, an increase in efficiency and an increase in the long-term earnings of all participants in the production process. Digitalization and technological development has the ability to help diversify the marketed products, but especially to the subdivision of work that leads to the increase of the efficiency of the production processes by clearly determining the duties of the employees (Bhatnagar and Grosse, 2019). As a result, these procedures promise to contribute to the substantial improvement of jobs and the results achieved accordingly, but above all they help to improve the social situation of individuals in this market. The Covid-19 pandemic represented a moment of advancement, of accelerating the digital processes that were already promised by the market, highlighting the vital role it has in the free market (Heyman et al., 2021).

Digitalisation is already definitively shaping the labor market. Even though some jobs are in danger of disappearing completely from the economy, and some have already been completely replaced by technology, the new work processes have created a favourable environment for the emergence of new jobs, at which point educational organizations were not completely in line with the processes on the free market, and many companies were in a position where they had to be willing to train at work in order to be able to generate the necessary resources for development and cover the market demand (Akyazi et al., 2022). It is not possible to determine exactly which jobs are threatened, which are either complementary or substitutable with the new technological procedure at the level of companies (Lilja, 2020). The transition to a better performing era with the help of electronic resources and equipment that takes over a large part of the human activity that is subject to human error, will result in the creation of jobs or the elimination of employees from the market (Mezzanzanica et al., 2022). The difference in the outcome is determined by social and political choices, by the rules of the market that will be established as a result of the need at the time (Heyman et al., 2021). Of course, there is a set of instruments through which the whole process can be oriented towards beneficial results, but they must be in line with the need at the time for long-term economic needs and the market's ability to attract and absorb the level of liberalized staff at the time (Akyazi et al., 2022). The approach cannot be regarded as predominantly individualistic, but must be analyzed from a holistic point of view in order to be able to coherently interpret market signals and to correctly choose methods of intervention (Lilja, 2020). The transformation of traditional processes into digital ones is not a condition of the fact that certain jobs will be eliminated from the market, rather the fact that most of the workloads within the existing workplaces will undergo changes in seeing the efficiency and updating of the job description in accordance with the related tasks (Bhatnagar and Grosse, 2019). From this point on it can be said that the need for subdivision of jobs in the digital sphere begins (Akyazi et al., 2022). The specificity of each economic field, but especially of the jobs they entail, leads directly to uneven changes and dynamics of work tasks, which depend to the greatest extent on the

nature of the object of activity, but also on the ability of individuals to cope with the skills imposed by the new job.

## 2. Literature review

The implementation of new working procedures will decisively change a person's ability to take up a particular job in the labor market. Thus, a significant percentage of tasks will be taken over by automated processes, and as a result, new skills with hybrid forms of work and especially with the need to have a multidisciplinary form of skills will be required from employees (Lilja, 2020). However, the combination of previous knowledge, strictly specific to the specific job such as financial, legal or medical, will be complemented with technical skills that you must have for a person to possess in order to be able to have a competitive advantage.

The classical system of training of the new generations, as well as those that deal with those for continuous training, be it state or private systems, come to respond to more and more in-depth needs of aligning work processes, market requirements, with the skills that individuals must possess in order to enter the ranks of employees in a formation as appropriate and as relevant as possible (Bhatnagar and Grosse, 2019). These organizations must expand the capacity to influence the labor market by standardizing the services they offer in order to increase competitiveness, reduce the cost of information and the costs of actual training, costs that some people are willing and end up paying out of their own pocket in order to be able to cope with the tension in the anthill market (Akyazi et al., 2022). On the other hand, at the macroeconomic level, the need to form an environment conducive to the normal development of the skills of individuals, caused by the need in the market, is felt. The professional life cycle of an individual is currently fragmented by the technological changes taking place on the market, which is why it is necessary to modify the activity environment in order to be able to generate the results that the market needs (Lilja, 2020). The maintenance of the step by the employees with the technological development, however, cannot be achieved uniformly, as recommended in the training offers of the institutions (Bhatnagar and Grosse, 2019). These new skills must take into account endogenous factors such as an individual's working environment, the studies that the person already has, but especially according to what is required on the labor market. The three elements set out above are not interchangeable, nor can one of them be disregarded, being complementary and imperative in order to be able to address the situation in the most relevant manner possible.

The rapid rate of change of technologies, the dynamics of digitalization as well as their multidisciplinary have led to market penetration on all sectors of activity, thus being an international phenomenon and valid for all member states of the European Union as well as for countries on other continents. Studies show that there is an ongoing general trend of increasing demand in terms of access to ICT, but also to the resources capable of using these services (Mezzanzanica et al., 2022). Specialist theory suggests that those companies that will be able to gain positions of free and adopt the most sophisticated digital technologies will be the ones that will determine the level of competitiveness and will resist

the greatest resistance to market changes. However, in order to be able to adopt new technologies, these companies need the workforce capable of operating these systems (Akyazi et al., 2022). The most representative companies are represented by the international ones, by the transcontinental ones that have a financial capacity clearly superior to the rest of the competitors. At the same time, as the market demonstrates, but being a large number of information that they have to process because of the large number of customers it has (as a result of the trust it presents in the market by size and by the age they have), they need people to work in a very niche field in order to be able to specialize on a small side of the entire process, but who possesses the necessary skills to reduce any inconsistency that may arise (Akyazi et al., 2022). Changing tasks would cost the company more than if the person has a very limited area, but extremely clearly definitive for which he has the right to intervene. In addition, these companies need people who not only have the ability to operate the technologies implemented, but who also have the ability to create new ones. In these situations, we are talking about the companies from the oligopolistic markets in the ICT and IT field that determine the development of new technologies (Meyer, 2020).

The emerging deficit in terms of professional skills are increasingly considered an impediment to the implementation of new technologies, given the competition in the market and the reduced capacity of many companies that do not have the financial capacity to attract that they are the people able to implement these procedures, to operate these technologies (Bhatnagar and Grosse, 2019). Digital transformation presents considerable employment challenges in most industries (Peña-Casas et al., 2022). These new procedures and market trends create and will continue for an impossibly approximated period of time to bring new jobs to the labor market, while reducing demand for other jobs. (Mezzanzanica et al., 2022). The most difficult aspect of this digital revolution to determine is to identify the sectors of activity that are most likely or, as the case may be, the least exposed to undergo changes as a result of digitalisation (Heyman et al., 2021). Although it is not possible to specify precisely a field and the level at which it is exposed as a result of processes, there are common features of tasks whose nature can determine whether or not they may be replaced by technology (Akyazi et al., 2022). Although their classification cannot be made on the basis of sectors of activity, it can be estimated on the basis of the tasks on which certain jobs are found, whether it is an internalized service or externalities. Current research suggests that the jobs that have the least possibility of disappearing from digitization processes are those that rely mainly on soft skills, such as those that focus on communication, negotiation, business intermediation, mainly those that require complementary human intervention with critical thinking skills and especially creative thinking (Meyer, 2020). The most representative element to be able to determine the ability of a job to be influenced by digitalization is the level of empathy that the job description implies (Heyman et al., 2021).

The most possible jobs to be replaced by technology are those that do not require any analytical type of thinking, but are predominantly based on classical human interventions such as data entry or physical work (Bhatnagar and Grosse, 2019). The most important aspects are the continuity of a task as well as the quality of the final result that can be regarded as a determining factor in the possibility of a task being replaced (Heyman et al.,

2021). Thus, if the purpose of a task is aimed at a uniform purpose each time, such as placing a vase in a box, then the possibility will increase (Akyazi et al., 2022). On the other hand, if the purpose of a task presents customizable elements, unique to each individual result such as the negotiation of a contract or the representation in court of an individual, then the chances that the task, that the job will be automated, decreases significantly (Akyazi et al., 2022). It is the market that will determine the level of replacement of individuals with automation processes, but this also largely depends on the ability of members of some professions to comply with the new requirements and focus on those fields that make their trades indispensable in terms of social needs. However, there is no certainty that certain IT jobs will not be questioned in what automation and single data processing means.

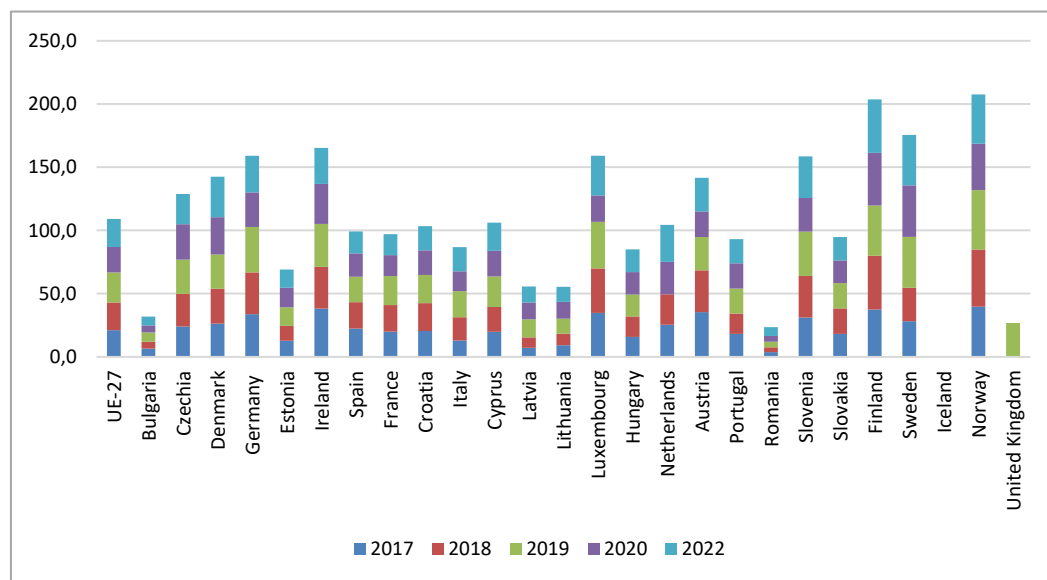
### 3. Data analyses

Economic development entails the need for digitalization and vice versa. There are studies that show that the number of jobs requiring higher education is increasing, like jobs that do not require any qualifications, the category of people that is most affected being formed by people with secondary education, who are too expensive for low-level jobs and lack the necessary skills for highly educated jobs (Meyer, 2020). Moreover, people who focus on hard skills, respectively repetitive work or who rely on information from state organizations and who do not require continuous training are those who are in a situation where, due to digitalization, they will not be able to give up as much as if they retrain or if they are part of the category of people with double specialization. Otherwise, people who fail to retrain on time, who do not orient themselves to time, will fall into the lower percentage of people on low incomes (Heyman et al., 2021). As a result, the middle strata will be represented by the category of professionals today, and the category of people with low incomes will increase, which will lead to an increase in the demand for jobs, which will automatically lead to a reduction in the salary that companies will be willing to give to unskilled people at that time on the labor market, outlining the demand and needs imposed by the conditions at the time.

Thus, more and more sectors of activity will have to analyse the job offer from the perspective of two categories: qualified and unskilled people. Being a field such as technical and digital, basically having operating knowledge that is completely quantifiable, this procedure will allow employers to critically analyse potential employees and rank them according to the ability to actually solve a task, the direct ability to solve a problem, so in the category of qualified or unskilled employees (Akyazi et al., 2022). There is a great possibility that the labor market will not be properly trained by educational organizations for which the retraining and re-education of workers will most likely be carried out at company, departmental, or through dedicated courses carried out in private regime. As can be seen in Figure 1, companies are most often motivated to take free labor from the market and integrate it into its own business (Heyman et al., 2021). Not all elements that depend on training are oriented towards the IT area such as programming or writing lines of code, but rather on the formation of an average level of skills necessary to form those attributes necessary for data operation. Basically, the discussion and the need about individual

attributes specific to a job description does not consist in recovering knowledge from the faculty benches such as those in the field of engineering for IT (Mezzanzanica et al., 2022). The major need is in the possession of human capital capable of collecting data, interrogating databases and digitizing certain processes.

**Figure 1.** Enterprises that provided training to develop/upgrade ICT skills of their personnel (% of total enterprises from private sector)

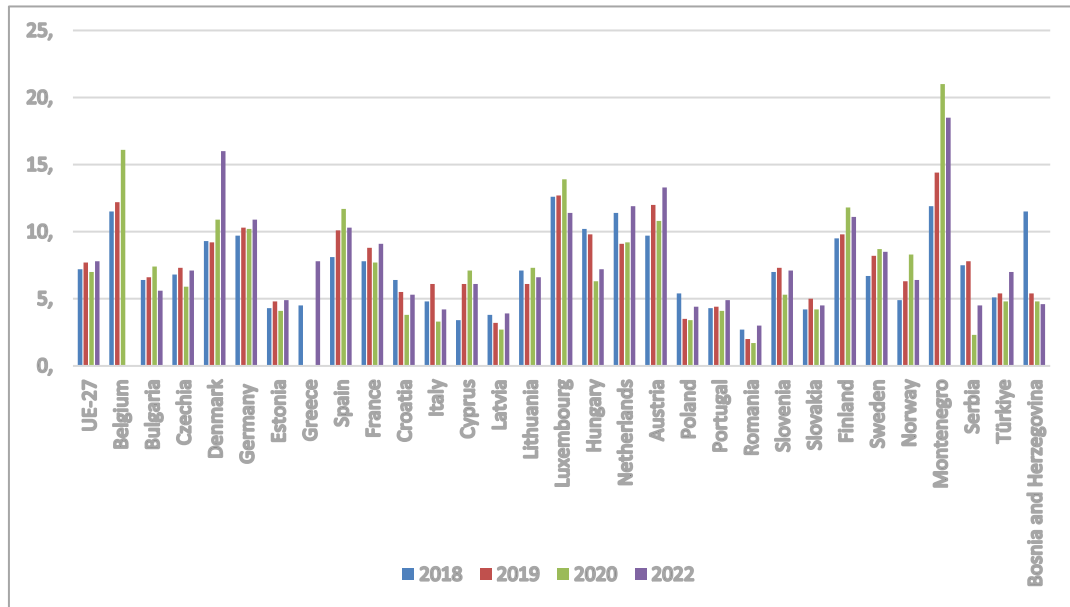


**Source:** Authors own processing of data from Eurostat database.

Therefore, companies do not offer retraining courses, but rather training courses for a necessary skill. Thus, the attributes of a profession, be it liberal or a collective one, the need to use tools is necessary to be able to cope with the competition (Akyazi et al., 2022). Thus, conditioning does not come from employees who do not fit into the labor market, but companies end up being conditioned by the market's ability to provide the necessary resources. It is about the digitalisation of jobs, not about their automation, and as a result, the use of new processes is a complementary act of an individual's professional values, not an optional attribute (Bhatnagar and Grosse, 2019).

However, many of the tasks known to the labor market nowadays will be at some point but automation, in different times and under different conditions and measures. This means that economic agents will increasingly require work that has these skills, while at the same time as their on-the-job training (Meyer, 2020). Figure 2 shows the high level of search of companies for platforms already trained to perform technical and digitized tasks (Akyazi et al., 2022). This occurs because the use and integration of technology does not replace human personnel until long-term and very long-term, but the near future conditions the implementation of new technologies on the use of a greater number of employees to operate functionally (Peña-Casas et al., 2022). The integration of technology entails the diversification of activities, does not replace it, but it conditions the quality of the people who have the necessary knowledge to be able to work within that organization.

**Figure 2.** Enterprises that recruited or tried to recruit ICT specialists (% from all enterprises from private sector)



**Source:** Authors own processing of data from Eurostat database.

It should be noted that not all these aspects automatically lead to the formation of a favourable framework for the development of work is at a distance. Unquestionably, in the first part of the education process, on-the-job training can only be carried out in efficient conditions if a process of face-to-face education takes place. However, the tasks arising from the development of these skills may also be carried out in a remote manner only partially or narrowly. The effects arise due to the need to activate those tools that allow work to be performed (Akyazi et al., 2022). Mostly, these tasks are found in the admonitive or simplistic digitized area, not in the IT area itself.

#### 4. Conclusion

The training of those digital skills will not make sufficient the condition for new employees to be able to make full use of themselves to cope with producers and large organizations. What economic agents are looking for in the growing market is a combination of established skills such as basic knowledge, but also skills in digital matters, operating and operating new production processes (Akyazi et al., 2022). As a result, it is very likely that in the coming period, the labor market will be predominantly in search of individuals who will be able to combine modern attributes with classical non-technical areas that are not necessarily in line with the activities of companies (Akyazi et al., 2022). As a result, the hybridization of skills is one of the most important issues currently emerging in the labor market and which are for the moment a benchmark for people in training who want to seek to evolve financially.

A large part of these changes are not determined by companies, but by the formation of new work processes within certain industries that generate new ideas, which arise from the double specialization or the mix of information in several areas of individuals employed within the company (Akyazi et al., 2022). Thus, in a field such as retail, attracting people who have the ability to combine information from this sector with a new, modern one such as the superficial concepts of the green economy, have the ability to add additional value to the already existing processes and to increase the level of competitiveness, which will generate an impulse, a need to adapt new companies to execute the activities in the same manner.

The hybridization of jobs is not a new phenomenon in the labor market, but appears as a mandatory necessity arising from globalization and international competitiveness (Bhatnagar and Grosse, 2019). Hybridization appeared in the form of linguistic education at first and subsequently, today, it has reached the level of operation of information. As a result, hybridization is not a choice that can be selected or assigned by name only to a sector of economic activity, but is a condition of alignment and adoption with the working environment present on the labor market.

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## **Policies in education, an analysis of the current study of knowledge**

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**Abstract.** *The degree of economic development and the performance of the educational system pre-present two interdependent components of society that leave their mark on the level of development of each individual and the social system in general.*

*A significant number of researchers highlight the fundamental link between education and economic development by mentioning various causal relationships between the two phenomena. The multitude of opinions expressed shows the importance of this topic for the understanding of the social phenomenon, but at the same time, it demonstrates a high degree of heterogeneity of the elaborated studies, in this context, a systematization of perspectives on the education-economic growth relationship is necessary which could be useful in clearer understanding of the results obtained through these studies.*

*The main objective of this research is the identification and analysis of the most relevant educational public policies applied in various countries over time. The analysis highlights the impact of these policies on the educational system, as well as how public investment in education has to an increase in educational and economic performance. Following this research, a series of relevant results emerged that show the intrinsic link between investment and economic performance, and the main conclusion of the study highlights the fact that the stability and predictability of public policies in education is one of the essential factors for increasing the performance of educational system from a country. Education is the enterprise of the domains of life, it includes behavior in the educational environment, having medium and long-term effects. The competitiveness of a nation is when a rich country has educated and rich individuals. The level of competitiveness generates well-being, well-being comes from education and produces: the growth of human capital and its development, the growth of technological progress, macroeconomic stability and the growth of microeconomic indicators, corporate governance, its functioning.*

**Keywords:** education, public policies, educational policies.

**JEL Classification:** H52, H75, I21, I26.



### Introduction and research methodology

The analysis of the current study of knowledge in the field of the role of education to achieve economic prosperity and the connections between investment and education with the aim of increasing economic performance and the quality of life reveals an already well-known fact, namely that education is one of the main factors that underpin well-being the population. Tomic (2015), taking one of Adam Smith's fundamental ideas, states that the annual production of a nation depends on two factors: the amount of labor employed in production and labor productivity. Ungureanu and Burcea (2003) highlights that, in the second half of the 20<sup>th</sup> century, humanity experienced an unprecedented economic growth, because of technological progress, which is increasingly rapid and due to humanity's ability to control and manage the environment according to its requirements by referring to science and education, which are the main drivers of economic progress. Education is no longer seen as an impact of economic growth, but also as a broader perspective of human development, placing in the foreground of the interdisciplinary concerns of government agencies but also of national and international NGOs. Today's economic approaches to education have focused on education for economic growth reviewed and evaluated by the theory of human capital, it is important to mention that a successful impact of education is the correlation between education and the adaptation of employment and economic growth, therefore, human capital is defined by economic education as an entire theoretical and practical system, integrated by general and specialized knowledge, skills and abilities acquired in the process of education and training (vocational training) as well as from work experience through economic behavior and social that the individual implements in the process of creating goods and services, benefiting from a long-term benefit both for him and for the community (Ungureanu and Burcea, 2003). Zoran (2015) believe that it is necessary to invest effort and resources in the educational system to help the population prepare for participation in the economic life of their country. Education represents the process of personality change in the desired direction for adaptation to a different content depending on the age, needs and necessities of individuals for everyday life and society. In this context, it can be easily seen that we are currently in a phase of accelerated technological development, in which a better harmonization between education and investment in education is most likely necessary. Education is the enterprise of the domains of life, it includes behavior in the educational environment, having medium and long-term effects. The EU aims for an inclusive growth as well as for each individual member. The most important branch of development that the European Union proposes is to increase the employment rate and invest in professional training skills, the reason is that people can find a job faster and have easier access to services and social benefits.

### The main results derived from the analysis of the current state of knowledge

Zoran (2015) claims that currently learning for knowledge is the main source of economic growth in the medium and long term of every global economy, showing that education and investments in human resources are among the strategies and public policies of every nation, applying policies safe and correct in education. State that among the three essential production factors, the raw material, the place of work and human capital, human capital

represents the most important, safe and future factor that ensures economic growth. Moreover, in the case of countries facing a low growth rate, the quality of human capital can represent an essential element in attracting investments and developing businesses. Idrees et al. (2013) mention that education represents a public good of merit, being at the same time an engine of individual well-being and of society as a whole. Education and specialization of human capital develops creativity and facilitates adaptation to new technology, increases the capacity for innovation and research contributing massively to increasing economic performance and improving the quality of life. Ungureanu and Burcea (2003) claims that human capital represents the most important, safe and future factor that ensures economic growth. Moreover, in the case of countries facing with a low growth rate, the quality of human capital can represent an essential element in attracting investments and business development. Niculescu (2018) states that education can be considered as a consumer good, or as a public good, but education cannot be conceived as a commodity, but, as an investment that brings long-term effects, that's why the educational choice is as well as decisions to invest in current income opportunities for the future. (Fischer et al. 2009) claims that education is a viable industry supporting both a proliferation of private providers and a series of new entrepreneurial activities within public institutions, public funding levels and objectives have varied substantially over time, public investments in the form of capital grants and subsidies for schooling or extended and or alternatively contacted. Political decision-makers have sometimes treated public policies as a mechanism for social inclusion and equality, other times as a tool for workforce development, sometimes policies are treated as operational declarations of values, declarations and intentions of perspective and disclosure. Defining policies in this way draws our attention to the importance of power, control, and conflict in the process of elaborating public educational policies. In this article, the author shows five factors that he highlighted as work factors, Accessibility, Responsibility, Marketization, Work force development, research and development. In some parts, the public policies in education are treated as values that we will bear fruit in time.

Education represents a strategic component in social functioning and development, which can determine for each individual, the place of work and the salary received, these two being the essential components to ensure the material and economic well-being that they create throughout their lives. Badea and Rogojanu (2012) cites (WEF 2012) and mentions the fact that the Global Competitiveness indicator produced by WEF (World Economic Forum) is based on the structure of twelve analytical pillars: P1 Public or private institutions, P2 infrastructure, P3 Macroeconomics, P4 Health and primary education, P5 Higher education and employment, P6 Market efficiency, P7 Labor market efficiency, P8 Financial market complexity, P9 Technology, P10 Market size, P11 business complexity and P12 innovation, of these twelve pillars most are based education. Haepf and Lyu (2018) show that education is the key investment in human capital, permanently providing basic knowledge, skills and competences necessary to improve productivity and innovation research capacity. Everything starts with primary education, which ensures the basic conditions for the subsequent development of life. Berlinski et al. (2006) consider that investment in early childhood is more important because learning is easier, more efficient and safer at that time than later in life, it is more essential for the development of skills and

abilities that uses them throughout life. Mandeep (2019) believes that primary education can be perceived as the most sensitive area in the field of educational planning and development, because children who start learning from a young age will acquire various habits, behaviors and abilities that they will use them throughout their life, in this context, the investment. In human capital, starting from a young age, significantly improves the skills and abilities that individuals will use both in secondary and tertiary education. In addition, the author claims that the educational structure of a nation is based on primary education, because it develops, enriches and increases the mental, physical and behavioral potential of the student. A child well taken care of in families and well prepared educationally has more chances to achieve special performances in the secondary cycle.

Matei (2022) claims that the subject of the national curriculum development for early education that guides school life consists of: responsibility, innovative spirit and creativity, excellent integrity, active citizenship, critical thinking, perseverance, and resistance. The curriculum for early education is based on several principles that represent fundamental values: the principle of child-based education, the principle of respecting the rights of the child, the principle of active learning, the principle of integrated development, the principle of interculturality, the principle of equity and discrimination. What is not explained in this article is the fact that we are not talking about education based on logic and not on memorization, the effects of this system are much more effective and the results would be different. Logic is the basic form of education, especially preschool education which is based on skills, acquisition of skills that accompany the individual throughout his life,

Mammadov and Gumu (2020), showcase that the relationship between investment in secondary education and economic growth, is a causality for the efficiency of economic progress, once again the author states that secondary education contributes to the increase in the supply of highly qualified labor necessary both for increasing productivity and in the development process of society. The conclusion of Mammadov and Gumu (2020) analysis, is that there is a relationship of mutual causality between education and economic growth, demonstrating while investment in education produces unlimited benefits both for the individual and for society. Dragoiescu (2015) states that education and higher education can influence economic growth in various ways: education turns into increased labor productivity through the accumulation of knowledge and skills to facilitate technological progress and innovation Dragoiescu (2015) quotes Barro (2002), and Barro (2013) who found that education significantly influences economic growth, using a cross-section of countries. Showing that there is a direct causal relationship between education and educational policies, which is measured by schooling rates and implicitly economic growth. Agiomirglanakis et al. (2002) quoted by Dragoiescu (2015) declares that he studied the relationship between human capital measured by rates of enrollment in primary, secondary and tertiary education, and economic growth in Greece, where they discovered that there is a direct causality between primary/secondary education, for economic growth and an inversely proportional causality if tertiary education does not have an effective result. Danacica et al. (2010) quoted by Dragoiescu (2015) mentions the effects of economic growth and its relationship with education in China in the period 1978-2004, the results obtained are determined by primary education and represent a direct cause for higher

education. The long-term relationship between economic growth and higher education in China are closely linked in economic development

Łukasz et al. (2022) hypothesizes that there is a positive correlation between the efficiency of the education system and economic indicators on the food market, the more companies there are, the more GDP per capita increases and the number of unemployed decreases, therefore, government policies including educational policy have a positive impact on the individual and it is assumed that today we must rely on knowledge, statistics, research and analysis in order to obtain a true result about the progress and efficiency of education. The disadvantage of real approaches in measuring the effectiveness of education and not taking into account the results that demonstrate the level of educational progress leads to an increase in functional illiteracy, decreases the passing rate in the baccalaureate exam and increases school dropout, and implicitly the job offer is less qualified Łukasz et al. (2022) claims that educational units influence the growth of human capital, and should translate into an increase in the wealth of a nation, but, they state that local public administrative units are responsible for the entire structure of the educational relationship with the exercise of territorial powers. Here it is proven that for the educational performance there must be a corroboration between the local authorities and the Ministry of Education, having as direct involvement the expenses made by the local authorities and the percentage allocated to education from the GDP.

Wasyłuk et al. (2020). Education is at the crossroads of change, because contemporary and future processes in the sphere of education are multiple and sometimes irreplaceable, the more factors that are very different from each other, the faster the change process the educational system has an effect, but we ask the questions: Who should you put to teach if the education staff are using the same working methodology? To whom to teach? If labor migration increases and demography decreases, what to learn? What to learn if we don't change the school curriculum and move from memorization-based education to logic-based education, what methods and tools to apply? If we don't have teachers, what new learning systems should they adopt or how should teaching be organized? Normally teaching must have a methodology applied to a certain form of teaching? Whom to involve and what results to expect? We have to answer this question honestly and correctly, we have to involve the family, especially the parents, to make children responsible by explaining to them through various teaching methods what it means if they are involved in the education system to acquire knowledge and skills, and if they are not involved in the system of learning and will not acquire skills, his future will not be so easy, and last but not least teachers, who should convene a coordination council for that individual who needs to be helped.

Education has always served inclusion in social life, inclusion is a source of challenge, education comes every time with successes, with innovation, with new technologies, ways of organizing life, education is what teaches you to interact between participants in the process. In society, education must not be the norm for the rationalization of knowledge, it must reflect all changes and prepare us for them. What I noticed is that at the world level there is not a great emphasis on the application of policies in education as a national priority, each nation treats education as some kind of product, without realizing that

education brings the new and develops technology, Akshay et al. (2017) states, when a person acquires knowledge and skills, he can use them when producing certain goods and services, and can increase their productivity through quality and efficiency.

Niculescu (2018) claims that currently there is a strong tendency to direct educational institutions to fields that provide knowledge and skills to new generations of workers, the main objective being the improvement of the national position for quality assurance. This system is especially valid in continental European countries, where the previous reforms were conducted on considerations of equality in opportunities with the idea of providing education based on individual ability that gains strength and ground. The economics of education can be defined as a science of education developed at the level of interaction between pedagogy and economics. The analysis of the relationship between education and the economy or between the economy and education represents the central point of the development of the economy. The author explains in this article that there is an intrinsic link between education and labor force performance, considering education as a consumer good or even as a public good, but everything depends on how education policies are approached and applied. The education of the future, as Wasyluk et al. (2020) calls it, stands out for knowledge, software skills, applied critical thinking, effective communication between individuals, emotional intelligence, but also preparation for teamwork.

These developments are distinguished by several characteristics that influence people's thinking and actions, they are visible through individual and group behaviors, depending on the area with different social trends, technological trends, environmental trends, economic trends, political trends, legal trends and culture. The trends are of three kinds: megatrends, macro trends and micro trends, the most visible trends are the macro trends that can be used when planning multi-year development strategies, especially when discussing education and its environment and when discussing the educational needs for progress in society (Wasyluk et al., 2020). The role of education is to prepare the individual for life today, for the present world and for the future. Education must prepare the individual for a change because knowledge and skills are what teach you to live well, to be up to date with technology as well as with economic progress. Lately it has been shown that there is a significant discrepancy between the truth understood in accordance with the facts and the truth created in the mass media space, especially in social media. Today's public opinion is shaped not by facts but by emotions, the curriculum should include the teaching of critical thinking and the correct evaluation of arguments. Pavelescu et al. (2007) draws attention to the fact that the number of workers and the relative average salaries provide an index of the quality of the components of human capital, through the link between salary differentiation and that of the educational level, it is shown that there is no perfect correspondence between the salary level and the educational system, because the salary cannot be a unit of measure for measuring the educational level, and because the salary can also be a reward for intelligence and selflessness at the service of the organization, family traditions or credentialism. Consequently, it is worth to mention that human capital is particularly important in increasing economic performance.

Wasyluk et al. (2020) also declares that education should be based on: education for real life skills, education based on challenges, education based on competences, education

based on active learning skills, education based on Reflective Learning, education based on service learning, education based on Reverse Learning, education based on Learning Emotional Skills, education based on experiences, education is like a nucleus of the social community, education in the network, education for yourself, green education, education without barriers, dialogical and behavioral education, organic education, intergenerational education, intercultural education, education without barriers in schools. All these types of education are useful and necessary for the future, nevertheless, my question is, how we will be able to promote these types of education, if at the European level there is no promotion of education systems and the development of a central European educational curriculum. All the forms of education presented above are also needed tailor-made schools and universities, so it would be good to choose schools and universities such as: My University, Universal Projects School, Sustainable School, Outdoor Schools, City Integration Schools, but also the community center school.

Wasyluk et al. (2020) consider that whichever form of education we approach, we must take into account its transformation into a form that teachers approach in the school, in order to transform the school from traditional education to modern education, we must have as a basis the newly appeared digital technological systems, new technology with up-to-date changes, and in this context we can note several types of learning, Technology-based learning, digital teachers, digital transformation of textbooks, virtual laboratories, gamification in education, mobile learning or microlearning through the smartphone where you get small pieces of information but by putting them together you find that you have created a complex and very useful piece of information, learning with educational toys based on logic, personalized online learning on digital platforms, creating Classroom or Google digital portfolio drive, learning created on avatars or voice assistants in education. All these systems are part of the revolution in education, the transition from traditionalism to digital technology that creates new advances in economic performance.

Furthermore, by focusing on relevant literature (Bălăceanu and Gruiescu, 2020; Badea and Rogojanu, 2020) a series of negative factors which put their mark on Romanian education process were drawn.

1. The increasingly frequent trend of dropping out among students.
2. The overall capacity of the economy to support investment in education, demonstrated by the very low percentage of GDP allocated to the education system.
3. Poor living standards and a high poverty rate.
4. Inadequate measures at the level of pedagogical policy practice.
5. Inconsistent public policies applied in the field of education, caused by political instability.
6. Lack of correlation between the education system and the requirements of the labor market.
7. Reduced collaboration between the private mode of business and the educational system.
8. Problems of the nature of demography and population migration.
9. Lack of involvement of the business environment in the growth of tertiary education.

10. Lack of obtaining a qualification upon completion of secondary education.
11. The increasing activity in social networks, the use of mobile phones and other gadgets during classes.
12. Low promotion in the baccalaureate exam.
13. Low participation rate in employee training and development programs.
14. Lack of technology for teachers for online education that would allow them to teach students courses but also of authentic digital pedagogies.

On a more global level, Psahcharopoulos and Patrinos (2018) mention that in addition to various negative factors that he also identified in various researches, they also discovered other very important negative factors: racial and ethnic discrimination, gender discrimination, income distribution and determining factors for various requests in education. I also complete with the most important and relevant negative factors for increasing the yield in education, the lack of coherent policies in the education system due to the political system and the governors, lead to a significant decrease in educational quality.

Manafia and Marinescu (2013) states that European Strategy 2020, promotes an intelligent, sustainable and favorable European economy for the labor market, through innovation, education and social inclusion, climate and energy. The authors claim that at the European level there were 80 million people with insufficient skills and 19 million children exposed to poverty, very high school dropout rates and many jobs with low qualifications for the labor market.

### Conclusions and debates

First, one can easily notice that most studies reviewed, have shown that education draws the attention of more and more researchers who are trying to highlight and demonstrate that educational policies when applied correctly could lead to effective results. Education is the source of success since ancient times and until today, nothing is done without education, and nothing develops without education. The study highlights that there are twelve pillars which are essential for economic development and the vast majority of these pillars are based on education: higher education and training, health and primary education, innovation, technology, the efficiency of the labor market, the complexity of the financial market and business complexity.

Second our literature review reveals that, for numerous authors, investment in education is the most important factor in the performance of education and economic development. Education is no longer seen as an impact of economic growth, but as a perspective of the development of human capital. It is considered by the experts as a determinant factor in the development of the economy and modern technology, having a causal relationship closely linked between them, for this reason education is viewed as an entire theoretical and practical system to acquire competences, skills and abilities in order to develop technology and use it.

Moreover, our research shows that professional training of adults is increasingly present in the educational system at the international level, being a factor of integration and adaptation of all individuals to knowledge of the labor market because the three factors of production, the raw material, the workplace and human capital are in a continuous change.

Third, while most reviewed studies focus on the outcomes of education, some authors are more critical and, highlight the negative factors such as the defective public management of educational process by local administrations in various rural and even urban areas. Perhaps, in the case of Romania, a more efficient collaboration between local authorities and the Ministry of Education could lead to a more efficient public educational system since the partnership of territorial units with the Ministry of Education could bring efficiency in the allocation of public resources. Moreover, the majority of factors that hinder the performance of Romanian educational system are related with the lack of coherent educational policies, which, in turn, could be linked with a deficiency and a lack of predictability at public management level. These deficiencies could be easily highlighted when we look to the public investment in education as, in the last 20 years in Romania, the average percentage of GDP assigned to education is 3.449%, considerable below the European average. In addition, another significant assumption drawn from this study, is that a more coherent public strategy should put more emphasis on the inherent connection between labor market and education process to provide a more skilled labor adapted to the technological and economic development. A higher qualified workforce could be the key for a better quality of life of the individuals and for social progress.

In the last 32 years, Romania has had 26 ministers of education, each minister brought a change in the educational system in Romania, but the change was not to improve the educational system, but to gain political capital in the medium and long term

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## **The relationship between digitalization, green economy and sustainable growth, in terms of human capital**

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**Abstract.** *Sustainable growth, digital transformation and green economy have become in recent years the most commonly used phrases in all fields. The digital economy helps to develop the efficient development of ecological industrial innovation, by modernizing the production structure, but also by stimulating the ecological technology of companies. Due to digitalization, all branches of the green economy can add value to human capital, but they can also provide innovative effects on sustainable development. Most companies carry out their economic activity lately under much more modern conditions, implementing different devices that replace a person's professional activity. The purpose of the work is to present and analyze the tendencies of national development in terms of digitization in the last 5 years, paying attention to the relationship it has with the green economy and sustainable growth, in terms of human capital.*

**Keywords:** green economy, digitization, human capital, sustainable development, digital skills.

**JEL Classification:** O10, O11, O15.

**The relationship between digitalization, green economy and sustainable growth**

Climate changes in the last period of time have become a factor that affects both financial stability and people's well-being, but especially global economic development. Green energy has become a main objective in the development agenda of economies, as they undertake various future commitments to have minimal carbon emissions. (Ren et al., 2020, pp. 228-242)

In this context, people are more and more interested in a transition towards a green economy, as a result the emergence of digital technologies has changed the way society thinks. Digitization increases the sustainability, safety and productivity of the energy system. (IEA, 2017)

Digitization is intensively transforming business activity, adding more value and bringing important advantages compared to the associated risks. By adopting technology, companies innovate and create new values, but also dynamic skills. However, there is no clear idea of how digitization affects business activity, considering that technology increases the level of competition, lowers market entry costs, helps access and external financing, etc. (Škare and Soriano, 2021).

However, along with its benefits, digitization also brings a series of risks, for example unqualified workforce, lack of experienced managers, reduction of internal competitiveness, etc. Digitization helps to change and adapt corporate strategies, business models and marketing plans, leading society towards the digital age. (Verhoef et al., 2021, pp. 889-901)

The researchers support the hypothesis that global market changes also force the digital transformation of companies, the speed of adaptation being largely influenced by the risks and uncertainties they face, an example being the pandemic - the moment when the global supply chain was interrupted. Also, the increasingly strong inflation, associated with uncertainty, forced companies to adapt their business strategies to the present.

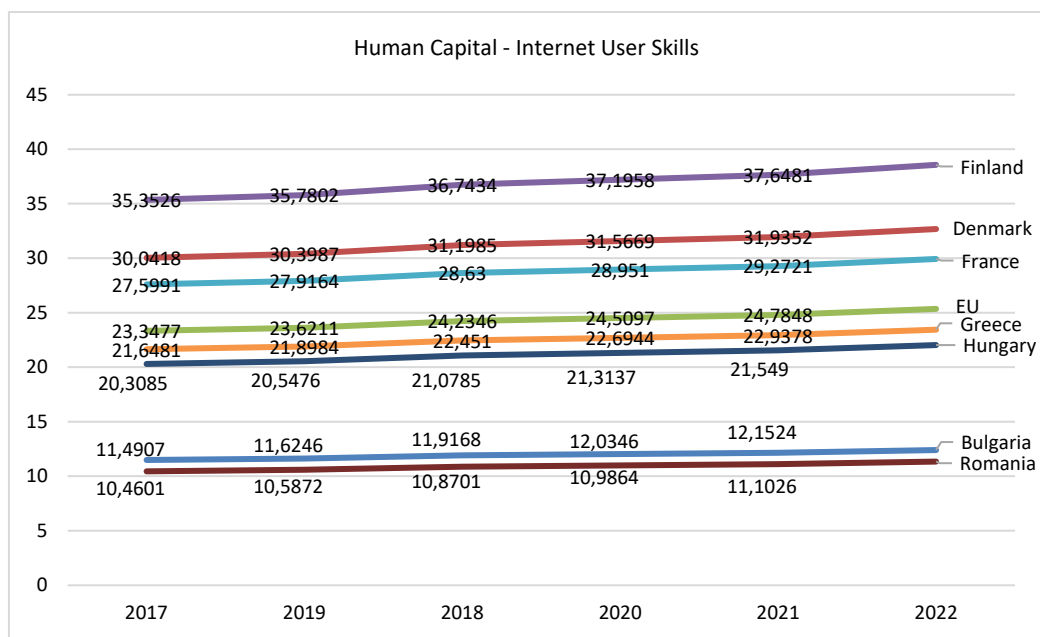
Currently, the war in Ukraine has become a critical factor in terms of digitization, companies adapting their business model according to these new challenges, in order to continue to meet the needs of customers. For example, last-generation services and products have appeared on the market, which use the latest digital technology, as a result, the customer niche is expanding and the market share of companies is increasing. (Kraus et al., 2022)

Digitization is constantly increasing, as a result digital skills are very important, they support the way of carrying out activities at the workplace nowadays. Digital skills, the way they interact, are extremely essential skills at this moment. Work techniques are more advanced, and companies expect current and future employees to learn these techniques and keep up with the advancement of technology. Without a firm knowledge of digital skills, companies have no other way to keep up with competitiveness. (Grover et al., 2020, pp. 1-37)

### Human capital and digital skills

The Digital Economy and Society Index (DESI), is a composite index that explores digitization in Europe, tracking the digital transformation of economies, internet use, human capital, digital technology integration, etc. According to its value, Romania is in last place in 2022 as well, showing a reduced rate of growth of the indicator in the period 2015-2022. During this period, the average increase in the DESI index for EU countries was 13.4 points, and for Romania the increase was only 3.7 points.

**Chart 1.** *Internet user skills*



**Source:** Own processing of data from digital-agenda-data.eu

According to the Chart 1, the inhabitants of Finland are at the top of the European Union in terms of digital skills, with Bulgaria and Romania at the opposite pole. Although Romanians spend hours on end every day on the Internet, according to data taken from Eurostat, Romania ranks last in the European Union in terms of digital skills. With the exception of social networks (Facebook, Instagram, Tik Tok, etc.), Romanian internet users do not have the basic skills to access different websites, write a digital document or communicate through different platforms (e.g. E-mail).

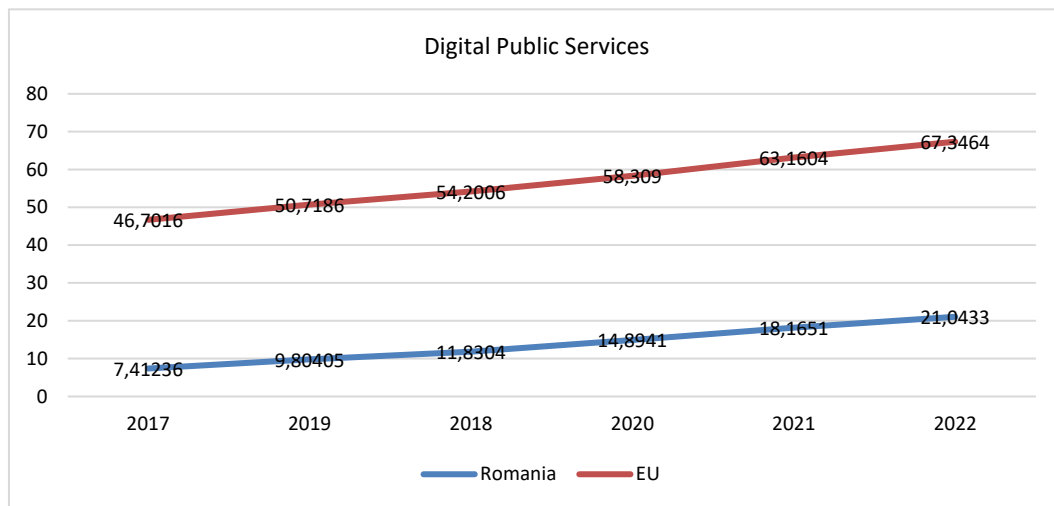
With the passage of time, digital inequalities have moved from having or not having access to the Internet, to the differences between its users. The usage gap occurs precisely because of the functionalities that users use on a computer. As it can be seen, the general population only uses the internet for relaxation, for entertainment, maybe after a tiring schedule at work. Compared to people with a high educational level or high professional status who show more advanced skills when it comes to the Internet, such as lifelong learning or human capital growth.

The Internet can contribute to important educational activities, helping the academic or professional performance of the population and improving human capital, this aspect being much more important than recreational activities, such as online games or watching movies with family or friends.

### Trust in digital services

Nowadays, public administrations focus more and more on collaboration with the public through organizational networks, in order to provide digital and quality public services. These collaboration strategies are very important and indispensable, in order to prioritize objectives and obtain concrete collaboration results.

**Chart 2.** *Digital public services*

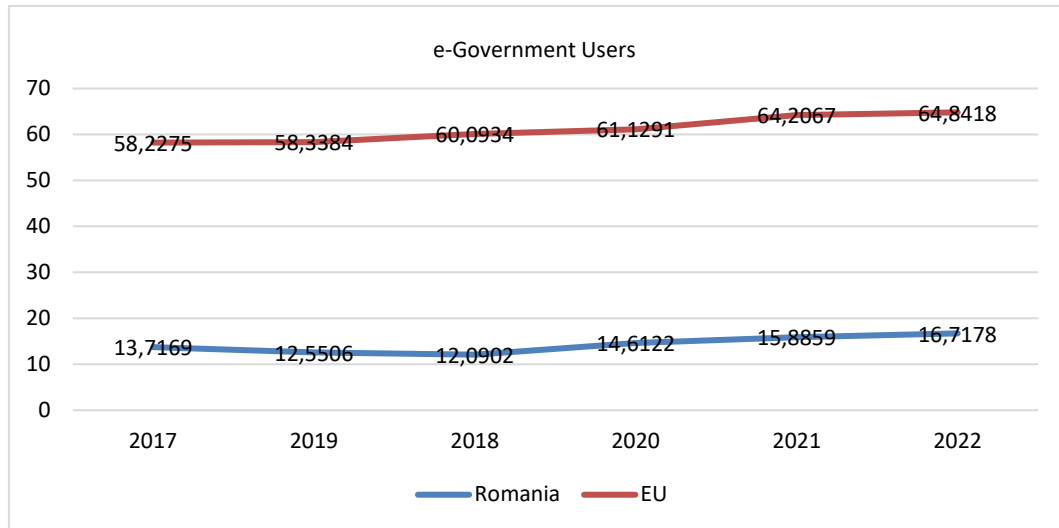


**Source:** Own processing of data from digital-agenda-data.eu

As can be seen from the Chart 2, Romania is far below the European Union average in terms of digital public services. However, an acceleration of growth can be observed in recent years, the COVID-19 pandemic forcing the transition of interactions with citizens from the physical plane to the online one.

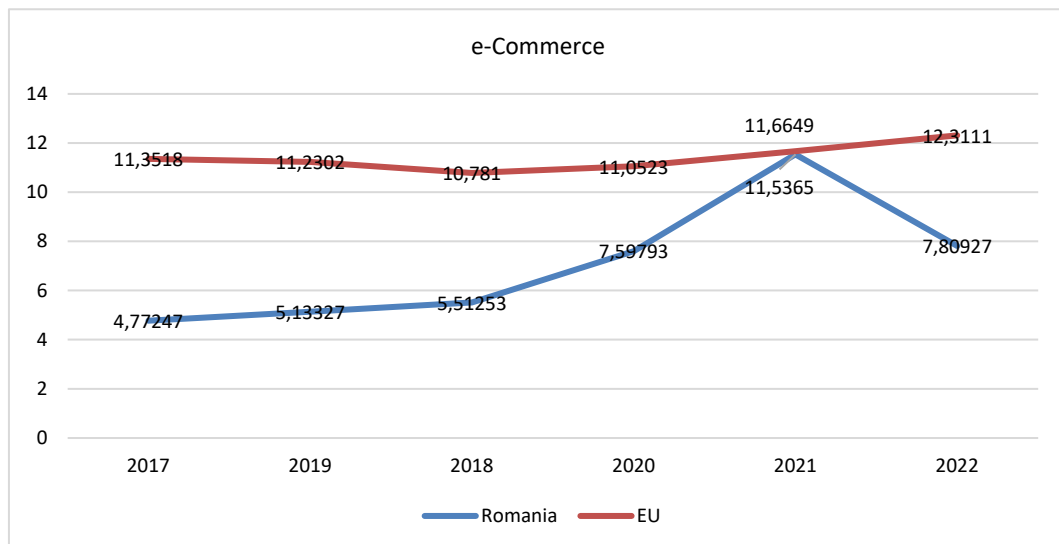
In addition, both private companies and state institutions are undergoing digital transformation and are currently adapting to external shocks, such as fluctuating fiscal policy changes, political instability, bureaucracy, exchange rate changes, etc. Moreover, digitalization helped companies to adapt more easily to the COVID-19 period, the connection with citizens and customers moving to the online side, thus the waiting period and queues being brought to a minimum.

But all this advanced technology is put into operation by human capital, which should have a qualification compatible with all these requirements of our days. Digital transformation is not possible without competent people, who understand and apply the acquired knowledge.

**Chart 3.** *e-Government users*

**Source:** Own processing of data from digital-agenda-data.eu

However, according to the DESI index data, less than 20% of Romanian internet users also use e-Government services, while the EU average is approximately 60%. From here we can conclude that Romanian citizens do not have yet full confidence in technology and the functions of digitization.

**Chart 4.** *SMEs selling online*

**Source:** Own processing of data from digital-agenda-data.eu

According to the DESI index, Small and Medium Enterprises (SMEs) had a boom in 2021, the moment when most companies started to market their products online. Definitely, as this time, it was all about the pandemic period, the period when companies had to adapt

their marketing strategies and direct their attention to the online part. However, as can be seen from the graph, Romanian merchants did not make this a habit, in 2022 the e-Commerce rate dropped back to the value it displayed in 2020.

## Conclusion

Lately, most companies have been carrying out their economic activity in much more modern conditions, implementing different digitization devices and techniques, the digital economy thus helping the efficient and ecological development of companies.

Digital transformation within companies is essential to optimize the allocation and use of limited resources and to streamline and achieve innovation and high-quality development. In addition, human capital and the business environment are very important factors regarding the performance of the real economy.

However, the real economy requires the transition from industrial management to digitized management, and SMEs are in a continuous adaptation, the process being carried out in small and safe steps. The investment in digital technology, infrastructure and human capital capable of these requirements is one of the most important investments nowadays.

This research is part of the final doctoral thesis, it is only a small part of what will be studied and analyzed in the future to reach much more concrete and attractive results. On the other hand, it is noted that digitization, sustainable growth and the green economy are in a direct relationship, being often used together in all fields.

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## **Impact of COVID-19 in Europe**

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**Abstract.** *The COVID-19 pandemic had profound effects on several industries. In this background paper, we attempted to justify how much this anomaly conducted to the increase of socio-economic inequality at the European level. The research takes into account 27 European countries simultaneously with 9 indicators that were the basis for the creation of the unequaled indicator. The composite index was calculated adopting the approach of the researcher A.A. Davidescu (Davidescu, 2017, pp. 227-240). Regarding the statistical methods and techniques used, we can mention: descriptive statistics, principal components analysis, cluster analysis, self-organizing maps and forecasts. The results determined a moderately increase in socio-economic disparities throughout Europe.*

**Keywords:** COVID-19, cluster analysis, principal component analysis, composite index, self-organizing maps.

**JEL Classification:** I10, I13, I18.

## Introduction

One of the most significant problems at the European level, but also worldwide, is that of economic inequality and the social problems it produces. The current paper demonstrated the fact that socio-economic inequalities are widespread in Europe and that their effects are inevitable in the period in which we live.

The most used method of measuring inequality is the Gini coefficient, this name comes from the Italian statistician Corrado Gini. According to the author Ha-Joon Chang, in his book entitled "Economy. User's Guide" he suggests another formula for calculating this indicator, namely the one given by Gabriel Parma, known as the Parma report (Chang, 2014, pp. 162-163). This ratio is much more efficient because it eliminates the vulnerability of the Gini coefficient regarding changes in the middle of distributions, where interventions are much more difficult.

The relation between income inequality and economic growth also has a long history in specialized literature. Kuznets stated that: "Inequality within nations increases in the early stages of economic growth, becomes more pronounced at intermediate levels of development, and then decreases as countries become richer." (Kuznets, 1955, pp. 1-28). In his opinion, only economic development and income redistribution can reduce inequality. His famous inverted U shape was considered one of the most important statements ever made about inequality and development.

In 2009, two epidemiologists, Wilkinson and Pickett, published a book entitled "The spirit level, why more equal societies almost always do better" in which they claim that inequality and its acute perception by the average EU citizen is a toxic element of today's European societies and one that seems to be associated with decreased levels of trust, civic engagement and participation, as well as to a host of other social challenges from poor health to crime, to underage pregnancies (Pickett and Wilkinson, 2009, pp. 102-107).

The outbreak of COVID-19 pandemic has caused profound consequences on world economy. In order to explore the long-term impact of the pandemic on economic growth and the effects of different policy responses.

The economies of many low-income countries have been hit hard by infectious diseases. Zhang et al. (2020, pp. 4-113) illustrate that pandemic leads to unpredictable socioeconomic and long-term effects in low- and middle-income countries, and people or countries with lower socio-economic status are worse off in these situations.

## Materials and methods

Principal component analysis (PCA) is a technique used to identify a smaller number of uncorrelated variables known as principal components in a larger data set. Principal component analysis additionally has the role of making all these changes involving minimal information loss. It is a method of extracting the essence from our observations and rendering the information in a clearer and easier form.

Principal component analysis can include the following defining characteristics and functions for example: elimination of information redundancies, dimensionality reduction, data compression and restoration, simplifying mathematical models, selection of influencing variables.

The algorithm proposed by I. Georgescu (Georgescu, 2015, pp. 106-107) for determining the principal components and their number is consist of the following 7 steps listed below:

1. Calculation of the covariance matrix denoted by  $\Sigma$  of the data in the table;
2. Determination of the n eigenvalues of the covariance matrix according to the formula:  

$$|\Sigma - \lambda I| = 0$$
3. The eigenvalues calculated in the previous step are ordered in descending order;
4. For each eigenvalue, the attached eigenvector will have to be calculated and determined;
5. Determining the form of the new variables, i.e. the principal components according to the formula:  

$$w_j = (\alpha^j)X$$
6. Deciding the number of main components according to a predetermined criterion;
7. Calculation of the matrix of principal scores.

### Cluster analysis

The clustering term was first used by R.C. Tyron in 1939. Cluster analysis or clustering has the function of grouping a set of objects so that the objects in the same group (called cluster) are very similar to each other, and the objects belonging to another cluster are as different as possible. It is an exploratory and multidimensional analysis because it deals with the grouping into classes or clusters of objects that are very similar to each other. For this type of analysis, at least three elements are needed, among which we list: a measure of similarity, a criterion based on which the formation of clusters results and an algorithm for their creation. There are two major classifications of clustering methods, these being: non-hierarchical clustering methods and hierarchical clustering methods.

Hierarchical clustering methods are also divided into two categories, specifically: aggregation and disaggregation. Regardless of what type it is, whether it is aggregation or disaggregation, these hierarchical methods deal with the formation of several cluster solutions which are called cluster solutions. Their most significant characteristic is that the number of clusters is not known a priori. Aggregation methods aim to produce ever larger classes, while disaggregation methods have the role of forming classes as small and narrow as possible. As examples of hierarchical aggregation methods we can mention: simple, average and complete aggregation, centroid and Ward.

A non-hierarchical clustering method generates a classification by dividing a data set into a set of (generally) non-overlapping groups that do not have hierarchical relationships between them. A systematic evaluation of all possible partitions is quite impossible and many different heuristics have thus been described to allow the identification of a good but very likely suboptimal partition. Non-hierarchical methods are generally much less demanding in terms of computational resources than hierarchical ones. Among the most well-known partitioning methods, we can mention: the k-means algorithm and the k-medoids algorithm.

### **Artificial neural networks**

Artificial neural networks (ANNs) are one of the main instruments used in support vector machine learning. As the "neuronal" part of the name suggests, these systems are inspired by the human brain, which aims to reproduce the way people learn. Neural networks consist of input and output layers, as well as (in most cases) a hidden layer consisting of units that transform the input into something the output layer can use. They are used to find patterns that are complex or numerous.

Even though neural networks were discovered in the 1940s, only in recent decades they have become an important part of artificial intelligence. There are several types of neural networks, each of which has its own use cases and different levels of complexity. The most basic type of a neural network is the "feedforward" type, i.e. direct in which the information moves in one direction, from the input to the output. A more widely used type of neural networks is the "feedback" type, i.e. recurrent in which the data propagates in several directions. These neural networks possess higher learning capabilities and are widely used for complex tasks such as handwriting and language learning and recognition.

In the same manner that we learn from our experiences, neural networks need data in order to learn. When researchers prepare to create a neural network, they usually divide the data into three sets. The first set is the training set, which helps the neural network to establish the differences between the levels of its nodes. After that, they will adjust using the validation data set. Ultimately, a test set is used to see if the inputs can be transformed into the desired output or outputs.

On a technical level, one of the biggest provocations is the length of time required to form networks, which leads to a considerably large amount of resources for complex tasks. The biggest dilemma remains the fact that neural networks are "black boxes" in which the user receives data and receives answers. They can adjust the responses, but do not have direct access to the decision-making process.

Due to their capabilities to reproduce and model nonlinear processes, ANNs can be applied in a wide range of disciplines. Areas of application include system identification and control (trajectory prediction, process control), quantum chemistry, game theory and decision making (backgammon, chess, poker), face identification, signal classification, medical diagnosis, data mining. Neural networks have been used to diagnose different types of cancer such as lung, prostate, colorectal and also to distinguish cancer cell lines using only information about the shape of the cell.

### **Self-organizing map**

The one who first defined and used the concept of self-organizing map was the researcher from Finland, Teuvo Kohonen, in 1981. A self-organizing map (SOM) is a type of artificial neural network (ANN) that uses learning unsupervised to plot the results in a map, which is usually two-dimensional. SOM is a clustering technique that aids discover categories in a large data set, in particular finding customer profiles based on a list of past purchases. The artificial neural network introduced by the Finnish professor Teuvo Kohonen in the

1980s is also called the Kohonen map or network (Kohonen and Honkela, 2007, pp. 110-112). Teuvo Kohonen wrote that: “SOM is an efficient software tool for large-scale data visualization that transforms the complex and non-linear static relationships between large-scale data into simple geometric relationships on a small-scale display.

The most common advantages of using maps with auto-organization are the fact that the maps can be viewed and, at the same time, can be interpreted very easily. Further, self-organizing maps are capable of organizing large and complex data sets. An additional strength of this neural network is the fact that we do not have to choose the number of clusters and the fact that they are much faster than other clustering methods.

The main disadvantage is determined by the difficulty of finding the input weights that should be used and the fact that a large data set is needed for a correct clustering. At the same time, maps can lead to divided clusters, and we can also say that in the case of some maps, different similarities can be found between them. So it is quite difficult to draw up a perfect mapping when dealing with unique groups. Another weakness is that it requires nearby points to behave similarly.

SOM-Ward clustering aims to cluster data on two levels, which uses the Ward clustering algorithm to determine self-organizing maps and to classify the results. It is desired to obtain as little variability within the cluster as possible and as much variability as possible between different clusters.

Ward's classical clustering method belongs to hierarchical agglomerative clustering, algorithms that are characterized as follows: starting with clustering, where each cluster forms a cluster by itself, in each step of the algorithm the distance between the two clusters that is minimal (depending on the distance measure that is characterized by a specific algorithm) are combined. This minimum distance is referred to as the Ward distance. The Ward distance formula is as follows:

$$d_{ij} = \frac{n_i \times n_j}{n_i + n_j} \times \left\| \bar{x}_i - \bar{x}_j \right\|^2$$

where  $i$  and  $j$  are two different clusters,  $n_i$  and  $n_j$  are the data points and  $\bar{x}_i$  and  $\bar{x}_j$  are the centroids of the clusters.

Agglomerative clustering algorithms broadly include a series of steps including:

1. The initialization that refers to assigning each vector to its own cluster.
2. Calculation of distances between clusters.
3. Connecting the two clusters that have the smallest distance between them, that is, the clusters that are the closest.
4. Repeat step number two until there is only one cluster left. It is worth mentioning that this method leads to choosing the optimal number of clusters in an easy-to-use manner.

Maps with self-organization are applicable in the vast majority of fields, since it is found in engineering, in process monitoring, also in the area of medicine, in the area of the financial field for credit analysis and last but not least at the macroeconomic level. To demonstrate this, researchers Kaski and Kohonen conducted a study in which they grouped various countries from all over the world, based on 39 indicators. These indicators included

life expectancy, the number of people who were illiterate and the mortality rate. What resulted from the study was a map where the prosperity of the countries decreased from left to right.

### **Composite index**

The composite index is used in the evaluation of the state of well-being at the level of a country and is known to be a very useful tool in studies at the macroeconomic level. Due to the fact that in order to build a thorough analysis and to draw the most truthful conclusions, we need a multitude of indicators from a fairly long period of time, which leads to many difficulties in the study of the phenomenon, we have reached the use of these types of indices. So, the composite index mainly has the role of synthesizing and completing in a single index the multitude of indicators from the first instance.

As a first strength if we choose this method would be the large amount of information that we can extract and retain from the multitude of initial indicators. As another strength, we can mention the fact that it allows us to make comparisons much easier and at the same time much faster than in the previous case. Finally yet importantly, it is also used in the fact that it can indicate many problems related to the respective country and can indicate in some cases the changes that need to be made. The major disadvantage may be the fact that the index was not constructed correctly and truthfully, which ultimately leads to completely erroneous conclusions and a wrong analysis.

In order to build this composite index, we used the approach of researcher A.A. Davidescu (Davidescu, 2017). The biggest difficulty in building this index involves the aggregation of data and information. Because in the present moment we are dealing with different weights, we cannot use the classic approach which implies that they should be equal. In order to be able to calculate the index, we will use the analysis of the principal components and also the proportion of their variance in its total. It is a fairly truthful method because this weighting is objective, it is not left to the researcher's choice by the simple fact that statistical techniques are used. In the formula we will use, they will take into account the fact that the collected data are correlated.

The composite index has the role of highlighting the level of economic-social inequality at which each country is. The evolution of this index will be visible with the support of graphs for each individual cluster.

### **Forecasting**

Forecasting is the inference of the value of a variable generically called  $y$ , carried out at a time  $T$  for a time horizon  $h$ . Forecasting ultimately consists in estimating future values of a variable based on past values that have already been observed.

There are several forecasting models, among which: univariate models and multivariate models.

In the case of univariate models the forecast is based on the behavior of previous periods. Regarding the multivariate models, the forecast is based on the historical evolution, as well

as on a series of other variables. For chronological series, a multitude of forecasting methods and techniques are known, among which: Simple moving average method, weighted moving average method, exponential smoothing, simple average method, Kalman filter, autoregressive and/or moving average models (ARMA, ARIMA, SARIMA, ARIMA), linear prediction, trend estimation, extrapolation, regression.

The simple moving average method requires calculating the average of a specific number of observations for which the same weight will be taken. The weighted moving average method also involves calculating the average of a specific number of observations, but this time the weights differ, they are no longer equal. The exponential smoothing method for forecasting future values assumes that more recent observations have greater relevance than those observed that are more distant. In other words, a greater weight is given to recent observations, and the weights decrease exponentially as the observations move away in time. The simple average method is the easiest of all because it involves calculating the average of past values. The Kalman filter, also known as quadratic linear estimation, is an algorithm that uses a series of measures used for observations over time, which contains statistical "noise" and produces estimates of unknown variables that tend to be more accurate than those that are simply based on their measurement. ARMA assumes that the forecasts depend on the previous values of the variable being forecast and on the previous prediction errors. ARIMA assumes ARMA that presents the period change up to a forecast period. Linear prediction is the mathematical operation in which future values that are discrete are estimated as a linear function of previous samples. Estimating the trend involves specifying the variable as a linear or polynomial function based on time. Extrapolation represents the process of estimating outside the initial range that was observed, the value of a variable based on its relationship with another variable. Regression involves a set of processes and statistical techniques that help to estimate the relationships between variables.

## **Empirical results**

### **Descriptive statistics**

In the already stated paper, we submitted to analyze the economic-social inequality at the European level, which includes 27 countries and for the period 2020-2022. We wanted to make a clustering based on the existing inequality in the countries, and for this we will use SOM. After that we will turn our attention to building a composite index for much easier and effortless comparison between countries.

Since the phenomenon of economic-social inequality is a complex phenomenon that requires a thorough analysis in which a multitude of indicators must be included, we tried to include as wide a sphere as possible. For this reason, we took into account in the database used for this study the most relevant indicators that are specified and recommended by the methodology of the National Institute of Statistics, among which: gross domestic product, at-risk-of-poverty rate, S80/S20, GINI coefficient, school enrollment, life expectancy, population, unemployment rate and population infection rate.

Gross Domestic Product (GPD) measures the monetary value of the final goods and services – that is, those purchased by the final user – produced by a country in a given period. The Gross Domestic Product also consists of a series of goods and services produced for sale on the market, but also includes a series of non-market products, such as defense or education services provided by the Government. An alternative concept is the notion of gross national product (GNP) which measures all the output produced by the inhabitants of a country.

At-risk-of-poverty rate is defined as the ratio of the number of people (in a certain age group) whose incomes are below the poverty line; it is taken as half of the average household income of the total population. It is also available by age group: child poverty (0-17 years old), working-age poverty and elderly poverty (people aged 66 and over).

The S80/S20 indicator is calculated as the ratio between the average income received by 20% of the population with the highest salary and 20% of the population with the lowest salary.

The GINI coefficient measures the distribution of income (or, in some cases, consumption expenditure) among individuals or households in an economy that deviates from a perfectly equal distribution. The coefficient ranges from 0 (or 0%) to 1 (or 100%), where 0 represents perfect equality and 1 represents perfect inequality. Values above 1 are theoretically possible due to negative income or wealth.

School enrollment (SE) rate represents the number of children enrolled at a level (in this case primary), regardless of age, divided by the age group that officially corresponds to the same level.

Life expectancy (LE) is a statistical measure of the average time an organism is expected to live, based on the year of birth, its current age and other demographic factors, including gender.

The population (P) is defined as the totality of elements, individuals or units that meet certain selection criteria for a group to be studied and from which a representative sample is taken for a detailed examination. The total tutor of populations is called the universe. The population in this case denotes the number of inhabitants of a certain geographical area.

The unemployment rate (UR) is defined as the percentage of unemployed people in the total labor force. People are considered unemployed if they are not currently working, despite being able and willing to do so.

Population infection rate (PIR) is the probability or risk of an infection in a population and is calculated as the ratio between the total number of infected people and the total number of the population.

Descriptive statistics can be found in the table below:

Ind	vars	n	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis	se
GDP	1	81	0,00	1,00	0,18	0,04	0,95	-2,33	2,34	4,66	-0,35	-0,50	0,11
RPR	2	81	0,00	1,00	-0,32	-0,07	0,88	-1,72	2,49	4,20	0,58	-0,43	0,11
S80/S20	3	81	0,00	1,00	-0,07	-0,07	0,89	-1,36	4,37	5,73	1,76	5,98	0,11



Ind	vars	n	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis	se
GINI	4	81	0,00	1,00	0,10	0,09	0,92	-4,13	1,73	5,86	-1,50	4,08	0,11
SE	5	81	0,00	1,00	0,29	0,13	0,77	-2,59	1,09	3,68	-0,99	-0,15	0,11
LE	6	81	0,00	1,00	0,46	0,09	0,65	-2,27	1,31	3,58	-0,73	-0,91	0,11
P	7	81	0,00	1,00	-0,35	-0,22	0,41	-0,73	3,03	3,76	1,77	1,95	0,11
UR	8	81	0,00	1,00	-0,15	-0,16	0,68	-1,36	4,03	5,39	1,81	3,88	0,11
PIR	9	81	0,00	1,00	0,22	0,02	1,19	-1,75	1,98	3,73	-0,24	-1,16	0,11

The explanation for each value from the table:

- **vars**: column number
- **n**: Number of valid cases
- **mean**: The mean value
- **median**: The median value
- **trimmed**: The trimmed mean (default trims 10% of observations from each end)
- **mad**: The median absolute deviation (from the median)
- **min**: The minimum value
- **max**: The maximum value
- **range**: The range of values (max – min)
- **skew**: The skewness
- **kurtosis**: The kurtosis
- **se**: The standard error

Histograms can be seen in the following graphs:

Figure 1. GDP Histogram

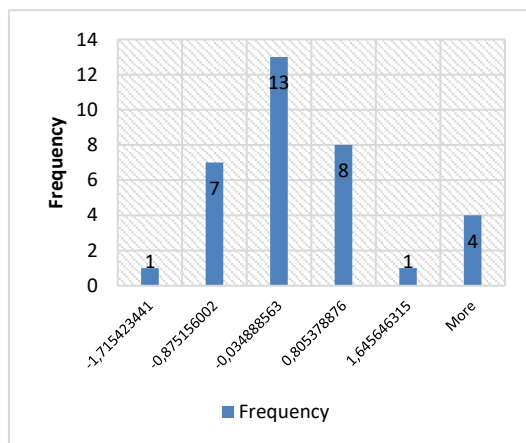


Figure 2. RPR Histogram

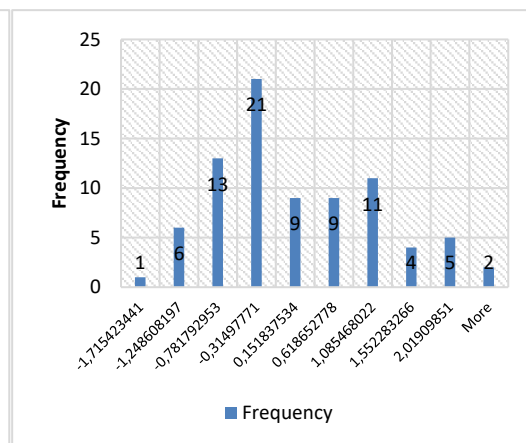


Figure 3. *S80/S20 Histogram*

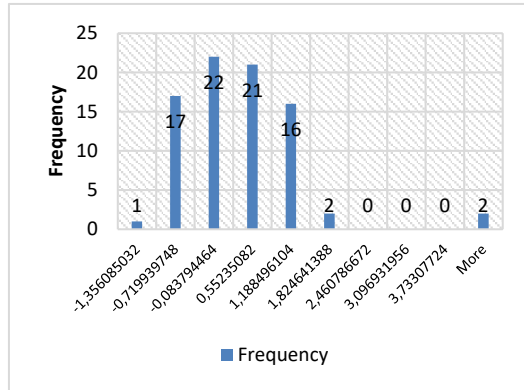


Figure 4. *Gini Histogram*

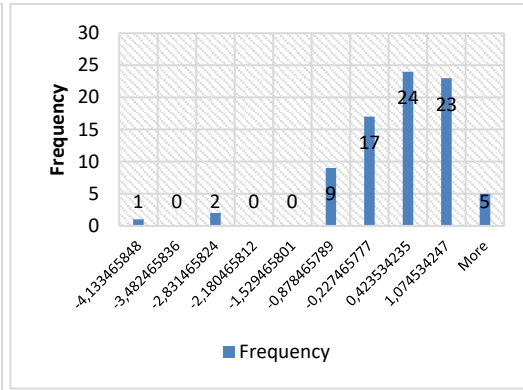


Figure 5. *SE Histogram*

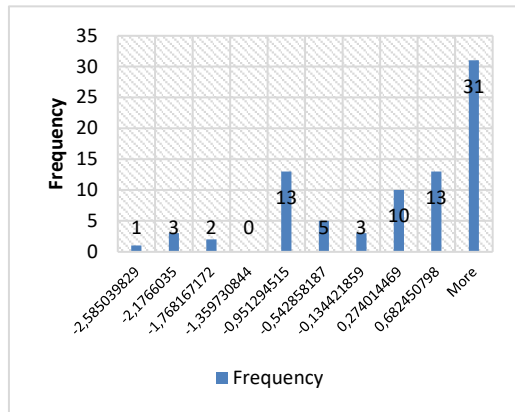


Figure 6. *LE Histogram*

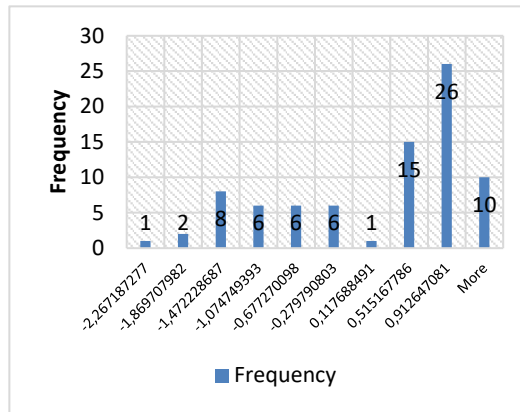


Figure 7. *P Histogram*

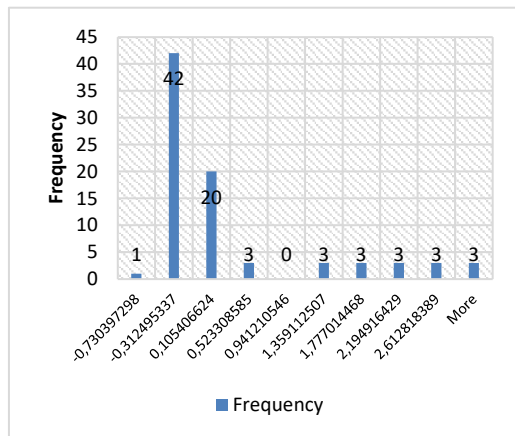
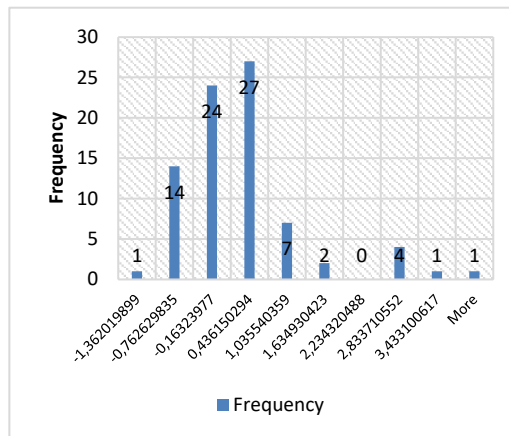
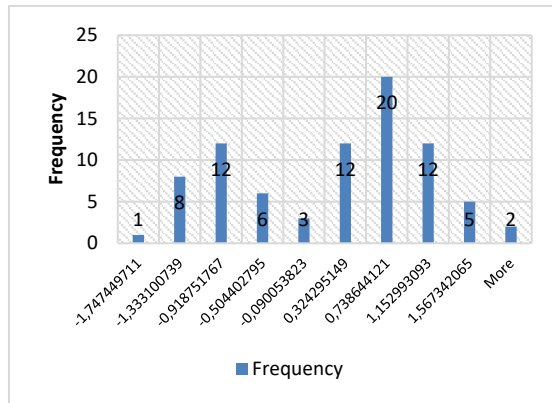


Figure 8. *UR Histogram*



**Figure 9. PIR Histogram**

From the analysis of the histograms and the table that includes the descriptive statistics, we came to the conclusion that Gross domestic product, school enrollment, life expectancy and population infection rate they have a negative asymmetric distribution, on the left and platykurtic. At-risk-of-poverty rate and population have a positive asymmetric distribution, to the right and platykurtic. S80/S20 and unemployment rate have a positive asymmetric distribution, to the right and leptokurtic. The Gini indicator has a negative asymmetric distribution, on left and leptokurtic.

### SOM – Ward clustering

We chose this type of method because it is a modern one as it uses computational intelligence techniques. By mean of this we can find out which is the number of the most performing clusters in a very safe and simple way and at the same time both significant elements, both the Ward distance and the topologies related to SOM can be found.

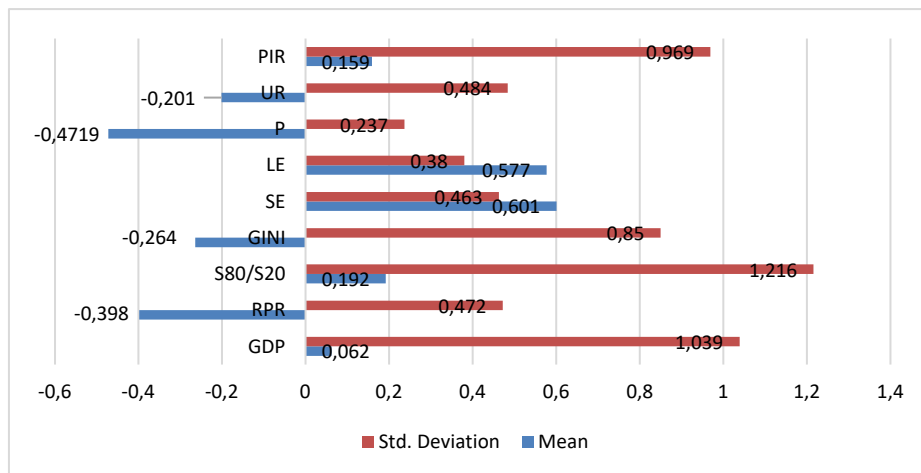
Since the collected data were measured differently and do not have a common denominator, we chose to use normalization, more precisely Z-score normalization. This type of standardization implies that the mean is equal to 0 and the standard deviation is equal to 1. All variables included in the analysis were standardized for the following processing. In order to harmonize the data as much as possible, it is recommended that the voltage parameter have values between 0.3 and 2. In the present case, we chose 0.5. Due to the fact that the size of the map influences the purpose for which the analysis is carried out, it is desirable that our map has a size as large as possible, that is why we chose it to contain 1000 neurons or nodes, which led to the formation of 4 clusters.

### Cluster 1

This cluster includes countries as: Belgium (2020-2022), Cyprus (2020-2022), Denmark (2020-2022), Estonia (2020), Finland (2020-2022), Croatia (2020), Ireland (2020-2022), Luxembourg (2020-2022), Malta (2020-2022), Netherlands (2020-2022), Portugal (2020-2022), Slovenia (2022-2022), Sweden (2022-2022). Although positive values can be

observed for indicators like life expectancy, school enrollment and gross domestic product, negative values are also visible for indicators for instance infection rate population, unemployment rate, population.

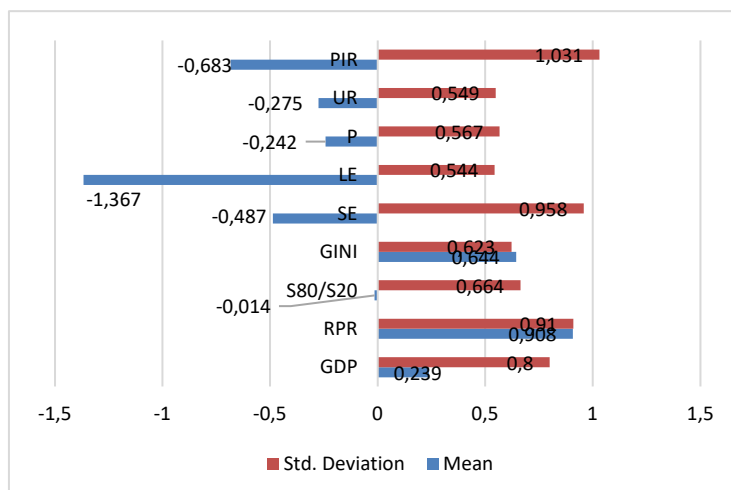
**Figure 10.** Cluster 1



## Cluster 2

The second cluster consists of the following countries: Bulgaria (2020-2022), Estonia (2021-2022), Croatia (2021-2022), Hungary (2020-2022), Lithuania (2020-2022), Latvia (2020-2022), Poland (2020-2022), Romania (2020-2022). In present cluster we can find negative values for the indicators as population, life expectancy, school enrollment which is not favorable. Positive values are for the indicators equally to gini, S80/S20, at-risk-of-poverty rate, gross domestic product.

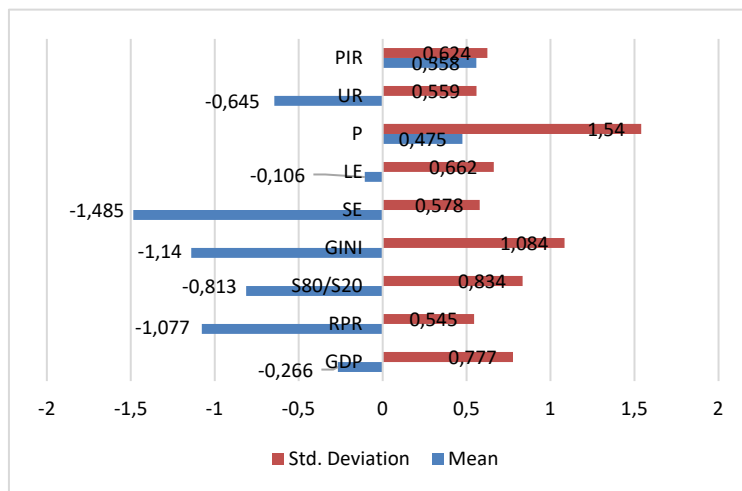
**Figure 11.** Cluster 2



### Cluster 3

The countries found in this cluster are: Austria (2020-2022), Czech Republic (2020-2022), Germany (2020-2022) and Slovakia (2020-2022). Negative values are found for unemployment rate and at-risk-of-poverty rate which is useful. Gross domestic product is negative which is not advantageous. Overall, we can say that it is a pleasing cluster.

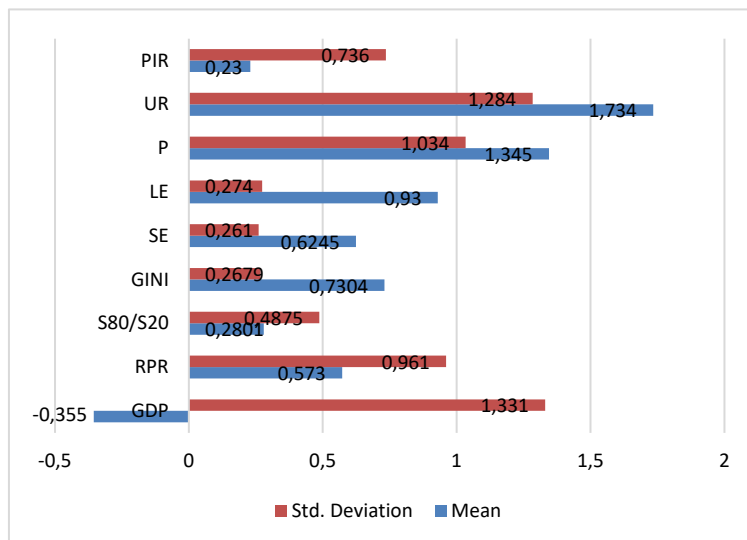
Figure 12. Cluster 3



### Cluster 4

The last countries are found in this cluster: Spain (2020-2022), France (2020-2022), Greece (2020-2022) and Italy (2020-2022). All indicators have positive values except for gross domestic product.

Figure 13. Cluster 4



### Principal components analysis and composite index

For the optimal choice of the number of principal components that we should use in the analysis, we used a series of three criteria, namely: Kaiser's criterion, the coverage percentage criterion and the slope criterion. Kaiser's criterion says that the principal components whose variance or eigenvalue is greater than or equal to 1 are retained in the analysis. This criterion has the disadvantage that it can only be applied to standardized data. The coverage price criterion is based on the calculation of a  $p_k$  measure, which usually must be in the proportion of 70-75%.

#### Cluster 1

The result of the analysis of the principal components can be found in the tables below:

**Table 1. PCA Cluster 1**

Indicator	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9
Standard deviation	1.3848	1.0081	0.9180	0.8305	0.52746	0.45422	0.26748	0.21417	0.15489
Proportion of Variance	0.3766	0.1996	0.1655	0.1354	0.05464	0.04052	0.01405	0.00901	0.00471
Cumulative Proportion	0.3766	0.5762	0.7416	0.8771	0.93171	0.97223	0.98628	0.99529	1.00000
GDP	0.41689733	0.768814880	-0.27926911	-0.31717891	0.1744949	-0.032316417	0.144297099	-0.04523924	0.04653550
RPR	-0.01271502	0.186507741	0.04497866	0.33684769	0.4688555	-0.161926643	-0.734828972	-0.18394919	-0.17235738
S80/S20	0.80985105	-0.103735525	0.34626238	0.36651555	-0.2199151	0.119435148	-0.050082091	0.01970406	0.11672648
GINI	-0.26730652	0.381840470	-0.33016487	0.63947349	-0.4615639	0.136419837	0.021551913	-0.04963982	0.17386679
SE	0.03777722	-0.072271657	-0.09166228	-0.34571672	-0.4428483	-0.447886916	-0.439988123	-0.17238562	0.49538265
LE	0.11546650	0.029754112	-0.16621699	-0.11532732	-0.4588127	-0.163609558	-0.211238204	0.29855654	-0.75750837
P	0.02824948	-0.046772418	0.04682279	-0.03733084	-0.1533003	0.002920377	0.178819455	-0.91407021	-0.32002825
UR	0.02564291	-0.001827523	0.05042422	0.31227006	0.1283000	-0.843565149	0.407404603	0.06025783	-0.04014148
PIR	-0.28724245	0.457466765	0.80642059	-0.10461622	-0.2042951	-0.029644880	-0.008123554	0.05705774	-0.03194251

Using the data in the table we created a representative index for this cluster. This index is built based on the weights that signify the total variance in the component it explains. The result was a vector denoted by WC, which has the weights of the three principal components chosen previously. It is obtained in the following way:

$$WC = \frac{0.3766}{0.7416}WC_1 + \frac{0.1996}{0.7416}WC_2 + \frac{0.1655}{0.7416}WC_3 = 0.5078WC_1 + 0.2691WC_2 + 0.2231WC_3$$

WC has the following form (0.5078; 0.2691; 0.2231).

The next step was to calculate the WC coefficients for each variable in this cluster. They were calculated in the following way:

$$GDP = 0.5078 \times 0.4168 + 0.2691 \times 0.7688 + 0.2231 \times (-0.2792) = 0.356246$$

$$RPR = 0.5078 \times (-0.0127) + 0.2691 \times 0.1865 + 0.2231 \times 0.0449 = 0.053755$$

$$S80/S20 = 0.5078 \times 0.8098 + 0.2691 \times (-0.1037) + 0.2231 \times 0.3462 = 0.460548$$

$$Gini = 0.5078 \times (-0.2673) + 0.2691 \times 0.3818 + 0.2231 \times (-0.3301) = -0.10664$$

$$SE = 0.5078 \times 0.0377 + 0.2691 \times (-0.0722) + 0.2231 \times (-0.0916) = -0.02072$$

$$LE = 0.5078 \times 0.1154 + 0.2691 \times 0.0297 + 0.2231 \times (-0.1662) = 0.029513$$

$$P = 0.5078 \times 0.0282 + 0.2691 \times (-0.0467) + 0.2231 \times 0.0468 = 0.012194$$

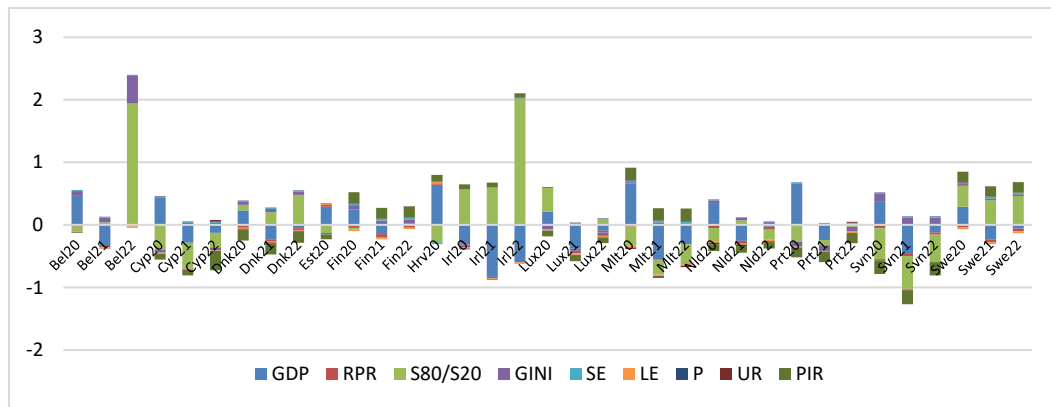
$$UR = 0.5078 \times 0.0254 + 0.2691 \times (-0.0018) + 0.2231 \times 0.0504 = 0.02376$$

$$PIR = 0.5078 \times (-0.2872) + 0.2691 \times 0.4574 + 0.2231 \times 0.8064 = 0.157154$$

The composite index, denoted by CI, was calculated using the previous results. We took into account the fact that the data are correlated and therefore we took with the opposite sign those results that should be as large values to obtain a reduced level of disparity. These variables are: gross domestic product, school enrollment, life expectancy, population and population infection rate. The formula for CI is:

$$CI = (-0.356246) \times GDP + 0.0535755 \times RPR + 0.40548 \times S80/S20 + (-0.10664) \times Gini + 0.02072 \times SE + (-0.029513) \times LE + (-0.012194) \times P + 0.02376 \times UR + (-0.157154) \times PIR.$$

**Figure 14.** *CI Cluster 1*

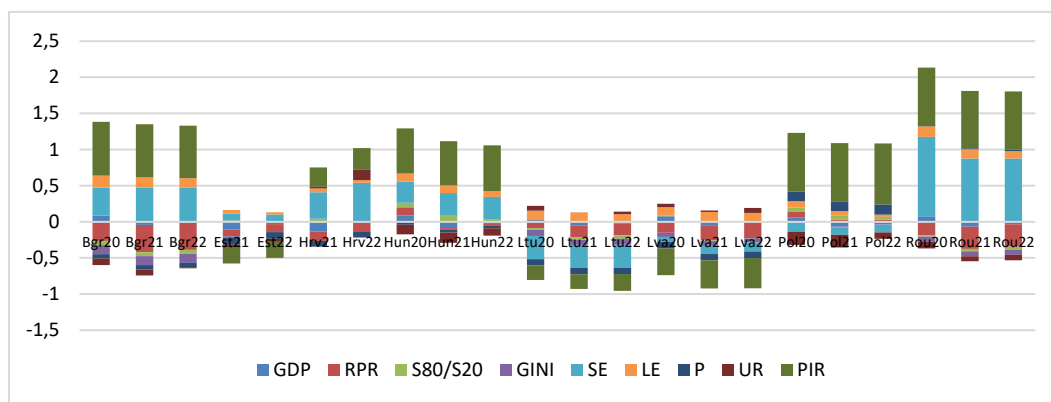


Regarding the COVID-19 infection rate, we can say that its value has increased from year to year. Nevertheless, this cluster does not present a very high socio-economic inequality because the values are approximately equal. Mostly, the negative values of school enrollment is also explained by the COVID-19 phenomenon. The highest value for virus infection is given by Ireland in 2022.

For the following 3 clusters, the obtained results will be presented in the Notes section.

**Cluster 2**

**Figure 15.** *CI Cluster 2*







Cluster 4 presented an obvious inequality. Notwithstanding, in this cluster we observed more negative values than positive ones for the analyzed indicators. Moreover, the values for COVID-19 are similar (3).

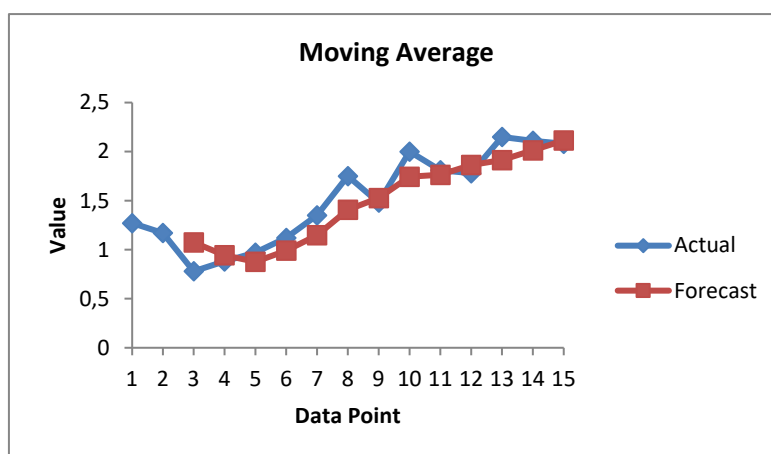
### Forecasting

The forecast was made for Romania. To forecast what the trend is and how Romania will be in 2023, I used the Excel software package. The values for the previous years were used from an older analysis. We used them in the forecast to be able to provide as much accuracy as possible in the final result. Analyzing the various values we justified the fact that this virus has significantly increased economic inequality. We calculated for Romania each composite index with the formula from the corresponding cluster, and after that we applied the simple moving average method. We chose this type of method because it is among the easiest and most accessible methods, and the results obtained are very efficient. We obtained each value for each year, along with the related graphic.

**Table 2.** *Forecasting*

Year	CI
2008	1,27
2009	1,17
2010	0,78
2011	0,88
2012	0,97
2013	1,12
2014	1,35
2015	1,75
2016	1,48
2017	2
2018	1,81
2019	1,78
2020	2,15
2021	2,11
2022	2,08
2023	2,1

**Figure 18.** *Moving average forecasting*



As we saw from the graph, the simple moving average prediction estimates the model and the trend very correctly of inequality in Romania. The composite index for 2018 reached 2.1 which indicates that we will not have an improved economic and social period. This is due to the fact that the measures taken by the authorities are not optimal at all, not even economically correct.

## Conclusion

In the current paper we have studied the case of economic-social disparities at the European level using a series of 9 indicators, for the period 2020 - 2022. We felt a need to justify if and how much the infection with the new virus led to these disparities. For this we have used various computational methods, first presenting the theoretical part, then presenting the real part and the analysis concrete on real data.

The first step taken was the grouping of countries into clusters that would help us classify countries more easily into countries with low, medium or high economic-social inequality. Here we were able to identify our country as part of a cluster, which unfortunately presents a significant and disturbing inequality.

The next step was the construction of the composite index to be able to compare the countries even among themselves, without the help of those clusters. The composite index was constructed for each cluster type separately. This index was constructed based on principal component analysis.

The last step consisted in creating a forecast for our country for the year 2023. This forecast is a gloomy one because we have noticed that the situation has not changed at all and we realize that we will be in an economic impasse and in a large inequality again.

## Notes

### Cluster 2

**Table 3.** PCA cluster 2 (1)

Indicator	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9
Standard deviation	1.3682	1.3442	0.8781	0.64059	0.40453	0.2638	0.24355	0.18443	0.09601
Proportion of Variance	0.3603	0.3477	0.1484	0.07897	0.03149	0.0134	0.01142	0.00655	0.00177
Cumulative Proportion	0.3603	0.7080	0.8564	0.93537	0.96687	0.9803	0.99168	0.99823	1.00000
GDP	0.099829423	0.05676501	-0.83753599	0.39017293	-0.23159662	0.06143258	-0.047842806	-0.25465105	0.09253822
RPR	-0.574860514	0.28574357	-0.21208563	0.15507012	0.06918412	-0.12239635	-0.199041116	0.61425955	-0.28663475
S80/S20	-0.374968225	0.25756767	0.07803812	0.18323516	0.32005568	-0.10797432	0.396154346	-0.59012823	-0.36620892
GINI	-0.342559345	0.20762375	0.21732356	0.33649246	-0.01797254	0.07686145	0.144704956	0.01385819	0.80729579
SE	0.508485806	0.33809176	0.28636854	0.62049069	0.06610529	0.24923414	0.009174936	0.19673830	-0.23418541
LE	0.241009338	-0.10003032	-0.31403629	-0.07968934	0.65821598	-0.08879093	0.494073532	0.33350287	0.17456897
P	0.049913910	-0.32766869	0.08936330	0.36365949	0.38267795	-0.55370875	-0.518615443	-0.14294569	0.08646719
UR	-0.005922599	0.32318784	-0.10249429	-0.26833333	0.49252275	0.50544979	-0.514961883	-0.19277021	0.11226060
PIR	0.287143885	0.68523745	-0.03342245	-0.28514201	-0.11035691	-0.57585127	-0.043305397	-0.04325189	0.13433384

$$WC = \frac{0.3603}{0.7080} WC_1 + \frac{0.3477}{0.7416} WC_2 = 0.5088 WC_1 + 0.4911 WC_2$$

WC has the following form (0.5088; 0.4911).

$$\text{GDP} = 0.5088 \times 0.0998 + 0.4911 \times 0.0567 = 0.078624$$

$$\text{RPR} = 0.5088 \times (-0.5748) + 0.4911 \times 0.2857 = -0.15215$$

$$\text{S80/S20} = 0.5088 \times (-0.3749) + 0.4911 \times 0.2575 = -0.06429$$

$$\text{Gini} = 0.5088 \times (-0.3425) + 0.4911 \times 0.2076 = -0.07231$$

$$\text{SE} = 0.5088 \times 0.5084 + 0.4911 \times 0.3380 = 0.424666$$

$$\text{LE} = 0.5088 \times 0.2410 + 0.4911 \times (-0.1000) = 0.073511$$

$$\text{P} = 0.5088 \times 0.0499 + 0.4911 \times (-0.3276) = -0.1355$$

$$\text{UR} = 0.5088 \times (-0.0059) + 0.4911 \times 0.3231 = 0.155672$$

$$\text{PIR} = 0.5088 \times 0.2871 + 0.4911 \times 0.6852 = 0.482578$$

$$\text{CI} = (-0.07862) \times \text{GDP} + (-0.15215) \times \text{RPR} + (-0.06429) \times \text{S80/S20} + (-0.07231) \times \text{Gini} + (-0.424666) \times \text{SE} + (-0.073511) \times \text{LE} + 0.1355 \times \text{P} + 0.155672 \times \text{UR} + (-0.482578) \times \text{PIR}.$$

### Cluster 3

**Table 4.** PCA Cluster 3 (2)

Indicator	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9
Standard deviation	2.0675	0.9885	0.7954	0.69570	0.47279	0.13007	0.07939	0.04791	0.01955
Proportion of Variance	0.6459	0.1477	0.0956	0.07314	0.03378	0.00256	0.00095	0.00035	0.00006
Cumulative Proportion	0.6459	0.7936	0.8892	0.96231	0.99609	0.99864	0.99960	0.99994	1.00000
GDP	0.004415023	0.044551526	-0.927912058	0.336884336	-0.091370485	-0.091180212	-0.03380180	-0.074708802	-0.009872340
RPR	-0.233011856	0.008263907	-0.126144084	-0.319445681	0.041451554	0.175239062	-0.85837733	0.241717987	-0.003621892
S80/S20	-0.397141915	0.036398224	-0.101021271	-0.067979879	0.203431443	-0.178229672	0.32342995	0.721587607	0.357324963
GINI	0.418189524	0.567763131	-0.041655652	-0.009071323	0.704181489	-0.004148351	-0.06326012	0.008063842	0.031455060
SE	-0.147623177	0.355642251	0.167551482	0.421797918	-0.220651192	0.346334414	-0.12559527	-0.158950455	0.660352262
LE	-0.140522712	0.577103048	0.005663349	0.005700547	-0.342242589	0.353404739	0.17517922	0.271651212	-0.548300858
P	-0.735287208	0.175138178	-0.023431612	-0.131595472	0.312100107	-0.101922719	0.09975710	-0.528093285	-0.119097516
UR	0.123191301	-0.092526357	-0.284817712	-0.612512886	-0.001947002	0.577686119	0.31006107	-0.149693868	0.260189259
PIR	0.125376214	0.418931042	-0.036751201	-0.457519907	-0.435258631	-0.583303083	-0.02976139	-0.122011921	0.229428113

$$\text{WC} = \frac{0.6459}{0.7936} \text{WC}_1 + \frac{0.1477}{0.7936} \text{WC}_2 = 0.8138 \text{WC}_1 + 0.1861 \text{WC}_2$$

WC has the following form (0.8138; 0.1861).

$$\text{GDP} = 0.8138 \times 0.0044 + 0.1861 \times 0.0444 = 0.011862$$

$$\text{RPR} = 0.8138 \times (-0.2330) + 0.1861 \times 0.0082 = -0.18809$$

$$\text{S80/S20} = 0.8138 \times (-0.3971) + 0.1861 \times 0.0363 = -0.3164$$

$$\text{Gini} = 0.8138 \times 0.4181 + 0.1861 \times 0.5677 = 0.445899$$

$$\text{SE} = 0.8138 \times (-0.1476) + 0.1861 \times 0.3556 = -0.05394$$

$$\text{LE} = 0.8138 \times (-0.1405) + 0.1861 \times 0.5771 = -0.00694$$

$$\text{P} = 0.8138 \times (-0.7352) + 0.1861 \times 0.1751 = -0.56572$$

$$\text{UR} = 0.8138 \times 0.1231 + 0.1861 \times (-0.0925) = 0.082965$$

$$\text{PIR} = 0.8138 \times 0.1253 + 0.1861 \times 0.4189 = 0.179926$$

$$\text{CI} = (-0.011862) \times \text{GDP} + (-0.18809) \times \text{RPR} + (-0.3164) \times \text{S80/S20} + 0.445899 \times \text{Gini} + (-0.424666) \times \text{SE} + 0.05394 \times \text{LE} + 0.56572 \times \text{P} + 0.082965 \times \text{UR} + (-0.179926) \times \text{PIR}.$$

#### Cluster 4

**Table 5.** PCA Cluster 4 (3)

Indicator	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9
Standard deviation	1.8032	1.3564	0.8707	0.65466	0.29261	0.18985	0.07700	0.03845	0.01841
Proportion of Variance	0.5075	0.2871	0.1183	0.06689	0.01336	0.00563	0.00093	0.00023	0.00005
Cumulative Proportion	0.5075	0.7946	0.9129	0.97980	0.99317	0.99879	0.99972	0.99995	1.00000
GDP	0.012017384	-0.980479689	0.01135526	0.0005469453	-0.07240951	-0.17276027	0.04848466	-0.02535446	0.01740865
RPR	0.480115242	-0.095509747	0.02499062	-0.5869155919	0.01825306	0.51053789	-0.14861437	-0.36314084	-0.01825332
S80/S20	0.105708781	-0.143398645	0.25151994	0.4131172189	0.57926045	0.61247928	0.11850887	0.09109918	-0.03629618
GINI	0.095366159	-0.005605049	0.16262474	-0.2180583042	0.11428123	-0.01773417	-0.07423388	0.46075013	0.82807101
SE	0.007477655	-0.013440587	-0.13247077	0.3278249561	0.21179549	-0.14539670	-0.75423448	-0.42303698	0.24681624
LE	0.046186451	-0.060040937	0.24263663	0.0128202816	-0.37419104	0.24001340	-0.59177432	0.52807216	-0.32945801
P	0.527190253	0.023778935	0.43550208	0.0053147591	-0.46305292	0.23515031	0.07305417	-0.41879591	0.28526144
UR	0.672609865	0.032172045	0.21024021	0.5486007481	-0.38940206	0.01913739	0.17064395	-0.06036909	0.12896981
PIR	0.128659198	-0.059639228	-0.77411459	0.1693810474	-0.30804640	0.44682327	0.04985183	0.10020583	0.21184099

$$\text{WC} = \frac{0.5075}{0.7946} \text{WC}_1 + \frac{0.2871}{0.7946} \text{WC}_2 = 0.6386 \text{WC}_1 + 0.3613 \text{WC}_2$$

WC has the following form (0.6386; 0.3613).

$$\text{GDP} = 0.6386 \times 0.0044 + 0.3613 \times 0.0444 = -0.34656$$

$$\text{RPR} = 0.6386 \times (-0.2330) + 0.3613 \times 0.0082 = -0.3411$$

$$\text{S80/S20} = 0.6386 \times (-0.3971) + 0.3613 \times 0.0363 = 0.015726$$

$$\text{Gini} = 0.6386 \times 0.4181 + 0.3613 \times 0.5677 = -0.06288$$

$$\text{SE} = 0.6386 \times (-0.1476) + 0.3613 \times 0.3556 = -0.00957$$

$$\text{LE} = 0.6386 \times (-0.1405) + 0.3613 \times 0.5771 = 0.007761$$

$$\text{P} = 0.6386 \times (-0.7352) + 0.3613 \times 0.1751 = 0.345169$$

$$\text{UR} = 0.6386 \times 0.1231 + 0.3613 \times (-0.0925) = -0.41792$$

$$\text{PIR} = 0.6386 \times 0.1253 + 0.3613 \times 0.4189 = 0.06059$$

$$\text{CI} = 0.34656 \times \text{GDP} + (-0.3411) \times \text{RPR} + 0.015726 \times \text{S80/S20} + (-0.06288) \times \text{Gini} + 0.00957 \times \text{SE} + (-0.007761) \times \text{LE} + (-0.345169) \times \text{P} + (-0.41792) \times \text{UR} + (-0.06059) \times \text{PIR}.$$

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## **EBITDA, one of the most important indicators regarding the financial sustainability of retail companies**

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**Abstract.** *Determining the EBITDA margin allows us to demonstrate the sustainability of the company in a more precise way, and businesses that include a significant part of depreciation costs for machinery and other long-term assets in their primary costs can think about financial sustainability. The research is represented by analysis of the influence of the degree of indebtedness and the intensity of capital on the financial indicator EBITDA margin, study carried out on retail companies in Romania. After the analysis, it was found that between the capital intensity rate, the debt level and the EBITDA margin, analysis carried out on a panel data set over a period of 10 years.*

**Keywords:** EBITDA, financial management, profitability, retail, sustainability.

**JEL Classification:** L25, L81, M21.

## Introduction

Sustainable company development is the basis of continued economic growth. The challenge of assessing the sustainable development of a company also brings to the fore the EBITDA indicator, which is widely used to examine a firm's financial health. (Mukhambetov and Yerdavletova, 2014).

The EBITDA indicator is often used in real-world scenarios, especially by analysts and investors who use these numbers to assess a company's financial health and estimate its market value. These measures are mostly used to assess a company's investor appeal and financial stability.

Using EBITDA, which is the same as operating cash flow or money the company made during the reporting period, one may evaluate the operational performance of the company. EBITDA depicts a company's financial performance without taking into account the impact of tax rates, depreciation schedules, and capital structures (by excluding compensation for borrowed money). EBITDA enables the profitability of the firm's core activity to be highlighted regardless of whether the company has commitments to creditors, commitments to the state budget, or the depreciation method used.

The EBITDA indicator is very useful when comparing companies with different capital structures within the same activity sector, being also one of the indicators that describe a company's performance.

Capital intensity and amount of debt both have a big impact on the features of the retail commerce sector. This is due to the fact that a store needs substantial capital expenditures in order to run profitably, such as storefront space, machinery, shelves, and other things.

The amount of assets needed to produce one leu of turnover is used to calculate the capital intensity, or the ratio of total assets to turnover. The asset turnover ratio, which gauges how well a company produces revenue from its assets, is the exact opposite of this.

Capital intensity is measured as the quantity of assets needed to generate one leu of turnover (Gamlath and Rathirane, 2012). A corporation is more capital intensive if it uses more capital to produce a given unit of output. A company with a high capital intensity ratio will need more assets than one with a low ratio in order to generate the same amount of revenue. To raise the ratio of total assets to turnover, managers must find sources of funding at reasonable and acceptable rates; otherwise, the company faces the risk of entering the counter-productivity zone.

The benefits of using EBITDA as a measure of a company's sustainability are clear. A company is said to be unprofitable if it makes a lot of capital investment.

However, by calculating EBITDA, we are able to demonstrate the sustainability of the company in a more precise way, and businesses that include a significant portion of depreciation costs for machinery and other long-term assets in their prime costs can claim sustainability.

EBITDA is used to determine how well a company will be able to pay off its obligations and reinvest profits in continued business growth.

EBITDA can also be used to quickly determine the most stable company among those with a comparable financial situation.

As it defines the company's ability to repay loans, EBITDA characterizes the sustainability of the organization. Often the value of a company can differ significantly from that of a company that has reported a similar amount of net profit.

Regardless of whether the company has commitments to creditors, obligations to the state budget or the amortization method used, EBITDA allows the profitability of the company's core activity to be highlighted.

When it comes to the characteristics of the retail sector, capital intensity and debt levels both play a significant role. This is because a store requires considerable capital to operate in optimal conditions, referring here to commercial space, equipment, shelves and other means.

#### Literature review

According to Santana and Lima (2004), EBITDA can supplement financial statement evaluations because it does not provide the consumer with a complete picture of the overall health of a corporation. They argue that when used in conjunction with other methods and indicators to create a business analysis, the value of the information provided by EBITDA can contribute more and is more meaningful.

EBITDA margin analysis, as an indicator of a company's long-term success, has received significant theoretical and practical attention in recent years. Based on this ratio, special indications of a company's long-term performance have been created. Companies, whether they are from the same industry or not, compare EBITDA margin to establish a profitability benchmark.

According to Lukić and Lalic (2020), managing the financial structure of Serbian food firms as effectively as possible is required to raise the EBITDA margin, which serves as a gauge of long-term performance.

Oliveira et al. (2017) investigated the relationship between market value and efficiency of 88 listed companies. The findings show that while ROA and ROE are unrelated to the company's share price performance, net margin, EBITDA and overall EBITDA margin are indicators that have the greatest impact on the market value of the companies under research. The authors argue that there is evidence of variations in market value indicators for companies depending on the economic sector.

In his study, Damijan (2018) finds that a significant portion of companies have a debt/EBITDA ratio of over 10 and hold almost half of all aggregate net debt. It states that, although the lack of financial soundness of a company in a period of financial difficulties becomes a crucial factor that restricts performance, it is less significant in the period of economic prosperity.



Levels of capital intensity differ from industry to industry, with higher levels being taken into account in a company's operations, according to Lubatkin and Chatterjee (1994).

The ratio of debt to capital affects a company's financial success because debt is thought to be a vital source of funding. It is challenging for a corporation to locate sources of external financing at cheap costs; instead, they prefer to use internal financing sources, according to Hamilton and Fox's (1998) study.

According to Asimakopoulos et al. (2009)'s investigation, there is a positive correlation between increasing sales, investments, ongoing business operations, and corporate profitability.

Financial indicators that reflect how profitable or quickly the market is growing are used by companies to choose whether or not to apply for loan financing. Businesses with a preference for short-term debt have more potential for expansion (Altunbaş et al., 2005).

Total debt is a factor that influences profitability, according to study on the relationship between profitability and capital structure by Velnampy and Niresh (2012). Furthermore, it was demonstrated in the same study that there was a negative relationship between profitability and capital structure. About 90% of the active players in the financial industry, according to a study that was done over an eight-year period and includes banking system enterprises, are represented by debt.

## The methodological framework of the research

### *Data*

The subject of this research is represented by the companies in the retail industry in Romania. The research data were collected from the annual balance sheets of the first 1000 companies according to the turnover achieved in the year 2021. The analyzed period is between 2012-2021, and the companies for which sufficient data were not found were eliminated from the sample, finally obtaining - a number of 370 companies considered relevant for the research.

### Research methodology

#### *Variables*

*Assets structure (SA)*

$$(SA) - \text{Assets structure} = \frac{\text{Fixed assets}}{\text{Total assets}} \times 100$$

*Global debt ratio (GD)*

$$(GD) - \text{Global debt ratio} = \frac{\text{Total debt}}{\text{Total assets}} \times 100$$

*Capital Intensity Rate (CI)*

$$(CI) - \text{Capital Intensity Rate} = \frac{\text{Total assets}}{\text{Turnover}}$$

*Company size (DIM)*

(DIM) – Company size =  $\ln(\text{AT-total assets})$

*Profitability (EBITDA)*

EBITDA = Net profit + Interest expense + Tax expense + Depreciation/Amortisation expense

(mEBITDA) – EBITDA margin =  $\frac{\text{EBITDA}}{\text{Turnover}} \times 100$

### Hypotheses

Based on the specialized literature review, the following hypotheses were developed:

*H1: Capital intensity positively affect financial sustainability indicator of companies.*

*H2: Debts negatively affect the financial sustainability represented by the EBITDA margin.*

*H3: Assets structure positively affect the financial sustainability indicator.*

*H4: Company size positively affect the financial sustainability indicator.*

### Methodology

The impact of the independent variables on the companies' performance was tested with the help of an econometric model using balanced panel data.

$$EBITDA_{it} = \alpha_0 + \alpha_1 CI_{it} + \alpha_2 DIM_{it} + \alpha_3 GD_{it} + \alpha_4 SA + \varepsilon_{it}$$

### Data analysis

#### Descriptive results

Gretl software was used for data modeling and estimation of results.

**Table 1.** Descriptive statistics

Summary Statistics, using the observations 1:01 - 370:10				
Variable	Mean	Median	Minimum	Maximum
mEBITDA	0.053468	0.043414	0.00012562	1.2120
CI	0.34793	0.27407	0.025015	7.9920
SA	0.33148	0.30776	0.00000	0.97612
GD	0.53426	0.53612	0.00000	2.3874
DIM	14.674	14.529	10.794	22.002
Variable	Std. Dev.	C.V.	Skewness	Ex. kurtosis
mEBITDA	0.049317	0.92236	7.5867	134.09
CI	0.42114	1.2104	12.145	197.46
SA	0.21865	0.65961	0.45597	-0.62936

GD	0.25672	0.48052	0.43157	1.6470
DIM	1.1584	0.078939	1.4792	6.2851
Variable	5% Perc.	95% Perc.	IQ range	Missing obs.
mEBITDA	0.0089657	0.12400	0.044167	0
CI	0.10801	0.75834	0.23116	0
SA	0.029114	0.71989	0.34028	0
GD	0.12975	0.91349	0.38893	0
DIM	13.106	16.520	1.3571	0

**Source:** own processing in Gretl software.

According to the result, the average EBITDA indicator throughout the studied period was 4.34%, the average capital intensity was 27.40%, and the average debt ratio was 53.61%. The minimum and maximum extremes of the EBITDA indicator confirm the low profitability margin for businesses in this industry. Despite this low average, there are companies in this sector who recorded an EBITDA level of over 120 percent, 121.2%, as well as companies whose values for this indicator are close to the minimum value. The ratio of CI ranges from 2.5% to 799%, showing that there is significant diversity among the businesses chosen for this study. Additionally, the average ratio of a company's debts to its assets reveals that 53% of the assets of businesses operating in Romania's retail trade sector are made up of loans, underscoring the significance of credit extended to these businesses by their suppliers. It's also important to note the debt ratio indicator's minimum and maximum values, which range from 0 to 238.74%. The structure of the assets registers an average of 30.77%, with a maximum recorded of 97.61%, showing that in the retail industry, fixed assets play an important role for the smooth development of the activity.

**Table 2.** *The correlation matrix*

Correlation coefficients, using the observations 1:01 - 370:10					
5% critical value (two-tailed) = 0.0322 for n = 3700					
mEBITDA	CI	SA	GD	DIM	
1.0000	0.5441	0.1250	-0.3763	0.2180	mEBITDA
	1.0000	0.1597	-0.0569	0.2743	CI
		1.0000	-0.1219	0.2854	SA
			1.0000	-0.1689	GD
				1.0000	DIM

**Source:** own processing in Gretl software.

The examination of the correlation matrix between the variables included reveals a moderately negative correlation of -0.3763 between the EBITDA margin and GD. We observe a moderately positive and correlated link between EBITDA margin and CI. We found a 0.2180 small but entirely positive connection between EBITDA and DIM. Also, between the structure of assets and the EBITDA margin, we have a positive correlation (0.1250).

### Econometric results

Which model produced the most accurate results was determined using the Hausman test (Table 3). The null hypothesis was rejected, showing that the fixed effects model is a more appropriate model for this collection of data.

**Table 3.** *The Hausman test*

Hausman test -
Null hypothesis: GLS estimates are consistent
Asymptotic test statistic: Chi-square(4) = 155.107
with p-value = 1.63715e-032

**Source:** own processing in Gretl software.

The results of using the suggested model, with EBITDA margin as the dependent variable, are shown in the table below (Table 4). The theoretical F for the F-test was computed using the FINV(0.05;369;3327) function, yielding a result of 1.1320034 F calculated 16.844, which when combined with a p-value of less than 0.05 demonstrates the validity of the model. The dependent variable, EBITDA margin, is influenced by the explanatory independent variables in a ratio of 65.38%, as indicated by the coefficient of determination, which is 65.38%.

**Table 4.** *The regression result*

Model 2: Fixed-effects, using 3700 observations				
Included 370 cross-sectional units				
Time-series length = 10				
Dependent variable: mEBITDA				
	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>
const	-0.155125	0.0212659	-7.295	<0.0001
CI	0.0230157	0.00357899	6.431	<0.0001
GD	-0.0660804	0.00392536	-16.83	<0.0001
DIM	0.0162708	0.00141890	11.47	<0.0001
SA	-0.00866044	0.00518417	-1.671	0.0949
Mean dependent var	0.053468	S.D. dependent var	0.049317	
Sum squared resid	3.114043	S.E. of regression	0.030599	
LSDV R-squared	0.653859	Within R-squared	0.172325	
LSDV F(373, 3326)	16.84400	P-value(F)	0.000000	
Log-likelihood	7848.235	Akaike criterion	-14948.47	
Schwarz criterion	-12623.65	Hannan-Quinn	-14121.11	
rho	0.149946	Durbin-Watson	1.511456	
Joint test on named regressors -				
Test statistic: F(4, 3326) = 173.121				
with p-value = P(F(4, 3326) > 173.121) = 7.24208e-135				
Test for differing group intercepts -				
Null hypothesis: The groups have a common intercept				
Test statistic: F(369, 3326) = 6.19441				
with p-value = P(F(369, 3326) > 6.19441) = 6.17102e-192				

**Source:** own processing in Gretl software.

According to Shaheen (2012)'s research, there is a negative relationship between EBITDA and GD. This finding is consistent with the idea that as a company's level of debt decreases, its financial performance improves, and vice versa, that as its level of debt rises, a company's performance will inevitably suffer from its ability to maintain its level of debt.

Regarding the effect of company size, we observe that this variable has a modest but favorable effect, which is consistent with the research findings of Erdoğan et al. (2015).

Regarding the structure of assets, we have a negative relationship, significant for a p-value < 0.1, thus, a lower level of fixed assets leads to an increase in the EBITDA margin.

From the point of view of capital intensity, we have a favorable correlation between the EBITDA margin, a result in agreement with other researches carried out (Pantea, Gligor and Anis, 2014).

Based on the research results, we can express the regression equation as follows:

**Table 5.** *The regression equation*

$\hat{m}EBITDA = -0.155 + 0.0230 \times CI - 0.0661 \times GD + 0.0163 \times DIM - 0.00866 \times SA$
(0.0213) (0.00358) (0.00393) (0.00142) (0.00518)
n = 3700, R-squared = 0.654
(standard errors in parentheses)

**Source:** own processing in Gretl software.

## Conclusion

The study came to the conclusion that the capital intensity, level of debt, and size of the company have a direct impact on the financial sustainability of the companies, which is in this case determined by the EBITDA margin. Three research hypotheses were developed based on the specialized literature review and tested in an econometric model of the type of regression with EBITDA margin as the dependent variable.

We used the financial information from 370 businesses engaged in retail trade in Romania from 2012 to 2021 to conduct this analysis.

According to the study, there is a positive correlation between firm size and performance, meaning that the bigger a company is, the more investors it will definitely draw, which will result in the creation of new growth prospects.

The degree of debt held by the companies is the final factor considered in this study. There is a weak negative relationship between this factor and the amount of debt held by the companies, suggesting that reducing this debt will improve financial performance and implicitly increase sustainability from a financial standpoint.

The study's findings broadly agree with those of other studies with comparable goals. We must emphasize the effect of other parameters on the financial sustainability of businesses in light of future research initiatives. The benefits of using EBITDA as a measure of a company's financial sustainability are clear. A company is more financially sustainable if a significant portion of their prime costs are made up of depreciation expense on machinery and other long-term assets.

The structure of assets influences in a negative and statistically significant way the EBITDA margin (p-value < 0.1), emphasizing the idea that in the retail industry, the emphasis is on current assets, especially merchandise stocks.

EBITDA is used to determine how well a company will be able to pay its debts and reinvest profits to expand its operations. In addition, EBITDA can identify financially sustainable companies even if at first glance, compared to other companies in the same sector of activity, the analyzed company is in a similar position in terms of declared profit.

Less volatile indicators attest to the stability of the company, which is crucial when evaluating a company, especially when the purpose of the evaluation is to invest in the company under evaluation. Thus, we cannot rely, for example, on the analysis of the net profit margin to demonstrate the financial sustainability of the company implicitly the stability of the business. Operating income provides a more complete picture of a company's financial strength. Financial analysts must therefore conduct extensive research to obtain as much data as possible to determine the true picture of a company's financial sustainability.

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## **Human capital – an important resource or impediment in the development of the economy?**

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**Abstract.** *Society is the environment in which we are born, develop, live and then die. Whether we are aware of it or not, each of us has our place and role in society, occupying a certain step on the societal ladder. Then, it depends only on us to advance on this ladder. At the same time, we live in a society characterized by the overwhelming presence of modern technological devices, which reduce the distances between people and lead to the birth of a new reality, the virtual one. In general, modern society has a lot of advantages over previous generations. The purpose of this article is to trace the importance of the individual.*

*An educated and skilled workforce is essential for the development of industries and businesses, which creates employment opportunities and increases productivity. Educated individuals can also lead to innovation and technological advancements, which further boost economic growth. But in these times some innovations create fewer job opportunities for some work segments. In this case, we raise the question: is the human capital an important resource or an impediment?*

**Keywords:** resource, development, economy, human capital.

**JEL Classification:** J23, J24, J28, O19, O33.



## **Introduction**

In modern society, education occupies an important role in the upbringing of the individual. If in the Middle Ages this possibility was offered only to noble children, today education is no longer a rarity: the vast majority of generations in training have access to it.

Education plays an important role in the development of the individual, both in his behavior in society and in his intellectual work. Thus, education has the role of forming, opening new horizons to the individual; on the other hand, its lack restricts the possibilities. In the same way, the dissonance between intellectual and social education can create discomfort for those around and primarily for the person himself.

The importance of education is undisputed, having the role of growing a community as healthy as possible from a social point of view and creating possibilities for the development of its mental skills, giving man unlimited access to (re)discovering his own life.

In today's economies, investment in education and training of human resources is at least as important as investment in heritage. We live increasingly in an information-based world where technology and production methods change rapidly and constantly. In this context, knowledge produces the greatest value. The goal of all public policy should be to improve people's lives. We can agree that people are productive not only because of the social and economic system or the quality of the technologies they use, but also because of the education and training they bring to work.

The development and implementation of an efficient system for qualification in education, a system in which specialized fields are directly correlated with the real and dynamic requirements of the labor market, represents the successful scenario through which educational units can contribute to the development of human capital.

The state's investment for the creation of a varied range of specialists depending on the real needs of the labor market ensures, on the one hand, a real field of activity after the end of studies and, on the other hand, an investment recouped by covering the positions with personnel professionally prepared. The role of education in providing access to the labor market is reflected in the increased employment opportunities for the educated population. People with high levels of education have better chances on the labor market.

## **Technology and education**

An educated person has more chances to integrate into the labor market, to find a job according to his level of competence, he has greater mobility, with a greater openness to permanent learning, to professional reorientation or diversification, etc. In economic and social terms, its performances are superior. Also, education has a particularly important role in reducing long-term unemployment both through initial training, providing the workforce with the ability to cope with changes, retraining, and lifelong learning.

The relationship between education and the labor market is permanent and affects the individual from the moment they enter the institutionalized educational structures. Education continues in different forms throughout the active life period, the education market and the labor market having to support each other.

The knowledge-based economy requires a tertiary education system that contributes significantly to the development of knowledge and skills. People must prepare for jobs that change rapidly due to the dynamics of developments in technology and work organization. The purpose of the adult training system, of lifelong learning, is to ensure the possibility of improving or supplementing general knowledge and qualifications in order to create the general premises necessary for the active participation of the individual in society.

As technology increasingly changes the nature of many economic activities, and as the desire to develop European strategic autonomy has led to talk of repatriating key industries to the old continent, a poorly educated workforce risks becoming a vital problem for our collective future. Some of us remember that, not long ago, the advent of computers and the Internet generated strong debates on the fact that they will change, for the worse, the educational process, when reality demonstrated that they improved access to information, being powerful and effective learning tools. The inevitable digitization of educational resources alongside gamification and personalized learning experiences, there are countless opportunities to develop applications with the help of Artificial Intelligence in the education process.

However, there is also a lot of interest in the advantages of using AI and an awareness that the professional roles of professional trainers and teachers will need to be adjusted and revised as AI technologies develop and diversify, developing new organizational forms.

Technological progress in recent years is unprecedented, in particular to the impressive breakthroughs in machine learning that are used, for example, for real-time language processing and translation, image analysis or process control. Of all the areas where AI will have an impact, in education it could be the biggest; the use of AI in education can generate information about how learning takes place and can change the way learning is assessed. It can reorganize classrooms or make them obsolete, increase teaching efficiency, or force students to adapt to the demands of new technology.

Among all the types of investments in human capital, the most important, for improving the quality of life, is the investment in educational human capital, especially in the context where the current economies are economies based on knowledge. The Global Education Agenda (Education 2030), which includes 17 sustainable development objectives, serves as proof of the importance of education, and implicitly, the investment in education (<https://www.unesco.org/en/education2030-sdg4/need-know>). One of the main documents of the European Union (EU) is the Europe 2020 Strategy, which aims to ensure economic growth: intelligent, through more effective investments in education, research and innovation.

### **Human capital**

The interaction process of the spheres of education and work is to be rethought from the perspective of eliminating the current constraints. The challenges of the new millennium call for significant changes in the foundation of education and professional training of the workforce. Governments, unions, and employers must accept the idea that an increasingly

qualitative and competitive workforce and an educational system that corresponds to this objective is necessary in order to have a sustained economic development. Even if technological progress, innovation and efficient distribution of goods and services are important for economic development, the quality and relevance of human resources are recognized as essential.

At the level of human capital, the realities of the Romanian economy stand out. The workforce in Romania is in the process of integration, in a market where it has been established that the main rule is competitiveness. The shortcomings of the most precious resource are reflected in the simple analysis of salary incomes, so a simple comparison of them with the incomes of the European Union shows us the hard truth, namely that our country ranks 53<sup>rd</sup> in the human development index (Human Development Report 2021-2022). Although the objectives of the National Strategy for Sustainable Development seem credible, a simple assessment of the situation of human capital in Romania reveals the fact that investments in education and professional training are insufficient, and the effects on the economic performance of the workforce are negatively affected. After communism, it is still a period in which forced industrialization and cooperativization prevented adequate training of the workforce. Employees are not motivated and brought up to the stage of assuming personal responsibility. The human resource in Romania still lacks adaptability to the constantly changing conditions of the economic system, flexibility and competitiveness.

In Romania, an attempt is made to promote sustainable economic growth through the National Strategy for Sustainable Development of Romania 2030, encouraging decent work and living, regardless of gender, geographic location or descent, by implementing the principle "no one is left behind". In the current context, tries a new approach of the European Union in terms of industrial policy with an emphasis on competitiveness by ensuring the sustainability of production and consumption, in the efficient use of resources and balancing the service sector. Also, Romania's economic development also depends on the financial sector and the complexity of the processes in this sector.

The horizon for the next years, in an economic context, comes with objectives that involve more of the country's human capital, supporting young people from a financial point of view by accessing new start-ups, initiating basic professional training programs with European funding, correlation with the needs identified on the market work and harnessing the potential of capital markets, including public-private partnerships.

Education plays an essential role in the formation of human capital and in determining the individual's chance from an economic point of view, so that the higher and good quality education the prospects for economic development increase visibly, giving credit to Peter Drucker who claimed that: "knowledge workers and service providers, trained and educated in accordance with society's performance criteria, able to incorporate in their attitudes and conduct society's values, requirements, commitments and manifest themselves as an educated person able to influence through their knowledge and skills, the present and shape the future, being prepared to live in a global world, as a citizen of the world – vision, horizon information" (Drucker, 2021).

### Technology and work

The stock of the economy comes from the labor force's efforts to innovate and invent. A country's rate of demodernization is associated with both its stock and its rate of human capital accumulation. Innovation or the process of change from a static or traditional society requires strategic human capital. The countries that make the fastest and most spectacular innovations are invariably the ones that are under the most pressure to accumulate this kind of human capital at a rapid rate. The experience in trying to accumulate physical capital at a fast pace in poor countries highlights the need for due attention to human capital, thus becoming evident that the effective use of physical capital depends on human resources. In emerging countries, the absorption capacity of physical capital has proved to be low, as the expansion of human skills failed to keep pace with the accumulation of human capital.

A higher rate of capital accumulation usually results from rapid increases in productivity and income in terms of physical output, but the casual relationship between the two factors "does not permit any easy assumption that more capital formation will itself lead to faster growth production". The accumulation of real capital is due to the fact that this is a channel through which the process of economic growth is affected by all other determining factors, such as changes in the population, the exploitation of natural resources, the level of technology, or even changes in saving habits or entrepreneurial perspectives. The accumulation of capital contributes to economic development by introducing many methods of production, which covers the free use of tools for the creation of a product or the use of capital in favor of goods and services. Capital accumulation is a normal characteristic of the expanding economy, being a normal process for the expansion of the production structure that accompanies industrialization or any change in the balance between industries that creates additional demands for capital. It also accompanies a market extension associated with population growth, favorable terms of trade, or the discovery of additional natural resources.

The link between human capital and performance is based on two theoretical lines. The first aspect refers to the resource-based view of the company, and the second aspect refers to the expectancy theory of motivation which is composed of three elements: valence or the value attached to rewards, instrumentality or the belief that the employee will receive the reward upon reaching a certain level of performance, of expectation and the belief that the individual can effectively reach the required level of performance.

The impact of technological change on employment is the subject of heated debate. This ranges from extremely negative assumptions to extremely positive assumptions, leaving a huge margin of unpredictability. Technological progress has been accompanied by substantial changes in the occupational structure, with two opposing effects on employment: a capitalization effect (employment increases in highly productive sectors) and a destruction effect (technology and labor are substitutes). Current digitization trends are replacing "jobs" with "tasks" and influencing work relationships by reshaping them or creating new ones. All of these are characterized by increased flexibility.

Overall low market stability and new economic models create a parallel dimension to traditional service sectors. E-commerce is also on the rise, offering more options and

breaking down barriers of distance and gender. New technologies facilitate the shift of the economic structure towards services, which influences internal mobility towards urban jobs. The Internet's ability to reduce transaction costs increases opportunities for people who face barriers to finding jobs or opportunities to engage in productive activities, and can promote the inclusion of women, people with disabilities, and people in remote areas. It also helps digital businesses grow faster and facilitates the emergence of new occupations.

Confronted with demographic trends, migration and mobility, increased life expectancy is a widespread global trend that reflects efforts to improve health and quality of life. In this context, there are major variations in demographic trends, migration and brain drain. While Eastern European and Balkan countries are already suffering from aging populations, shrinking workforces and increasing care burdens, Southern Mediterranean and Central Asian countries are struggling to meet the needs of booming young populations that require significant public investment in education, housing and infrastructure. For aging societies, automation can be seen as an opportunity to address labor shortages, while growing populations have put countries under pressure to create quality jobs for new entrants to the labor market. If so, the share of the young population is falling everywhere, demonstrating a global aging trend. Internal migration to urban areas is another important trend. Increased urbanization puts pressure on social services, infrastructure as well as energy supply in almost all countries.

The dynamics of the labor market are increasingly detached from the education and training system, which tries to keep up with such rapid developments, leading to a skills mismatch. While cooperation and coordination between the two systems is far from optimal, employers often find it difficult to predict future needs, even in the medium term, due to market uncertainty.

On the other hand, the increase in the share of young people not working, not participating in an education or vocational training program (NEET) may imply an underutilization of young people's potential.

### **Case study**

Four essential technologies – high-speed mobile Internet, artificial intelligence, big data analytics, and cloud technology – will take on new meaning in the next few years and help boost business performance. Socioeconomic trends, such as national economic growth and the development of education (especially in developing economies), will create new opportunities for companies. The transition to a greener economy will also mean advances in green technologies.

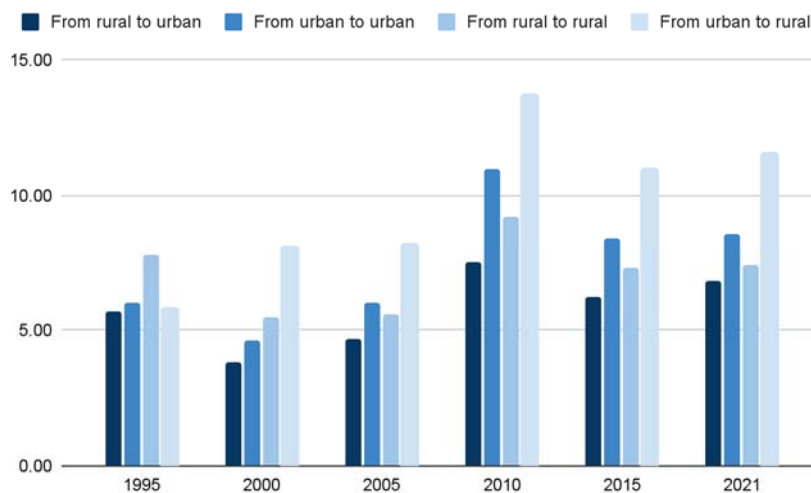
Workforce planning should be a priority for company leaders during this exciting but chaotic time. This will help you secure your company and prepare your people for the challenges and opportunities ahead.

Whatever the coming years bring, your business and your employees need to be ready for change. That means keeping an eye on the labor market, monitoring the latest technological trends and encouraging the workforce to retrain.

In the last 20 years, Romania is facing a strong demographic decline mainly determined by the reduction of the total fertility rate, the maintenance of high values of mortality in general and infant mortality in particular, as well as the increase in temporary or permanent external migration. Demographic decline and its consequences are manifesting themselves as a lasting trend and are making the labor market vulnerable, putting pressure on the long-term sustainability of social and pension systems. Romania, like other countries, faces a shortage of labor force in certain fields, largely as a result of the phenomenon of migration. Four million Romanians are officially registered as working abroad in the EU states, but the figure could be somewhere around 5 million, because there are also Romanians who are not officially registered, say the authorities. The main reason why Romanians go abroad, especially those who were doing unskilled or low-skilled work in the country is the higher salary they can get in Western European countries. However, for doctors or IT-scientists and generally for skilled employees, the main reasons are different. They want education and quality public services, draw the attention of specialists. Regardless of the motivation, their permanent departure abroad, to which is added the persons who go to work seasonally outside the country, creates vulnerabilities on the labor market in Romania.

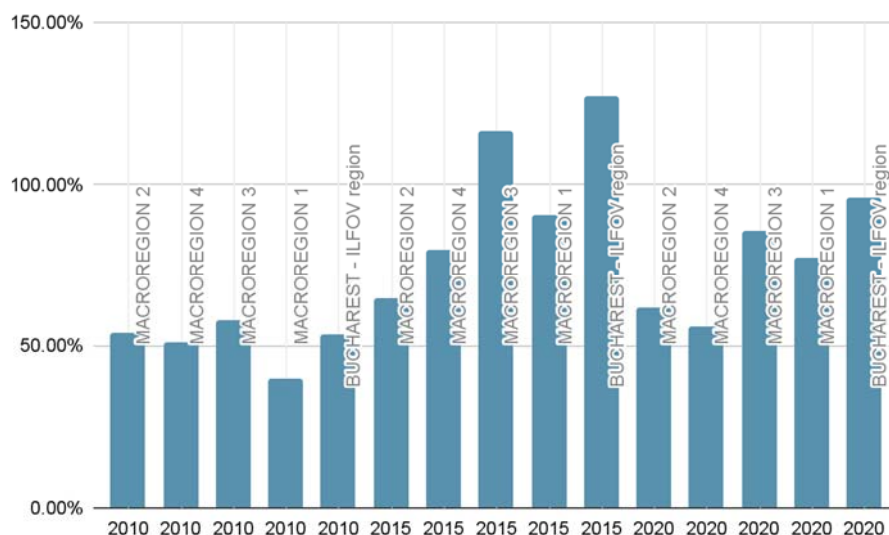
Also, the last years have shown a mobility of the population, in search of jobs and a better life, usually towards the urban area. Implicitly, jobs in the urban area involve working with technology, and this migrating population needs training to be able to adapt.

**Chart 1.** *The structure of urban and rural internal migration flows, determined by the change of residence per thousand inhabitants*



**Source:** Authors processing with data from <http://statistici.insse.ro/>

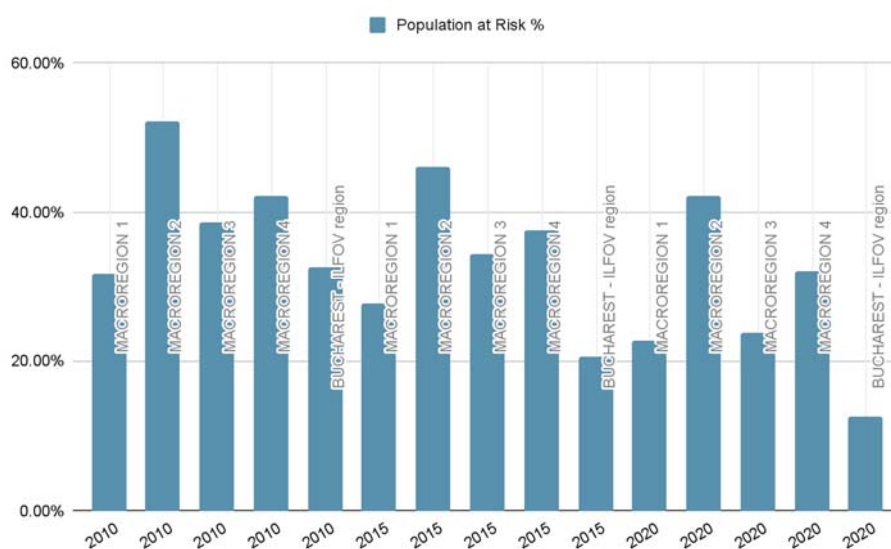
**Chart 2.** The rate of vacant jobs by macro-regions, development regions and activities of the national economy by sections, Romania, 2010-2020



Source: Authors processing with data from <http://statistici.insse.ro/>

Work intensity reflects how hard all working-age household members worked compared to their maximum potential. In general, the higher the work intensity in a household (the closer people are to full employment), the lower the probability of being at risk of poverty. Work intensity is indicated with three levels, from very low, to medium and very high.

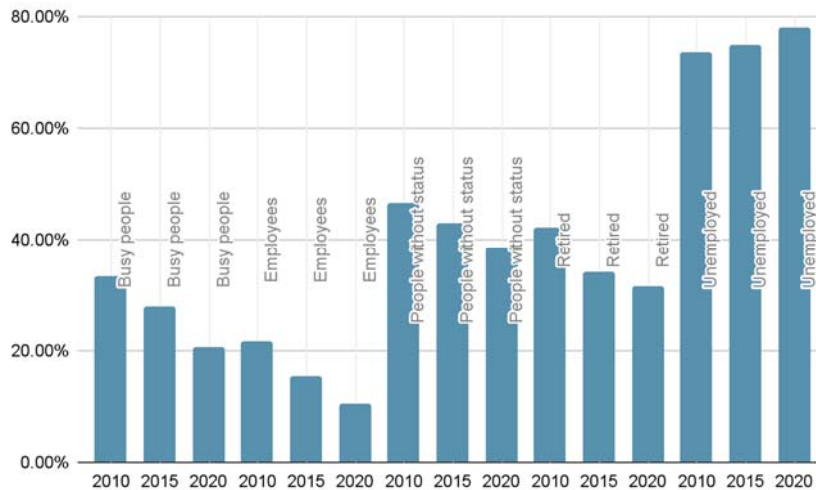
**Chart 3.** Rate of risk of poverty or social exclusion by macro-regions and development regions, Romania, 2010-2020



Source: Authors processing with data from <http://statistici.insse.ro/>

We can also take into account the risk of poverty for less technological areas. The risk of poverty is higher in the areas from where the population migrates.

**Chart 4.** Rate of risk of poverty or social exclusion of people aged 18 and over after the main activity, Romania 2010-2020



**Source:** Authors processing with data from <http://statistici.insse.ro/>

Theoretically, under certain socio-economic conditions, any person, regardless of their particular situation, can become poor for a longer or shorter period of time. For some people, however, the risk of falling into poverty is always high and almost inevitable. It is about people whose physical, mental, educational, occupational characteristics, etc. making it difficult for them to access the welfare levels offered by society and make them vulnerable to the phenomenon of poverty. To these, of course, the poor are also added, i.e. people affected by some changes likely to influence the labor market or the general development of society at a given moment.

The demographic-socio-economic characteristics of people, as well as the types of households in which they live, are influencing factors, often determinants, of the emergence and increase of the risk of poverty.

The existence of an occupation, and in general the occupational status, represents a characteristic of the greatest importance in creating a living environment that ensures the well-being or poverty of the respective persons. This is where the differences come from existing between the poverty rates of different socio-occupational categories.

A first distinction in the analysis can be made from the point of view of the existence of an occupation that offers the possibility of earning some income. In this case we can observe that, on the whole, normally, employed people are more safe from the danger of poverty than the unemployed or inactive, but even within these two categories a variety of situations can be noted.

The major concern of the European Union for the promotion of social inclusion in the member states found its materialization through the development of an integrated strategy,



through which the elimination of the risk of poverty was fixed as a target, throughout the Union.

The end of the 60s marks the beginning of industrial expansion in Romania, a process that is accompanied by its corollary, urbanization. These two social macro-processes were not possible to achieve without the training of an ever-increasing mass of population that set in motion the national industrial colossus on the way to construction.

The main characteristic of the post-December evolution of internal migration is the spectacular growth of urban-rural migration, especially through retro-migration. Young people represented, in each stage, the most dynamic age group, respectively with the highest migratory rates. Even in moments of crisis in the evolution of internal migration, the young ages continued to hold the most important shares.

Internal migration, although less researched than international migration, is a key mechanism in adjusting to regional economic shocks, especially when other tools prove useless. But this process has very complex determining factors that can be economic, social, demographic, environmental, etc.

We have to take into account the well-being of the population. Happiness as a state of mind, happiness as satisfaction in life, happiness as a fulfilled life with an impact on society – all three can be measured, can be development targets and can be promoted through public policies to: satisfy all basic needs; active promotion of educational and labor market policies in accordance with the new economic paradigm; promoting mental health; promoting compassion, altruism and honesty; the importance of ethics; traffic discipline; urban cleanliness; rural infrastructure; resistance to hyper-consumerism; intolerance of corruption; environmental quality, etc.

Specifically, there is an index to measure satisfaction, the Happiness Index, and it follows these six strategic factors:

1. average gross income;
2. social support systems;
3. healthy life expectancy;
4. the freedom to make the life choices you want;
5. the generosity of the population;
6. perceived level of corruption.

All this is corroborated with people's perception of the quality of their own life, and this is how the champions of happiness are established. Not coincidentally, the top Nordic nations share several key characteristics, including high GDPs, systematic education, robust social programs and healthy lifestyles – aspects that seem more important than harsh environmental conditions.

Romania occupies the 24th place, after, in the past years, we were among the unhappiest in the European Union. After going through complicated times like the pandemic and the war, we changed our perspective on life and what makes us happy. Even the concept of happiness has undergone changes from one generation to another.

## Conclusions

Education is important both for the present and for the future, providing people with knowledge, skills, abilities to effectively participate in social life, to develop current knowledge, to activate, integrate or successfully reintegrate in the labor market.

It is important that the career planning activity is a coordinated process and not left to chance. Career planning can be voluntary, when it is done by employees by evaluating internal opportunities and communicating to managers the wishes for promotion, career guidance, or imposed, when it is done by the employee to avoid dismissal.

Under these conditions mentioned in this paper, Romania urgently needs measures to increase the average level of education of the population. Country objectives in the area of education should include:

- Reducing the high rate of early school leaving.
- Lowering the level of functional illiteracy among students and graduates of compulsory education.
- Increasing the number of those completing university studies, especially in fields with demand on the labor market.
- Developing lifelong learning programs for adults.

The difficulties of the continuous professional training system in Romania are mainly generated by: a relatively rigid system of training, with a long period of internship necessary to obtain a qualification; training costs and lack of training offered at local level. We can also talk about a wrong perception of some employers, who tend to consider the expenses of professional training as a cost and not as an investment.

In creating the bi-univocal relationship between the educational sector and the world of work, partnerships have a special role, the importance of which in education and professional training is also emphasized in European policy documents.

The paper concludes that human capital is vital for the development and economic growth of a country, in general, and Romania in particular. We must learn that the prosperity of a country depends on its capital resource, man.

This resource must be capitalized, being a long-term investment to increase the economic well-being, but also the general well-being of the population. Education, investments in technology and infrastructure can be the pillars for our country's needs to grow and sustain itself.

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## Digitalization – saving or wasting resources?

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**Abstract.** *Digitalization, the main driver for the current economic paradigm helped the business environment to gain more sustainability by developing business models based on the implementation of the latest digital technologies in their activities, gaining more economic growth by being more efficient in their approaches; and by transforming the analogue paper-based procedures into digitalized procedures by using the IT technology, the waste of resources has been decreased significantly. But is that completely true?*

**Keywords:** digitalization, technology, investment, consumption, sustainability.

**JEL Classification:** O1, O13, O14, Q55.

## Introduction

The main goal of digitalization and digital transformation is to provide a sustainable development that should impact both the current and future generations. Sustainable development represents that development which must increase the living standards and the wellbeing of the current generations without sacrificing the conditions of future generations. Therefore, the aim of digitalization in the actual context of sustainability is to increase the economic growth while reducing the waste by redistributing the resources, especially the secondary resources that can be obtained by breaking the linear consumption model and recycling the products by their end-of-cycle time, creating more added value for the same existing resources (Demartini et al., 2019).

Since the current paradigm has determined changes in consumption of IT and digital resources in the past years, consumption that has been outlined by the forced digitalization, imposed by the economical limitations determined by the COVID-19 pandemic, the study should analyse if by acquiring the latest digital technologies and implementing them in their activities, businesses have ended up increasing the waste of resources, by not fructifying them to the maximum potential, instead of saving the resources. The current paper aims to answer the research question by analysing the available data to observe if the implementation of the latest technologies have determined businesses and individuals to actually produce more waste, studying if there are any connections between the investments realized in the Research & Development and the increasement in the waste of IT and digital resources (E-waste); or if the investments in digitalization and digital technologies have indeed helped the economic environment to gain more sustainability by encouraging resource savings.

Digitalization is a term that has been widely used over the past decade, and it mainly represents the process of converting analogue information into digital form. The concept of digitalization has been pivotal in transforming societies, and it has been applied to various aspects of business and human activities, such as the economy, social interactions, health sector, and the entertainment industry as well. The development of technology has made digitalization even more possible, and it has brought significant changes to the way people live and work.

Meanwhile, the economic environment has been strongly reshaped by the COVID-19 pandemic which has led to a more forced digitalization of the business processes and activities, taking into account the powerful impact that the limitation imposed by the spread of the virus had on societies and businesses.

Simultaneously, the main advantage driven by digitalization is that it has the potential to save resources in various ways, especially by reducing the dependence on physical resources, making it possible to access services and products digitally. Additionally, digitalization enables resource optimization through the use of data, therefore the resources can be used more efficiently, despite the increasement in the usage of electronic devices and therefore, the increase in energy consumption.

### Literature review

The shift in the economic paradigm will drive the economic environment to demand products that will form the new generation, designed to meet the social and economic needs of individuals and businesses, carefully manufactured by using the latest digital technologies that have been implemented in the business models and processes, while focusing on efficient resource management, in order to create human-made systems that will increase the efficiency and the productivity, especially in the manufacturing industry or the business processes that are not requiring human-driven activities. Therefore, there can be agreed that digitalization is mostly understood as a great opportunity to implement new approaches for meeting customers' needs and for increasing efficiency and productivity, becoming more competitive in the future economic and business environment (Hallstedt et al., 2020).

Affecting both the society and businesses, digitalization is considered to be the most significant technological trend that quickly became the new mainstream of the economic environment, businesses adopting the latest digital technologies in their business models despite the investments and other digital transformation associated costs (Reis et al., 2020).

As the scientific literature has already defined digitalization and digital transformation as well, they represent the processes of adopting the latest digital technologies for increasing productivity, value creation, and social welfare overall. Digital transformation has been implemented both by the government and the private organizations, while producing strategic-foresight studies to establish the long-term policies that should be adopted for achieving the sustainability goals of the future economic environment. Therefore, from an economic perspective, the digital transformation goals have been focused on: improving the technical standards and the framework regulations; increasing the productivity and value addition for generating higher income; and implementing the latest innovative business models based on the adoption and the implementation of the newest digital technologies in the economic activities (Ebert and Duarte, 2018).

Should also be taken into consideration the fact that digitizing the business environment and activities, processes sustaining information and digital technologies require non-stop functionally, 24/7 as well as 365 days a year. This represents an important step forward for business efficiency and productivity, reducing the risk of malfunction, and allowing faster transactions and better management of information, while optimizing the speed of moving information. From another perspective, the implementation and use of the latest digital technologies are accompanied by substantial resource consumption for functioning, maintaining, and updating the technological systems. Therefore, while digitalization should not be undervalued, it is necessarily to be more considerate on how the consequences of digitalization over the environment and sustainability of sociotechnical systems must be approached, taking into account the interplay between social sustainability and environmental sustainability, especially the unexpected and involuntary externalities of digital transformation that might directly impact the environment (Veit and Thatcher, 2023).

The latest technological development and the implementation of the newest digital technologies in business models and individuals' lives have changed the habits of consumption all around the world, increasing the demand for electronic devices and vehicles for economic activities and other daily activities, such as household chores, studies, health-care services and other job-related technological requirements, while facing strong urban expansion and population growth globally. Therefore, the economic growth has been driven by unsustainable consumption habits or patterns, outlined by the linear economic model of consumption “make-take-use-dispose”, which in the current environment invokes strong socio-economic concerns, especially while E-waste possesses a high recovery and recycling potential, which could be used in order to provide secondary materials for the related industries (Modoi and Mihai, 2022).

Innovation and new technologies must be the drivers for companies to function, while working and developing the business processes and models in a constantly changing environment. At the same time, innovations and implementation of the latest digital technologies must help in reducing the negative impact of businesses development and economic growth over the environment. Hence, the innovation strategies should define methods for achieving long-term goals in which the digital transformation is used for building a stronger position on the market. Therefore, innovations should be focused on increasing the sustainability goals directly impacting the company's financial results or the company's level of employment and efficiency, keeping in mind that the latest digital technologies must be implemented while aiming a low or zero emission economy, in other words, focusing on economy decarbonization and reducing the E-waste (Borowski, 2021).

E-waste, as defined by Hossain et al. (2015) in their study, represents the fastest growing waste category, globally. Based on their framework, E-waste can be divided into two component parts: the first one - electronic E-waste, formed by TVs, monitors, electronic equipment, and consumer electronics; while the second part – electrical E-waste, represents the appliances and the refrigerators used by businesses and individuals.

E-waste, meaning the waste determined by the usage of Electrical and Electronic Equipment, also known as WEEE has four issues that should represent a priority on a global level: global quantities of electrical and electronic equipment, the impact on resources, environmental and health issues, and ethical concerns. These aspects reflect the importance of prioritizing the concerns regarding the resource depletion and the impacts on environment and health, since the structured management system of E-waste should be based on resource conservation and environmental protection, being aligned with the concept of Circular Economy (Shittu et al., 2021).

Starting from the premises of digitalization, great expectations have been assigned to the digital transformation to deliver the “win-win” situation for the *environmentally sustainable industrialization*, focusing on economic growth based on resource use, but considering that the sustainable industrialization in the context created by the ongoing digitalization involves more than digital transformation to save resources and reduce waste, especially E-waste, since the obsolescence of digital instruments and equipment is likely to appear earlier than their end-of-life due date (Kunkel and Tyfield, 2021).

The accelerate grow of global sustainability pressures made the recognition of E-waste a priority of the actual policies on limiting the environmental impacts of production and consumption of products and services. Hence, the sustainable management of E-waste must include the recovery and recycling of used materials (secondary materials) in order to be reused again in the manufacturing processes of similar products. Although the feasibility regarding the economic aspects of this procedure must still be determined. At the same time, a more feasible solution is represented by the mechanical-based solutions, since the use of robotics to disassemble and recycle E-waste products to their initial form is more cost effective and therefore more organizations and industries might include approaches of E-waste management in this aspect. Nevertheless, digitalization indeed has provided new instruments in waste separation, processing facilities and waste management in general. On the other hand, the fast pace of digitalization and the shift in the economic paradigm determined an increase in the consumption of IT and Electric and Electronic Equipment, therefore huge loads of waste had to be processed, raising the question if digitalization is indeed helping the environment, business and societies to be more sustainable and resource efficient (Minashkina et Happonen, 2022).

#### Digitalization and the use of IT resources in business environment

Digitalization has revolutionized the mode in which companies, organizations and businesses operate, significantly reducing the need for physical resources, such as paper and personnel. Businesses that have embraced digitalization have also been able to reduce their carbon footprints, which was supposed to have a positive impact on the environment. Regrettably, the impact was not the expected one since digital pollution has been frequently underestimated due to its direct physical invisibility. In this aspect, the study conducted by Oo et al. (2023) has shown that at a global level, digital pollution formed by E-waste, consumption habits, and production is accountable for 3.7% of CO<sub>2</sub> emissions, which is hard to reduce or to solve since it is rarely even getting acknowledged, owing to the fact that digital activities, for instance emailing, searching and streaming are considered to have little to no impact on the environment. Nevertheless, manufacturing and E-waste are unfortunately collaborating in using more resources while focusing on saving resources and reducing waste. Due to the trend of gadgets to get smaller and be more practical and efficient, more internal components are added to the devices, and their productions generates more trash, questioning therefore the achievement of the sustainability goals regarding to waste reduction, aimed by digitalization and its implementation in the business models.

Digitalization is not only revolutionizing the way businesses and individuals operate their daily activities but has significantly impacting the use of resources. Technology holds great promise in terms of reducing the reliance on physical resources, minimizing waste, and boosting efficiency. Meanwhile, digitalization has also been implicated in the overuse of resources, generating E-waste and its attendant environmental problems, as well as social-environmental implications, such as the rise of internet-dependent lifestyles and the increasement in energy consumption. For instance, as the study conducted by Bisht et al. (2022) shown, the digital technologies developed by the R&D specialists can be



implemented and utilize in several industries or business sectors around the economic environment, such as: Customer Services, Accounting, Supply Chain Management, Human Resource, Health Care and Financial Service, in which big data and AI technologies have especially raised the apparition of automated personal assistants that are capable of analysing the financial markets and make smart financial decisions. This is just a particular example of how the resources were not necessarily saved by digitalization, just replaced. And by that, there should be considered that the human resource has just been replaced using technology, so instead of mental and physical power that can be regained by sleep, the AI technology will need physical equipment to function, that must be manufactured and that will need electricity in order to achieve the task received by the customers. Therefore, the resources in general, have not been saved or wasted, just replaced, based on methods that can be quantifiable, with advantages such as increasing the efficiency and reducing the risk of operations, and disadvantages such as decreasing the need for personnel, hence impacting the unemployment rate on the longer run.

Additionally, digitalization has made it possible for individuals to work remotely, reducing the need for physical workspaces and reducing fuel consumption. This has led to a reduction in the number of vehicles on the roads, bringing benefits to the environment, reducing emissions, and increasing air quality. Moreover, digitalization has facilitated e-commerce, which has reduced the need for physical retail outlets, thereby reducing the amount of energy needed to light, heat, and cool buildings. Online shopping has also reduced the need for packing materials and transportation activities, which has also contributed to reduce waste.

The study published by Eurostat in 2021 alongside the enterprises with at least 10 employees and self-employed people, regarding the use of digital technologies among EU enterprises, highlighted the important role of digitalization in the current economic environment. As shown in Table 1, the implementation of Information and Communication Technologies as part of the digital transformation, allowed businesses to improve their products and services while improving their competitiveness, proving that digitalization and the adoption of digital-driven business models can impact businesses' strategies, from organizing their production processes to communication and soft management activities.

**Table 1.** *ICT use in EU enterprises with at least 10 employees in 2021*

94% used a fixed broadband internet connection	78% had a website on its own	59% used social media by their own profile
41% used cloud computing systems	38% used Enterprise Resource Planning (ERP) software	35% used Customer Relationship Management (CRM) software
29% used Internet of Things	22% had e-commerce sales in 2020 (reference year)	8% used Artificial Intelligence (AI) technologies

**Source:** Data processed by the authors from Eurostat.

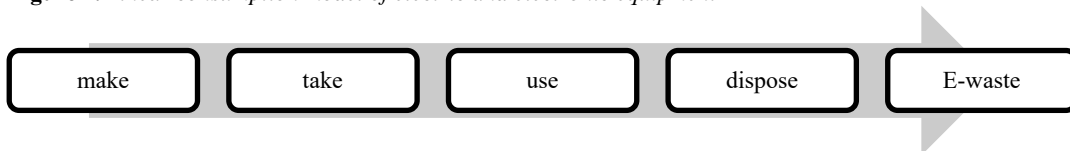
Therefore, the consumption of the latest digital technologies is widely spread, mostly connected with the state-of-development of the instruments, as well as is shown by the 94% of enterprises involved in the study case, which are using a fixed broadband internet connection, the basic instrument of digital transformation's infrastructure, while only 8% of the organizations have adapted and implemented AI technologies in their business model.

Hence, the usage of digital technologies alongside the enterprises is different, as the most common instrument is mostly used and the latest one is the least used, while the instruments that have been already tested and proved as tools for increasing the efficiency and productivity are moderately used by the enterprises, outlining the current business environment paradigm.

### Digitalization and electric and electronic equipment consumption models

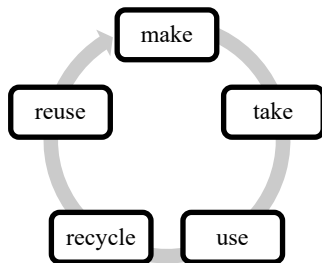
Digitalization maps the path towards a smart Green Planet by offering solutions, guidance, and assistance for sustainable development, providing instruments such as IoT, big data management and AI, instruments which once integrated into the business models and processes might bring benefits to the economic environment. At the same time, special attention is necessary for observing and managing the implications of unequal level of digitalization achieved by the businesses and unequal data access of individuals, that can accentuate the digital poverty and instead of driving digital sustainability, the opposite result might be achieved, the increase in inequalities. Nevertheless, the benefits of digitalization can be easily observed in the current economic environment, especially the integration of big data in daily activities, both by individuals and businesses, promoting the quality of life and assisting humanity to overcome the sustainability challenges, ensuring the availability of resources, human condition, natural environment, and earth resilience (Mondejar et al., 2021).

**Figure 1.** Linear consumption model of electric and electronic equipment



**Source:** Data processed by the authors.

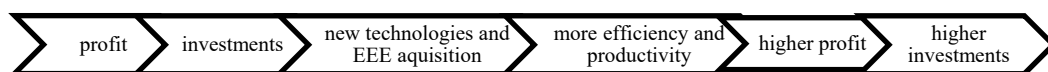
As shown in their study, Antikainen et al. (2018), there are numerous opportunities of digitalization regarding to the Circular Economy, such as virtualization and adopting circular business models focusing on slowing, closing, or narrowing the loop, in which virtualization can enable resource savings and cost reductions while helping in designing modular products that can be easily updated. The main idea of the circular business model based on virtualization is that not only one company closes the loop, but the ecosystem does, therefore the companies should be working together for breaking the linear model of resource consumption (Figure 1) and implementing a circular model, as proposed by the authors in Figure 2, in which the end-of-life products should be recycled and the secondary resources obtained should be reused and reintroduced in the economy, creating more added value for the existing resources and meeting the demand for raw materials and resources, especially for Electric and Electronic Equipment. Therefore, the products once used, if only the obsolescence represents the reason for reaching the end-of-life point, should be recycled and reused, creating more added value. Hence, by recycling the products and reuse the materials, the economic growth and the development of businesses can be reached with the same resources at least twice.

**Figure 2.** Proposed circular consumption model of electric and electronic equipment

Source: Data processed by the authors.

### Investments and electric and electronic equipment consumption loop

Taking into account, the results provided by the study conducted by Rosin et al. (2020), the analyzed data had shown that a high degree of digitalization leads mostly to cost reductions, but not exactly a reduction in consumption of other resources, such as number of employees or office space, even if a higher degree of digitalization achieved by the implementation of the latest digital technologies might result in greater operational efficiency and productivity, which can be understood as resource consumption reduction. Therefore, adapting the business models to the digital transformation and the use of the latest technologies imposed by digitalization does not involve a reduction or an increase of resource consumption, since a higher efficiency and productivity will impact the financial results of the businesses, which might actually be translated in resource waste, especially E-waste on the long run, because as shown in Figure 3, businesses can enter into an Investment and Consumption Loop for Electric and Electronic Equipment, because due to the increments in efficiency and productivity, organizations will gain more profit, the budget available for investment will be extended, therefore the probability of replacing perfectly-fine working Electric and Electronic Equipment just based on obsolescence might increase. Hence, without knowing directly, businesses can turn the benefits of digitalization into impediments for sustainability.

**Figure 3.** Investment and consumption loop

Source: Data processed by the authors.

Meanwhile, on the other hand, digitalization has been blamed for wasting resources, particularly energy. As more individuals and businesses access the internet, database centres have increased in number and size, and therefore the technological equipment has been more used and manufactured since the demand for database centres infrastructure is continuously growing. Digitalization has also led to the development of electronic devices and in increasing the number of users for the newest digital devices, devices that require energy to function. The use of digital devices such as laptops, smartphones, and tablets, both by businesses and individuals has widely spread, especially in the past years due to

the implications and limitations of the COVID-19 pandemic, therefore the increase in electricity consumption was inevitable, both in using and manufacturing the electronic devices, as well as the disposal of electronic waste represents a significant environmental threat, particularly in the current economic paradigm in which the presence of an increasing trend in manufacturing companies is determining businesses to pay more attention on the environmental impact of their economic activities, mostly due to the growing international attention for climate change and the tightened environmental regulations, since digitalization is an important factor in the evolvement of manufacturing industry towards environmental sustainability goals (Chen et al., 2020).

## Conclusions

But is that completely true? This is the research question that is guiding the current research. To provide an answer, the authors have been exploring the scientific literature and used the available information to summarize the findings and to analyze the available data.

In conclusion, mainly, digitalization has considerable promises in terms of saving resources, through reduced physical resource dependence, efficient use of resources, and optimization of resource use. However, it also has significant downsides in terms of resource consumption, E-waste generation, and new habits of consumption linked to digitalization. Therefore, there is a strong need for sustainable digitalization to ensure that the benefits of digitalization for resource conservation are optimized, and the unintended negative effects are reduced. Strategies to achieve sustainable digitalization might include Circular Economy approaches, responsible consumption practices, and the reduction of E-waste generation through the promotion of digital recycling systems.

Meanwhile, as proposed by Chen et Ogunseitani (2021) in their paper, Blockchain applications should be integrated into a lifecycle perspective, which needs to include manufacturing, retailing, individuals as consumers and the end-of-life fate of products which should be related to an E-waste management system based on recycling, reuse, and refurbishment, focusing on obtaining secondary resources for the industries, such as the manufacturing of Electric and Electronic Equipment one.

Therefore, by adopting and implementing these measures, it is possible for businesses and individuals to leverage digital transformation's effects for positive environmental impacts, leading to a sustainable digital future, since there is no direct or specific statistics data available in order to provide an exact answer to the research question. The digital transformation is mostly based on resource redistribution more than resource saving or waste management. In this case, digitalization has improved the efficiency and the productivity of the business environment, by creating more sustainable digital business processes, but on the other hand it has been focusing on gaining more income and achieving economic growth which has advantaged the business environment while saving the most important non-physical resource, the time, but it has disadvantaged the most important psychical resource, the labour force (individuals), affecting directly the social environment, strongly impacting individuals' income. So, ultimately, from this perspective, the "win-

win” situation aimed by digitalization over the sustainability goals, has not been completely fulfilled, leaving space for further studies to observe if the “equilibrium” might be achieved in the future, or if the digital transformation will develop separately from the sustainability goals, deepening even more the discrepancy between the social and the economic environment.

### Limitations and further discussions

The study has been limited by the availability of data that was necessary for conducting the initial proposed research, hence instead of quantitative research methods, qualitative research methods had been used by the authors for stating an answer to the research question. The current study can be extended once the data will be available since the quantitative research methods are fully applicable on the topic.

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## **The case study conducted at the Gura Ocnitei Village Hall aimed to analyze the role of communication in improving the performance of public servants**

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**Abstract.** *The case study conducted at the Gura Ocnitei Village Hall aimed to analyze the role of communication in improving the performance of public servants. Qualitative research methods, such as interviews and direct observations of employee behavior, were used to achieve this goal. The study results showed that effective communication between employees and between employees and citizens has a significant impact on the performance of public servants. Clear and open communication can lead to greater employee engagement and motivation, improved citizen relations, and better conflict management. Additionally, the study found that certain communication problems can have a negative impact on the performance of public servants, such as insufficient or ambiguous information, delayed or inadequate communication of decisions, and a lack of communication with citizens. In conclusion, this study demonstrated the importance of communication within the Gura Ocnitei Village Hall and suggested that investing in developing employees' communication skills could lead to better performance and better relations with citizens.*

**Keywords:** communication, civil servants, principles.

**JEL Classification:** D81, D83, L63.

The case study conducted within the Gura Ocniței City Hall was carried out with the purpose of analyzing the role of communication in increasing the performance of public officials. Communication is an important aspect in any organization, especially in the public sector, where efficient communication can lead to better public service administration and an improved relationship with citizens.

To achieve this objective, qualitative research methods were used, such as interviews and direct observations of employee behavior. Interviews were conducted with 23 out of a total of 33 public officials, with the aim of obtaining their feedback on the role of communication in their daily work and identifying the problems they face regarding communication with colleagues and citizens. Direct observations were made with the aim of observing employee behavior during interactions with citizens, to identify potential communication problems.

The results of the study showed that effective communication between employees and between them and citizens has a significant impact on the performance of public officials. Specifically, it was found that clear and open communication can lead to greater involvement and motivation of employees, an improvement in the relationship with citizens, and better conflict management. These results are in line with previous research in the field of communication, showing that effective communication can lead to improved performance and better employee engagement.

It was also found that certain communication problems can have a negative impact on the performance of public officials, such as insufficient or ambiguous information, late or inadequate communication of decisions, and lack of communication with citizens. This can lead to a decrease in employee involvement and motivation, a weaker relationship with citizens, and poorer conflict management.

Following the interviews, it was found that the majority of public officials within Gura Ocniței City Hall identified communication as a major issue regarding their performance. They mentioned problems such as lack of transparency in communication, communication conflicts, and lack of feedback. These issues were also highlighted during direct observations of employee behavior, where it was observed that some employees did not pay enough attention to communication with citizens, and others were inadequately prepared to provide complete and accurate information.

In conclusion, this study demonstrated the importance of communication within Gura Ocniței City Hall and suggested that investing in the development of public officials' communication skills could lead to better performance and a better relationship with citizens. In this regard, certain solutions were proposed, such as organizing training sessions for employees to develop their communication skills and increase awareness of the importance of effective communication. The need for developing appropriate technical solutions was also suggested to ensure fast and accurate communication between citizens and employees.

In conclusion, the case study conducted within Gura Ocniței City Hall highlighted the fact that effective communication can lead to greater employee involvement and motivation, an



improvement in the relationship with citizens, and better conflict management. However, communication problems can have a negative impact on the performance of public officials and the relationship with citizens. Therefore, investing in the development of employees' communication skills and appropriate technical solutions.

### **Study objectives**

The objectives of this study aim to improve communication and develop employee skills in public institutions, as well as analyze the impact of using technology and appropriate solutions in achieving these goals. In this context, the specific objectives are as follows:

1. Assessing the current level of communication and employee skills in public institutions, with a focus on Gura Ocnitei City Hall.
2. Identifying challenges and opportunities related to communication and employee skill development in the context of public administration.
3. Analyzing technological solutions and strategies implemented in other public institutions and evaluating their applicability in the case of Gura Ocnitei City Hall.
4. Investigating the impact of technological solutions, such as internal collaboration platforms, communication channels with citizens, CRM systems, e-learning, data analysis tools, feedback systems, videoconferencing, process automation, and progress monitoring, on communication efficiency and employee performance.
5. Evaluating how investments in employee skill development and their adaptation to the specific public environment influence citizen satisfaction and trust in the services provided by public institutions.
6. Identifying the most effective technological solutions and strategies that can be implemented in public institutions to improve performance, efficient resource management, and strengthen relationships with citizens.
7. Formulating recommendations on adopting technological solutions and developing employee skills in public institutions, to ensure a tailored and responsible approach to community issues, as well as transparency and accountability within public institutions.

### **Methodology**

The methodology used in this case study was based on qualitative research methods, with an emphasis on interviews and direct observations of employee behavior during interactions with citizens. These methods were chosen because they allow researchers to gain a deeper understanding of phenomena and behaviors within the organization, as well as identify communication issues within the city hall.

Interviews were conducted with 23 public officials out of a total of 33 working at Gura Ocnitei City Hall. These officials were selected based on their position within the organization and their degree of involvement in communication activities with citizens. The interviews were structured according to research objectives and included questions about employees' experiences in communicating with colleagues and citizens, the role of communication in improving their performance, challenges they face in communication, and their feedback on how communication can be improved within the city hall.

Direct observations of employee behavior were conducted during interactions with citizens. These observations aimed to identify communication issues within the city hall and to observe how employees interact with citizens and how communication issues manifest during these interactions.

Overall, the qualitative research methods used in this study allowed researchers to gain a deeper perspective on communication issues within the city hall and identify ways to improve communication between employees and citizens. These methods were considered appropriate for the study objectives, as they enabled researchers to obtain qualitative and detailed data on communication issues within the city hall and identify specific solutions for improving public officials' performance regarding communication.

### **Interview development**

The interview was conducted face-to-face with public officials and is based on 8 multiple-choice questions, as follows:

1. What is your role within the public institution?
  - a) Management.
  - b) Project investments.
  - c) Services for citizens.
  - d) Others.
2. How do you assess the current level of communication within your institution?
  - a) Excellent.
  - b) Good.
  - c) Satisfactory.
  - d) Unsatisfactory.
3. What is the biggest challenge in communicating with colleagues and citizens?
  - a) Lack of efficient communication channels.
  - b) Ambiguity of information.
  - c) Response time to requests.
  - d) Lack of employee involvement.
4. What skill do you consider most important for employees in public institutions?
  - a) Ability to synthesize information.
  - b) Logical thinking.
  - c) Decision-making ability.
  - d) Effective communication skills.
5. What type of technological solution do you think would most improve communication and process efficiency in your institution?
  - a) Internal collaboration platforms.
  - b) Communication channels with citizens.
  - c) CRM systems.
  - d) Data analysis tools.

6. Which of the following strategies do you think would contribute most to improving communication and employee performance?
  - a) Developing employee skills through training.
  - b) Implementing efficient technological solutions.
  - c) Improving feedback and monitoring processes.
  - d) Ensuring a collaborative working environment.
7. How do you think investing in employee skill development and their adaptation to the specific public environment might influence citizen satisfaction and trust in the services provided by your institution?
  - a) Significant positive impact.
  - b) Moderate positive impact.
  - c) Neutral impact.
  - d) Negative impact.
8. What type of public institutions do you believe would benefit most from implementing technological solutions and strategies for improving communication and employee performance?
  - a) City halls.
  - b) Higher education institutions.
  - c) Government agencies.
  - d) All types of public institutions.

### Interview period

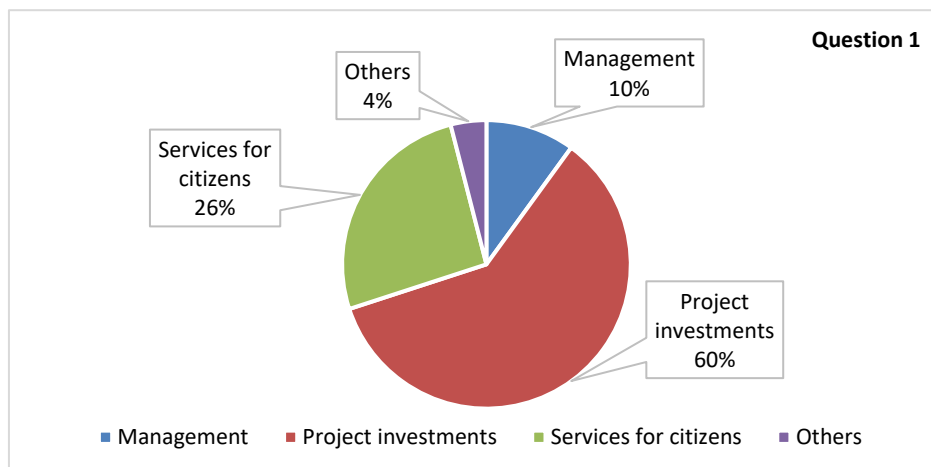
The interviews took place from March 2, 2023, to March 10, 2023.

### Result interpretation

The interpretation of the results took place from March 12, 2023, to March 16, 2023.

### Interview results

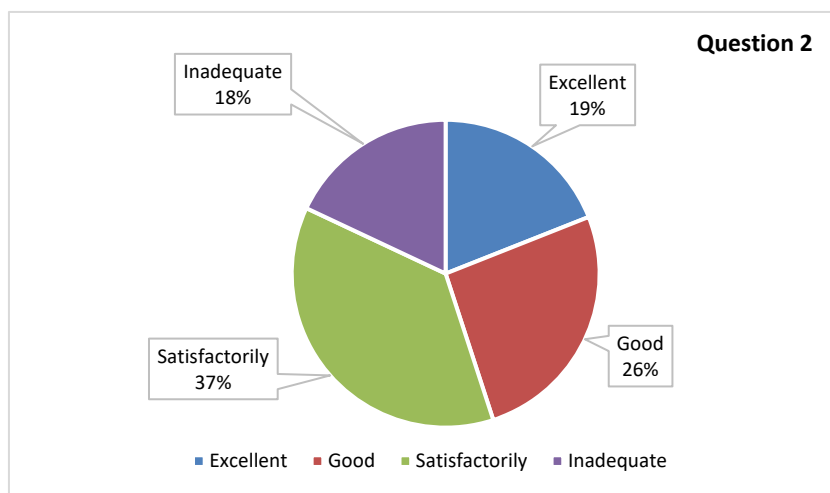
**Chart 1.** *What is your role within the public institution?*



The results show that the majority of study participants (60%) work in the field of services for citizens. This indicates that a large part of the interviewed sample has direct experience in interacting with citizens and managing their requests. At the same time, 26% of respondents work in the field of investments and projects, and 10% hold management positions. The remaining 4% of participants reported other roles that are not specified in the response options.

This distribution of roles can provide valuable insight into the different experiences and perspectives of employees in public institutions.

**Chart 2.** *How do you evaluate the current level of communication within your institution?*

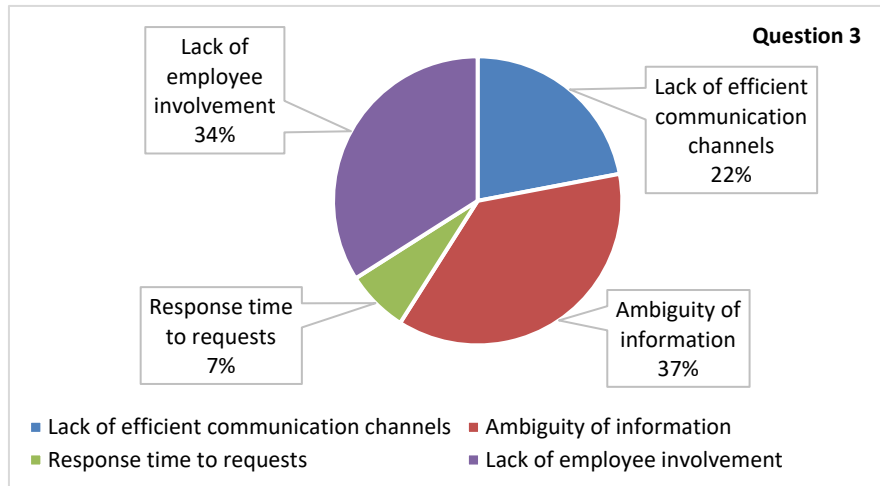


Analyzing the results, it can be observed that 45% of respondents consider the level of communication within their institution to be "Excellent" or "Good". This suggests that there is a moderate degree of satisfaction regarding internal and/or external communication.

However, 37% of participants rated communication as "Satisfactory", indicating that there is some room for improvement in this area. Additionally, 18% of respondents considered the level of communication to be "Unsatisfactory", underlining significant communication issues within some public institutions.

These results highlight the need for further investigation into aspects that can be improved regarding communication and identifying solutions to address weaknesses in internal and external communication. In this context, the results can be used to develop strategies and initiatives aimed at improving communication in public institutions.

**Chart 3.** *What is the biggest challenge in communicating with colleagues and citizens?*

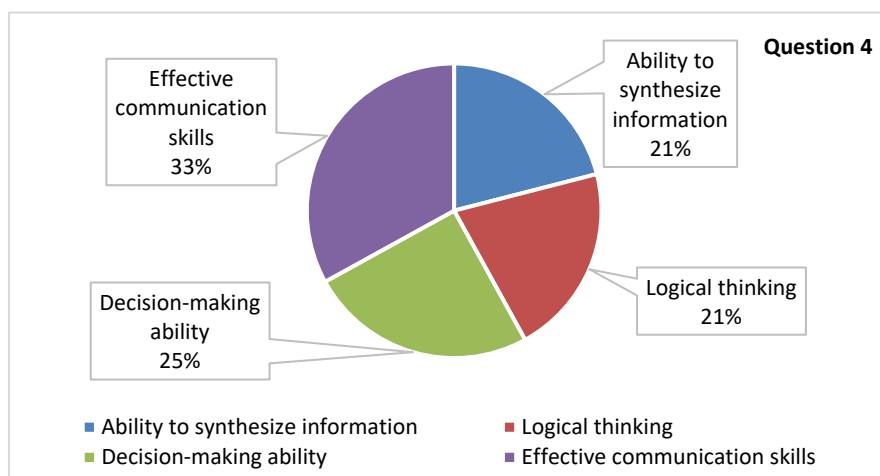


From the Chart 3, the results show that the main challenges in communicating with colleagues and citizens are the ambiguity of information (37%) and the lack of employee involvement (34%). These aspects can lead to misunderstandings, frustrations, and dissatisfaction among both employees and citizens.

The lack of efficient communication channels was identified as a significant challenge by 22% of respondents, indicating a need to develop and implement better communication systems that facilitate the exchange of information and improve coordination between employees and citizens.

Response time to requests was considered a smaller challenge, with only 7% of participants indicating this aspect as the most important in their communication. However, this aspect can also be an area for improvement, as a short and efficient response time can enhance citizen satisfaction and improve the overall efficiency of public institutions.

**Chart 4.** *What skill do you consider most important for employees in public institutions?*



The results indicate that efficient communication skills are considered the most important for employees in public institutions (33%). Effective communication is essential for ensuring good collaboration among colleagues and for providing clear and concise information to citizens.

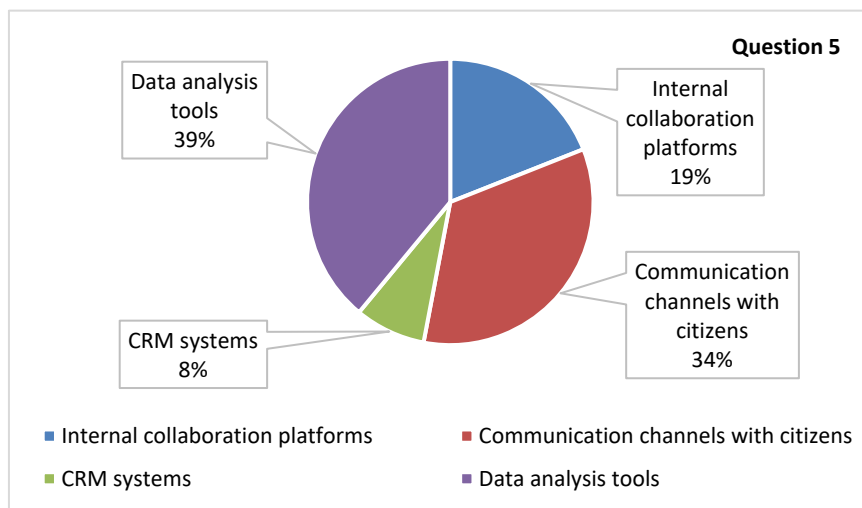
Decision-making ability was ranked as the second most important skill (25%). Making quick and accurate decisions is crucial in public administration, where employees need to manage resources and respond to the needs of citizens efficiently.

Information synthesis capacity and logical thinking received the same percentage of votes (21%). These skills are also very important in the work of public officials, as they help in analyzing and understanding complex information, as well as applying sound reasoning in the decision-making process.

Overall, the results highlight the importance of developing a balanced set of skills for employees in public institutions, with a focus on effective communication, decision-making, and logical thinking. This can contribute to better performance and a closer relationship with citizens.

In light of these findings, it is important to take measures to address these challenges, such as clarifying information, increasing employee engagement, and improving communication channels, to ensure efficient and transparent communication in public institutions.

**Chart 5.** *What type of technological solution do you believe would most improve communication and process efficiency in your institution?*



The present chart indicates that data analysis tools (39%) and communication channels with citizens (34%) are considered the most effective technological solutions for improving communication and process efficiency in public institutions.

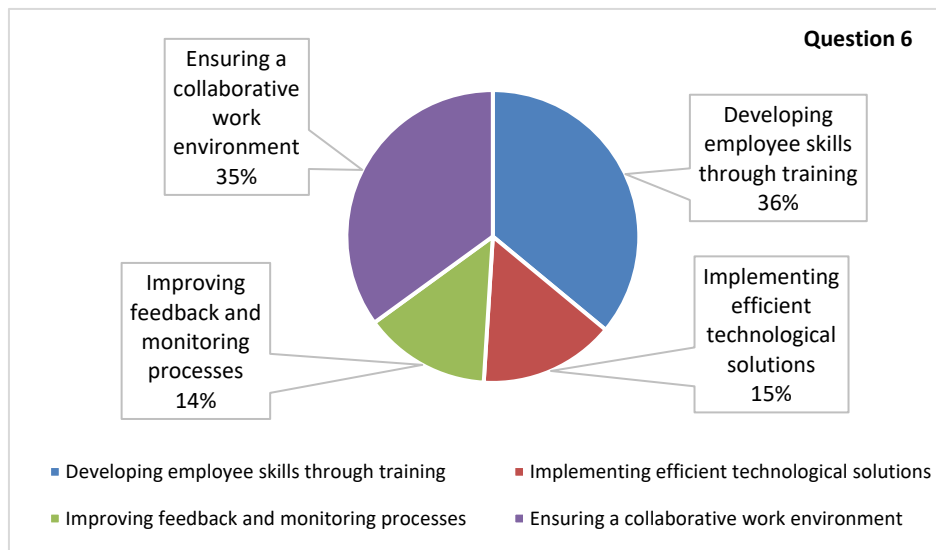
Data analysis tools can help institutions assess and monitor performance and identify opportunities for improvement. These tools can contribute to increased efficiency and better decision-making based on concrete data.

Communication channels with citizens allow for more direct and transparent interaction between public institutions and citizens. These solutions can include accessible websites, mobile applications, and social networks that facilitate communication and public institutions' accountability to citizens.

Internal collaboration platforms received 19% of votes and can play a significant role in improving communication and coordination among employees. These platforms enable information exchange, task management, and project progress monitoring in a centralized manner.

CRM (Customer Relationship Management) systems received the lowest percentage of votes (8%), but they can be useful in managing relationships with citizens and monitoring requests and feedback.

**Chart 6.** Which of the following strategies do you believe would contribute most to improving communication and employee performance?



The results show that participants believe developing employee skills through training (36%) and ensuring a collaborative work environment (35%) are the most effective strategies for improving communication and employee performance in public institutions.

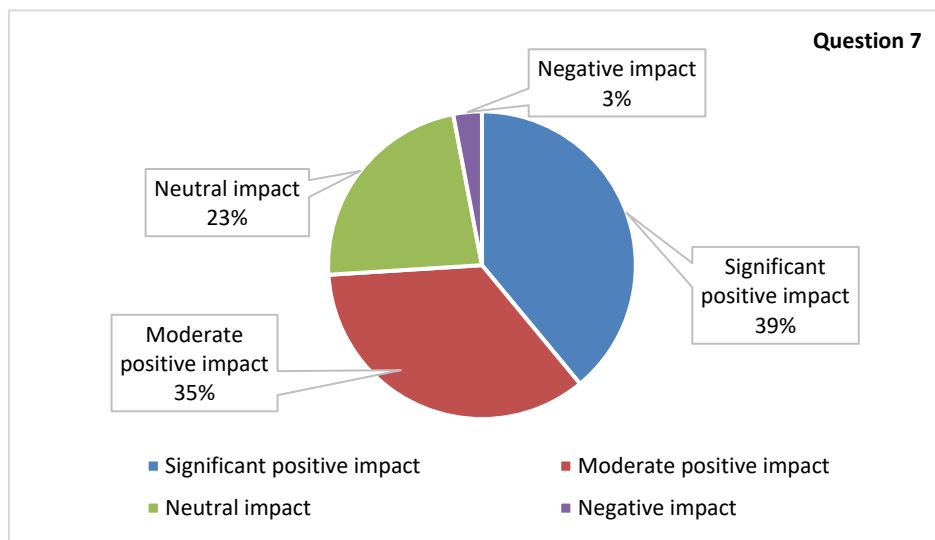
Developing employee skills through training may include courses on communication, project management, leadership, and conflict resolution. These courses can help employees improve their competencies and become more efficient in fulfilling their tasks.

Ensuring a collaborative work environment involves creating an organizational culture where employees work together, share ideas, and support each other's efforts. A

collaborative work environment can lead to better communication, greater job satisfaction, and increased performance.

Implementing efficient technological solutions (15%) and improving feedback and monitoring processes (14%) received a smaller percentage of votes but can also contribute to improving communication and employee performance. Technological solutions can help simplify processes, while feedback and monitoring can contribute to identifying opportunities for improvement and ensuring a high level of accountability.

**Chart 7.** *How do you believe that investing in the development of employees' skills and their adaptation to the specific public environment can influence citizens' satisfaction and trust in the services provided by your institution?*



The results of this chart show that the majority of participants believe that investing in the development of employees' skills and adapting them to the specific public environment will have a positive impact on citizens' satisfaction and trust in the services provided by public institutions.

A significant positive impact (39%) indicates that participants believe that well-prepared employees, adapted to the specific public environment, will be able to provide quality services to citizens, respond efficiently and promptly to their requests, and maintain open and transparent communication. This can lead to increased satisfaction and trust from citizens in public institutions.

A moderate positive impact (35%) suggests that although investing in the development of employees' skills and adapting them to the specific public environment is important, a broader approach may be necessary, including other strategies and initiatives to significantly improve citizens' satisfaction and trust in public services.

The neutral impact (23%) shows that some participants do not believe that investing in the development of employee skills will have a direct impact on citizens' satisfaction and trust. This may indicate that some participants believe other aspects, such as infrastructure



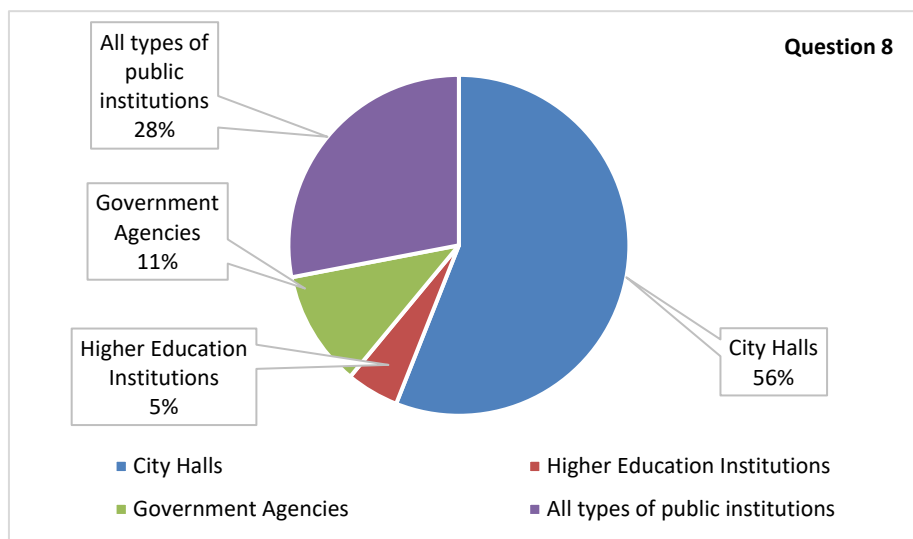
quality, financial resources, and government policy, may have a greater impact on citizens' satisfaction and trust.

The negative impact (3%) is very small and shows that only an insignificant proportion of participants believe that investing in employee skill development and adapting them to the specific public environment could have a negative impact on citizens' satisfaction and trust in public services.

In conclusion, the results suggest that investing in employee skill development, ensuring a collaborative working environment, and implementing efficient technological solutions and feedback and monitoring processes can significantly impact improving communication and employee performance in public institutions.

Overall, the results suggest that investing in technological solutions such as data analysis tools and communication channels with citizens can have a significant impact on improving communication and process efficiency in public institutions.

**Chart 8.** Which type of public institutions do you think would benefit the most from the implementation of technological solutions and strategies to improve communication and employee performance?



The results indicate that the majority of respondents (56%) believe that city halls would benefit the most from the implementation of technological solutions and strategies for improving communication and employee performance. A significant proportion of respondents (28%) believe that all types of public institutions would benefit from these solutions and strategies. On the other hand, a smaller proportion of respondents see higher education institutions (5%) and government agencies (11%) as the main beneficiaries of these measures. These results suggest that city halls and, in general, all types of public institutions could be priorities for implementing these solutions and strategies.

The results of this case study have shown that effective communication between employees of Gura Ocnitei City Hall and citizens can have a significant impact on the performance of public officials. Specifically, it was observed that clear and open communication can lead

to greater employee engagement and motivation, improved relationships with citizens, and better conflict management.

However, it was found that certain communication problems can have a negative impact on the performance of public officials, such as insufficient or ambiguous information, late or inadequate communication of decisions, and lack of communication with citizens. These issues can lead to a low level of citizen satisfaction and negatively affect the performance of public employees.

Following interviews with public officials from Gura Ocniței City Hall, it was found that the majority of them identified communication as a major problem in terms of their performance. Lack of transparency in communication, communication conflicts, and lack of feedback were identified as the main issues.

Direct observations of employee behavior during interactions with citizens showed that some communication problems can arise due to several factors, such as lack of time, insufficient employee knowledge, and technical issues. For example, employees were unable to answer certain questions from citizens due to lack of knowledge and information. There were also technical issues with the city hall's computer system, which led to delays in providing information requested by citizens.

A first step would be organizing training for employees, with the aim of developing communication skills and increasing awareness of the importance of effective communication. These trainings could include interpersonal communication strategies, communication in conflict situations, and communication with citizens. In addition, feedback sessions could be organized, in which employees receive feedback on their communication skills and recommendations for improvement.

### **Proposals and recommendations**

Following the case study conducted in Gura Ocniței City Hall, certain communication problems were identified that had a negative impact on the performance of public officials. In this regard, the following measures can be proposed to improve communication within the city hall:

1. *Implementing an efficient internal communication system*: This can be achieved through online collaboration platforms or by organizing regular meetings among employees, with the aim of sharing information, problems, and solutions.
2. *Developing employee communication skills*: This can be achieved through organizing trainings and training sessions that target the development of interpersonal communication skills, conflict management, and communication with citizens.
3. *Ensuring an efficient flow of information*: This can be achieved by developing a centralized information management system and constantly updating it so that information is available in real time for both employees and citizens.
4. *Improving the relationship with citizens*: This can be achieved by developing efficient communication channels with citizens, through which they can receive information and

communicate with the city hall quickly and efficiently. These channels can be represented by online platforms, such as websites or mobile applications.

5. *Regular monitoring and evaluation of performance*: This can be achieved by implementing monitoring and evaluation systems for employee performance so that communication problems can be quickly identified and addressed appropriately.
6. *Creating an open and transparent working environment*: This can be achieved by encouraging dialogue and feedback between employees and between employees and citizens. This can contribute to increasing employee motivation and involvement in city hall activities, and ultimately improving their performance.
7. *Implementing an employee empowerment and accountability system*: This can be achieved by giving employees clear and well-defined responsibilities and encouraging them to make decisions within their scope of duties. This can increase the level of autonomy for employees and improve their performance.

In conclusion, the objective of this case study was to analyze the role of communication in improving the performance of public servants within the City Hall of Gura Ocniței. By using qualitative research methods such as interviews and direct observations, communication problems within the city hall were identified, and their impact on the performance of public servants was assessed.

The results showed that effective communication can lead to increased employee engagement and motivation, improved relationships with citizens, and better conflict management.

However, certain communication problems can have a negative impact on the performance of public servants, such as insufficient or ambiguous information, delayed or inadequate communication of decisions, and lack of communication with citizens.

To avoid poor communication and improve the performance of public servants, we recommend the development of the following skills:

- *Information synthesis*: This skill allows public servants to extract and combine relevant information from a variety of sources to formulate concise and clear messages. This is crucial to avoid ambiguities and to convey correct information to citizens and colleagues.
- *Logical thinking*: Logical thinking is essential to analyze situations and identify cause-and-effect relationships. Public servants with this skill can make rational decisions and communicate coherently, facilitating understanding and collaboration.
- *Reasoning*: Reasoning involves the ability to evaluate and solve problems based on logical principles. Public servants with good reasoning skills can identify and solve communication problems, anticipating possible negative effects and finding appropriate solutions.
- *Simultaneous analysis of multiple elements in multiple environments with unpredictable actors*: This skill allows public servants to manage complex situations, prioritize tasks, and efficiently respond to challenges involving multiple actors and variables. They can adapt communication strategies to the specific needs of each situation and maintain effective communication, even in unpredictable circumstances.

- *Decision-making ability:* Public servants must be able to make informed decisions and take responsibility for them. A solid decision-making skill contributes to building trust and reducing misunderstandings and conflicts in the communication process.
- *Assumed choices:* Assuming choices means being aware of the consequences of decisions and actions taken. Public servants who assume their choices improve their ability to communicate effectively, promoting transparency and accountability within the institution.
- *Real-world skills adapted to specific environments:* Public servants must be able to apply their communication skills in the specific context of the public environment. This involves adapting to procedures, regulations, and the unique needs of citizens and the community. By adapting real-world skills to the work environment, public servants can communicate more effectively and meet the diverse needs of various stakeholders.

To develop these skills among public servants, institutions can implement training and mentoring programs, as well as create opportunities for continuous learning. These measures can help improve employee performance and promote an organizational culture based on effective communication and responsibility.

In addition, the use of technology can play an important role in improving communication and developing the skills mentioned. Efficient communication systems and appropriate technical solutions can facilitate rapid and accurate communication between citizens and employees, while also allowing for data analysis and monitoring to identify weaknesses and areas for improvement.

### **Proposals for implementing modern technological solutions**

The use of technology to improve communication and employee skills development can be approached by implementing the following solutions:

- *Internal collaboration platforms:* Implementing internal collaboration platforms, such as Microsoft Teams, Slack, or Asana, can help employees communicate and work together efficiently. These platforms allow for rapid information sharing, project and task management, as well as real-time progress monitoring.
- *Citizen communication channels:* Creating accessible and user-friendly communication channels for citizens, such as mobile applications, chatbots, social networks, or web portals, can facilitate interaction and information exchange between citizens and employees. This can lead to better understanding of citizens' needs and faster problem resolution.
- *Customer Relationship Management (CRM) systems:* Implementing a CRM system adapted to the needs of the public sector can help efficiently manage information and interactions with citizens. This allows for monitoring and analysis of data to identify weaknesses and areas for improvement in communication and services.
- *E-learning and training platforms:* Implementing e-learning and online training platforms can facilitate employee skill development and access to training courses and materials. These platforms can offer a wide range of resources, such as courses,

tutorials, webinars, and interactive tools, which can help employees improve their communication skills and adapt to new technologies.

- *Data analysis and reporting tools:* Using data analysis and reporting tools, such as Tableau or Power BI, can help monitor and evaluate communication performance and service efficiency. These tools allow for identifying trends, weaknesses, and opportunities for improvement, as well as generating easily understandable reports and visualizations for informed decision-making.
- *Feedback systems:* Implementing feedback systems, such as online surveys, question-and-answer sessions, or discussion forums, can help public institutions better understand citizens' needs and expectations. These systems can provide valuable information to improve communication and services provided by public officials.
- *Videoconferences and virtual meetings:* Using videoconferencing platforms, such as Zoom, Google Meet, or Cisco Webex, can facilitate real-time communication between employees and citizens, as well as between different departments and institutions. These platforms can improve communication efficiency and save time and resources, especially in situations where physical travel is difficult or costly.
- *Process automation:* Integrating automation technologies, such as Robotic Process Automation (RPA) or Artificial Intelligence (AI), into communication and information management systems can reduce the time required to process and respond to citizen requests. This can lead to better efficiency and faster and more accurate communication between citizens and employees.
- *Progress monitoring systems:* Implementing progress monitoring systems, which regularly evaluate the effectiveness of communication and services provided, can contribute to identifying weaknesses and developing action plans for continuous improvement. These systems can provide relevant information for institution management and support data-driven decision-making.

By implementing these technological solutions, public institutions can create an efficient working environment adapted to the current needs of citizens and employees. This will allow for efficient communication, better collaboration among different stakeholders, and increased satisfaction and trust of citizens in public institutions.

By investing in the development of these skills and appropriate technical solutions, public institutions such as Gura Ocnitei City Hall can ensure efficient communication and improve the relationship with citizens. This will contribute to increasing citizen satisfaction, better resource management, and efficient addressing of community problems in a transparent, responsible, and adapted manner to the specific needs of the public environment.

In the perspective of future development, it is recommended to organize training for employees to develop communication skills and increase awareness of the importance of efficient communication. Additionally, it is important to develop efficient communication systems and appropriate technical solutions to ensure fast and accurate communication between citizens and employees. By investing in the development of employee communication skills and technical solutions, Gura Ocnitei City Hall can benefit from better performance and a better relationship with citizens.

In conclusion, improving communication and developing employee skills in public institutions such as Gura Ocnitei City Hall are crucial aspects to ensure better performance and a closer relationship with citizens. The use of technology and the implementation of appropriate solutions, such as internal collaboration platforms, citizen communication channels, CRM systems, e-learning, data analysis tools, feedback systems, videoconferencing, process automation, and progress monitoring, can significantly contribute to achieving these objectives.

These technological solutions facilitate fast and accurate communication between citizens and employees, promote better understanding of citizen needs, and improve process efficiency. Moreover, investing in the development of employee skills and adapting them to the specific public environment will lead to increased satisfaction and trust of citizens in the services offered by public institutions.

Therefore, public institutions that integrate these technological solutions and invest in employee skill development will benefit from better performance, efficient resource management, and a consolidated relationship with citizens. This will allow for an adapted and responsible approach to community problems while ensuring transparency and accountability within public institutions.

### Acknowledgements

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## **Ten essential principles for successful communication**

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**Abstract.** *To improve efficiency in the communication between public officials and citizens, there are ten essential principles that must be followed. These include transparency, clarity, timely response, active listening, accountability, collaboration, adaptability, professionalism, confidentiality, and integrity. Applying these principles can have a positive impact on the communication between public officials and citizens and can improve public services. In this article, each principle will be explained and concrete examples of how they can be implemented will be provided.*

**Keywords:** communication, civil servants, principles.

**JEL Classification:** D81, D83, L63.



## **Introduction**

Communication is a key element in all aspects of life, including the work of public officials and public administration. Efficiency in communication can have a significant impact on their performance and the services provided to citizens. In this article, we aim to analyze ten principles that can contribute to creating efficient communication between public officials and citizens, as well as within public administration.

Understanding the importance of efficient communication is crucial for public officials, as it can contribute to improving their relationship with citizens and providing better services. Also, efficient communication can help increase transparency and improve relations between public administration and citizens.

However, creating efficient communication can be a complex process, requiring constant effort from public officials. They must be prepared to address the specific challenges of this field and adopt a set of principles that ensure efficient communication with citizens and other members of public administration.

In this regard, through this article, we will identify the ten essential principles that can help create efficient communication between public officials and citizens, as well as within public administration. They will be presented in a clear and concise manner so that they can be easily applied by public officials and other members of public administration.

In conclusion, improving communication between public officials and citizens, as well as within public administration, is essential for achieving better performance and providing quality public services. Adopting these essential principles can help create more efficient communication, leading to a better understanding of citizens' needs and better collaboration between public officials and other members of public administration.

### **1. Principle of transparency**

The principle of transparency is essential for efficient communication between public officials and citizens. This principle requires public officials to be open and provide complete and accurate information to citizens.

Transparency in communication can be achieved by providing information about the decisions and actions of public officials, as well as by offering access to relevant documents and information (Carnegie, 2019). For example, public administration can publish reports and data on budget and expenses, as well as on services and programs offered to citizens. This can help build trust and transparency in the relationship between public officials and citizens.

Transparency can also be promoted by facilitating citizens' access to information, such as by creating an online portal or organizing regular public meetings. Public officials must be prepared to answer questions and provide complete and accurate information to citizens, regardless of their nature.

In conclusion, the principle of transparency is essential for efficient communication between public officials and citizens. Public administration must take measures to promote transparency and provide access to complete and accurate information, with the aim of building trust and increasing the performance of public officials.

**Table 1**

Ethical behavior	Unethical behavior
Respecting the confidentiality of information	Using confidential information for personal interests
Avoiding conflicts of interest	Participating in decisions involving personal interests
Honesty in reporting information	Reporting false or misleading information
Respecting citizens' rights	Neglecting or violating citizens' rights
Adhering to professional standards	Neglecting or violating professional standards
Compliance with laws and regulations	Violating or ignoring laws and regulations
Equal treatment of all citizens	Discriminating or favoring some citizens at the expense of others
Accountability for decisions and actions taken	Avoiding responsibility for decisions and actions taken
Open and transparent communication	Refusing or avoiding open and transparent communication
Meeting deadlines and commitments	Delaying or failing to meet deadlines and commitments.

**Source:** Developed by the author.

## 2. The principle of clarity

The principle of clarity is an essential component of effective communication between public officials and citizens. This principle focuses on how information is presented and received, with the aim of ensuring that messages are correctly understood by their recipients. It is important for public officials to use simple and easily understandable language, avoiding the use of jargon or technical terms.

In addition to using clear and simple language, presenting information in an organized and logical manner can contribute to ensuring clear communication. A well-structured and coherent format can help avoid confusion and ensure that information is transmitted efficiently and effectively (Borza, 2021).

A relevant example in which the principle of clarity is essential is when the public administration wishes to inform citizens about a change in local taxes. In this case, simple language should be used and the information should be presented in an organized and logical manner, including the start date of the change, the new tax amount, and how the tax will be used. A well-structured and coherent format can help avoid confusion and ensure that citizens are well informed and prepared for the change.

The principle of clarity is interconnected with the principle of transparency, which focuses on the accessibility and availability of information. Both principles are essential for efficient communication and ensuring that citizens are well informed about the decisions and actions of public administration.

It is important for public officials to adopt the principle of clarity in all their communication activities, from drafting official documents to presenting to citizens, in order to ensure that information is presented in a clear, concise, and easily understandable manner. It is also important to consider the education level and other socio-demographic factors of citizens,

in order to adapt the way information is presented so that it is accessible to all. The use of appropriate communication techniques, such as the use of charts, diagrams, or other visual forms, can help improve the clarity of communication.

Moreover, the principle of clarity is not only important in communication with citizens but also within public administration. Using clear and easily understandable language in official documents and internal correspondence can improve the efficiency and productivity of public administration, thereby avoiding misinterpretations or ambiguities.

To ensure that the principle of clarity is implemented in communication between public officials and citizens, attention should also be paid to other factors. For example, public officials should be prepared to answer citizens' questions about the information provided and offer additional explanations if needed. Also, online or offline resources should be available to help citizens better understand the information provided.

In conclusion, the principle of clarity plays an essential role in efficient communication between public officials and citizens and can improve understanding of public administration decisions and actions. Implementing this principle requires clear and organized communication, the use of simple language and avoidance of technical terms, as well as adapting the information presented based on the education level and other socio-demographic factors of citizens.

### **3. Principle of timeliness**

The principle of adhering to response times is directly related to the principle of clarity, as both focus on how information is received and understood. While the principle of clarity focuses on using simple and easy-to-understand language, the principle of adhering to response times focuses on the promptness with which public officials respond to citizens' requests.

The principle of adhering to response times refers to the promptness with which public officials respond to citizens' requests and respect the established response deadlines. This principle is essential for ensuring that citizens receive the information and assistance they need in a reasonable time and for building trust and transparency in the relationship between public officials and citizens (Feşnic, 2020).

Public officials must respond to questions and requests from citizens in a timely manner and inform citizens about the progress and results. Additionally, public officials must adhere to established response deadlines, such as deadlines for responding to information requests or resolving reported issues.

This principle can be promoted by creating clear and efficient procedures for responding to citizens' requests and by monitoring and reporting on the performance of public officials in adhering to response times. Public administration can also consider citizens' feedback and suggestions for continuous improvement of response times and services provided (Sîrbu, 2021).

Moreover, public officials need to be trained regarding the importance of adhering to response times and be held accountable for their responses. They must understand that quick and comprehensive responses can contribute to building citizens' trust in public administration and improving the services provided.

In conclusion, the principle of adhering to response times is essential for ensuring that public officials promptly and efficiently respond to citizens' requests and for building citizens' trust in public administration. It is important for public officials to respect response times and inform citizens about the progress and results of their requests. This can be achieved by using simple and easy-to-understand language and presenting information in an organized and logical manner, as accomplished by the principle of clarity.

#### **4. Principle of listening**

The principle of active listening refers to the ability of public officials to listen carefully and understand the needs and concerns of citizens. This involves an active and participatory approach to communication, where public officials are willing to listen and respond to citizens' questions and concerns.

Active listening can be achieved through open questions, answering questions, and passive listening. Public officials must be open and receptive to citizens' feedback and take into account their opinions and suggestions in the decision-making process. For example, if a citizen visits the information office of a public institution and complains about a faulty service, the public official should listen carefully, take note of the citizen's concerns, take action to resolve the issue, and inform the citizen about the progress of the issue resolution (Bădescu, 2021).

Active listening is essential for ensuring effective communication between public officials and citizens. It can contribute to building trust and improving the services provided by public administration. Through active listening, public officials can better understand the issues and needs of citizens and find more efficient and tailored solutions. This can contribute to the improved performance of public officials and the enhancement of services provided to citizens.

#### **5. Principle of collaboration**

Collaboration is an essential principle in the communication of public officials, as it involves working together with other members of public administration and citizens to achieve common goals. This may include collaboration between different departments or government agencies, as well as collaboration with community organizations or other partners. Collaboration can help increase the effectiveness of public services and build citizens' trust in their government.

Effective communication is essential for public officials and public administration in general. Therefore, it is important for public officials to adhere to essential principles such as transparency, clarity, adherence to response times, active listening, responsibility,

adaptability, professionalism, confidentiality, and integrity, thus contributing to their improved performance and the enhancement of public services provided to citizens (Săndulescu, 2019).

Collaboration can be achieved through public-private partnerships, where the government works together with private companies to provide high-quality public services. Additionally, collaboration can be achieved through partnerships with community organizations, which can offer valuable insight into community needs and contribute to the improvement of public services.

Collaboration can also be achieved through technology. The use of modern technology, such as online communication platforms, can facilitate collaboration between public officials and citizens, as well as between different departments or government agencies.

It is important to note that effective collaboration requires open and transparent communication, as well as a willingness to listen and work together to find solutions. Public officials must be willing to understand the needs of citizens and work together to meet them, thereby creating a more efficient and citizen-centered public administration.

Therefore, collaboration is an essential principle for public officials' communication, as it can contribute to increasing the efficiency of public services and citizens' trust in their government. Public officials must be willing to collaborate with citizens, community organizations, private companies, and other partners to achieve common goals and improve public services provided to citizens.

## **6. Principle of adaptability**

Adaptability is an essential principle in public officials' communication, as it involves their ability to adapt to changes and challenges. In the context of public administration, adaptability may include the ability to respond to legislative changes or the evolving needs of citizens.

Adaptability can also be important concerning technology, as public officials must be able to use digital tools and modern technologies to improve their services and respond more efficiently to citizens' needs.

Adaptability can also be important when collaborating with other members of public administration and citizens. This can include the ability to work in interdepartmental teams or in partnership with community organizations or other partners. Adaptability can help public officials be more flexible and find creative solutions to address challenges (Watkins, 2020).

In general, adaptability is essential for public officials to respond efficiently to citizens' needs and changes in the environment. By cultivating this principle, public officials can contribute to improving their performance and the public services provided to citizens.

## **7. Principle of confidentiality**

Confidentiality is an essential principle in public officials' communication, as it involves protecting sensitive information and respecting citizens' rights to confidentiality. In the context of public administration, confidentiality may include protecting citizens' personal information, such as names, addresses, contact information, and medical information. Confidentiality can also be important concerning information about government affairs or activities, which may be considered sensitive from a security or public interest standpoint.

Public officials have a legal obligation to protect sensitive information and respect citizens' confidentiality. This can include implementing security measures to protect digital information or using confidentiality agreements to protect information shared with other partners or organizations.

In addition, public officials must be aware of the laws and regulations governing confidentiality and adhere to these rules in all their activities. It is important for public officials to be well-trained in confidentiality matters and follow established procedures to protect sensitive information (Franc et al., 2020).

Confidentiality is essential for protecting citizens' rights and privacy and maintaining their trust in their government. By adhering to this principle, public officials can contribute to improving their performance and the public services provided to citizens.

## **8. Principle of connection**

Connection is an important principle in public officials' communication, as it refers to connecting public officials with citizens and other members of public administration.

Connection can help increase the efficiency and effectiveness of communication and contribute to improving public services provided to citizens.

Public officials can connect with citizens through various methods, including public meetings, social networks, and feedback programs. This can help identify citizens' needs and concerns and take action to address them.

Public officials can also connect with other members of public administration through collaboration and information exchange. This can help identify more efficient solutions and address common issues.

Connection is also important to avoid redundancy and ensure public services are provided efficiently and effectively. Public officials who connect with each other and other partners in the public and private sectors can identify ways to collaborate and provide more efficient and effective services to citizens (Sinek, 2021).

By connecting with citizens and other members of public administration, public officials can contribute to improving their performance and the public services provided to citizens. By connecting with other members of public administration, public officials can contribute to increasing the efficiency and effectiveness of public services provided to citizens.

## **9. The principle of empowerment**

Empowerment is an important principle in public officials' communication because it refers to granting authority and responsibility for decision-making and actions at the appropriate level.

This principle can help increase the efficiency and effectiveness of communication and contribute to improving public services offered to citizens.

Public officials who are empowered can make decisions quickly and act rapidly without the need for additional approvals or waiting for decisions from other members of the administration. This can help improve the efficiency of public services provided to citizens.

Empowerment can also contribute to increasing public officials' performance, as it allows them to make decisions and act autonomously, which can lead to greater involvement and motivation (Covey, 2021).

Furthermore, empowerment can contribute to improving communication between public officials and citizens, as the latter can access decisions and actions taken at the appropriate level and benefit from a faster and more efficient response to their requests (Popescu (Iacob), 2012).

By empowering public officials, public administration can ensure that decisions and actions are taken quickly and efficiently, thus improving public services provided to citizens, increasing public officials' performance, and enhancing communication with citizens.

## **10. The principle of multiplication**

Multiplication is an important principle in public officials' communication because it refers to the ability to spread and extend information and knowledge efficiently. This principle can help increase the efficiency and effectiveness of communication and contribute to improving public services offered to citizens (Scott, 2019).

Public officials can multiply information through various methods, including disseminating information through social networks, presentations, and publications. This can help spread information to a wider audience and improve communication with citizens.

Public officials can also multiply knowledge through training and mentoring. By transmitting knowledge and experiences to other public officials, better understanding of the issue and a better capacity to make decisions and act can be ensured.

Multiplication can also contribute to improving collaboration and enhancing the efficiency of public services provided to citizens. By sharing information and knowledge among public officials, all team members can stay up-to-date with the latest developments and make decisions and act efficiently (Rubin, 2020).

In conclusion, the principle of multiplication is essential for public officials and public administration in general. By cultivating this principle, public officials can contribute to increasing their performance and improving public services provided to citizens by

disseminating information and knowledge efficiently. By transmitting knowledge and experiences, a better understanding of the issue and a better capacity to make decisions and act can be ensured.

### **Conclusions**

We believe that adhering to these essential principles in public officials' communication and public administration can be an important step in improving the relationship between them and citizens. Applying these principles, such as transparency, clarity, adhering to response deadlines, active listening, accountability, collaboration, adaptability, professionalism, confidentiality, and integrity, can lead to more efficient, professional, and credible communication between public officials and citizens.

It is important to consistently prioritize public officials' training and maintain a high level of knowledge and skills to ensure the implementation of these principles. Moreover, respecting citizens' information confidentiality and avoiding unethical behaviors such as corruption are essential for efficient and professional communication.

Public authorities should continuously monitor the effectiveness of these principles and adapt according to the needs and requirements of citizens to demonstrate their commitment to improving public services and citizens. Implementing these principles can also contribute to increasing citizens' trust in public authorities and improving their quality of life through better and more accessible public services.

In conclusion, we believe that adhering to essential principles in public officials' communication and public administration can be an important step in improving communication between them and citizens, as well as in enhancing public services provided. These can be applied through consistent training of public officials, maintaining a high level of competence and knowledge, respecting citizens' information confidentiality, avoiding corruption, and unethical behavior.

It is important to note that this may require certain adaptations and changes at the system and organizational culture level, but these can be justified by the long-term benefits, such as increasing citizens' trust in public authorities and improving their quality of life through better and more accessible public services.

In the end, we believe that implementing these principles can be a genuine commitment of public authorities to work in the interest of citizens and ensure high-quality public services. It is important to continuously monitor their effectiveness and adapt according to citizens' needs so that high-standard public services can always be provided.

Ultimately, it is essential for public authorities to demonstrate their commitment to citizens by consistently applying and adapting these principles in public officials' communication and public administration. Through constant training, maintaining high levels of competence and knowledge, respecting confidentiality, and avoiding corruption and unethical behavior, public authorities can work towards building trust and ensuring better



public services for their citizens. By doing so, they can contribute to improving the quality of life for all and create a more inclusive and responsive public sector.

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## **The impact of the energy crisis on everyday life**

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**Abstract.** *Energy is becoming an increasingly important resource and convenience as the world continues to become more industrialized. Due to an imbalance between supply and demand, there is currently an energy crisis. This article will examine the effects of the energy crisis on the world economy, including rising costs, resource scarcity, and the possibility of market collapse. The various solutions to this dilemma will also be covered, including the creation of alternative energy sources and measures to improve efficiency.*

**Keywords:** energy, crisis, EU, analysis macroeconomic.

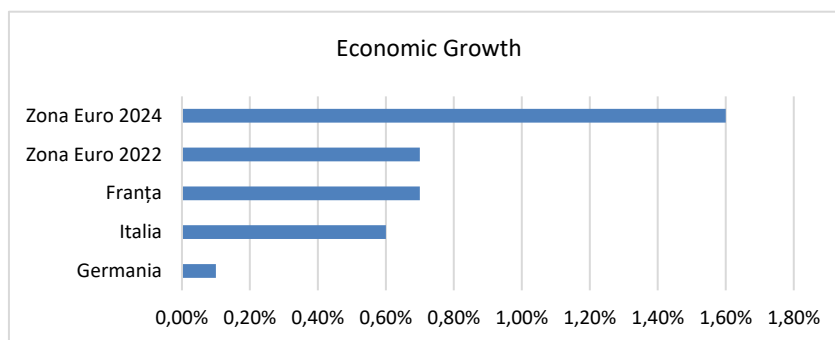
**JEL Classification:** L10, L11, L19.

The 2022 energy crisis is a looming issue that has had a major impact on the daily lives of people around the world. As the world's population continues to grow, the demand for energy is increasing, but energy sources are not keeping pace with demand. This crisis means that people will have to make changes in their daily lives to cope with the energy shortages that are expected to occur in the coming years.

The first and most obvious impact of the crisis was the increase in energy costs. With the rising cost of energy, people have been forced to spend more money on things like electricity, gas and oil. This additional cost had a significant impact on household budgets as families had to make difficult decisions about what they could and could not afford. This meant cutting back on discretionary spending, such as entertainment or travel, as well as on basic needs, such as food and housing. The energy crisis of 2022 also affected transportation. With more and more people relying on automobiles for transportation, the demand for gasoline has increased. This has resulted in higher gasoline prices or a shift to alternative fuels such as electric cars or hybrid vehicles. In addition, public transport systems may need to be improved to reduce energy consumption, and people may need to consider alternative forms of transport such as cycling or walking. Europe's transition to electricity has certainly been accelerated by the energy crisis. In 2023 the clean, electrified economy towards which Europe is rushing will be fully manifested. Everyone must be prepared for the rapid change ahead.

The crisis also had an effect on businesses and the economy as a whole. With rising energy costs, businesses have either had to raise prices to cover their costs or pass the costs on to consumers. This resulted in inflation and additional pressure on household budgets. In addition, businesses have had to cut production and staff to stay afloat, leading to job losses and reduced economic activity. According to a European Commission estimate published in January, consumer prices in countries using the euro rose at an annual rate of 8.5% in January, down from 9.2% in December. Since the inflation rate hit 10.6% in October, there have been three monthly declines.<sup>(1)</sup>

According to studies carried out by the International Monetary Fund, the European economic area that uses the Euro is estimated to grow by 0.7% compared to the initial estimates of 0.5%, reaching a share of 1.6% in 2024.<sup>(2)</sup> While some European powers have a strong and stable growth rate such as France with a yield of 0.7% and Italy with an increase of 0.6% for 2023, other powerful states are struggling to assimilate a positive trend such as Germany which has managed to reach 0.1% growth from -0.3%.



The International Monetary Fund said this week that despite the likelihood of a slowdown in the global economy this year, growth is likely to be more resilient than expected, thanks in large part to persistent efforts by central banks to fight inflation, which have begun to show results. In the past, Germany's imported gas supply accounted for 60% of Russian gas exports and about 40% of the total amount of gas imported by European nations. Industry estimates state that the EU has increased its purchases of Russian gas by 150% over the past 20 years. Although some gas is still imported via Turkish Stream and in the form of liquefied natural gas, the European Union has largely eliminated Russian oil and gas from its energy mix.<sup>(3)</sup>

The energy crisis also had an impact on the environment. As the cost of energy rises, the likelihood that people will use more coal and other fossil fuels to meet their energy and industrial production needs has increased. All these price fluctuations have resulted in an increase in the price of all primary processing materials. This can lead to increased air pollution and climate change, further impacting the environment and economy.<sup>(4)</sup>

Last summer, Azerbaijan emerged as an alternative to natural gas. Austria, Bulgaria, Germany, Greece, Italy, Spain, Ireland, Portugal, Romania, Croatia and the Czech Republic already receive oil and gas from the nation. The EU said Azerbaijan's natural gas supply to the EU will double by 2027, reaching 12 billion cubic meters in 2022.

After months of volatility that put pressure on European businesses and households, EU energy ministers finally agreed to cap gas prices at €180 (£159) per megawatt hour (MWh) as 2022 draws to a close.



EU policymakers say the cap is an attempt to regulate unruly market forces that sent gas prices soaring to nearly €340/MWh last summer and electricity prices approaching a record €1,000/MWh. However, new floating regasification terminals in Germany and the Netherlands have allowed an increase in liquefied natural gas (LNG) imports by winter,

and Europe would have enough gas in storage for the season. While this government intervention may give the impression that this energy crisis caused by Russia's invasion of Ukraine in February 2022 is finally over, it is not. The recent gas price cap imposed by EU policymakers was significantly higher than key LNG prices and the cost of gas purchased in advance on the futures market for delivery this winter, which is currently trading around €70 per megawatt hour.<sup>(5)</sup>

The energy cataclysm of 2022 has had a significant impact on everyday life from an economic perspective. With rising energy costs, people have been forced to make difficult decisions about how to allocate their limited resources. Businesses faced high costs and people struggled with increased prices for goods and services. The effects of the crisis can also be seen in other areas, such as transport, the environment, production and services. Finally, the energy crisis has shown its significant impact on the global economy, with countries facing increased pressure to provide energy to their citizens.

### **Proposals**

If 2022 served as the year for emergency measures to address the energy crisis, then 2023 will serve as the beginning of addressing the fundamental problem and ensuring that a catastrophe of this nature never occurs again. Most of the emissions rules have been finalized by the end of 2022, and the choices made indicate that the EU is "still on pace" to meet its climate targets. A reform of the EU's electricity market, which is expected to be proposed in the spring, should help increase renewable energy sources. Adoption of regulations promoting renewable energy and energy efficiency should take place this year. There will also be a push to finalize legislation on gas decarbonization and improving the energy performance of buildings.

Combined, this should help Europe switch from expensive CO<sub>2</sub>-emitting gases to renewable energy sources and reduce overall energy consumption. To meet its emissions reduction targets, the EU will also need to phase out the use of coal. People and workers must get enough help in these difficult times to maintain a good standard of living. In this sense, maintaining people's purchasing power requires wage increases and income replacement that are at least in sync with productivity growth and inflation. During this crisis, social discussions and collective bargaining are also essential strategies for ensuring justice and unity.

### **Conclusion**

The European Commission wants to establish long-term electricity contracts that provide consumers with reliable energy at a fixed cost. All new investment requiring subsidies must be guaranteed to producers by EU member states at a minimum energy price. The plan provides government guarantees designed to increase the viability of long-term agreements between electricity producers and users. According to the EU commission, its aim is to strengthen the rights of end-users by allowing them to select suppliers that offer both fixed-price and dynamic contracts, as well as the option to sign more than one supply contract.

The energy crisis is a global problem that requires a global solution. To solve the crisis, we need to focus on increasing and stabilizing the efficiency of existing energy sources, transitioning to renewable energy sources and reducing our energy consumption. We also need to develop more efficient and cost-effective technologies for energy production and distribution, and promote the sustainable use of energy in the public and private sectors. Finally, governments must create policies and regulations that encourage energy conservation and the use of renewable energy sources. With the right measures, we can solve the energy crisis and create a more prosperous and sustainable future. This requires investment in new energy sources as well as policies that promote energy efficiency and reduce energy waste.

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### Notes

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- (1) See at: <https://www.nytimes.com/2023/02/01/business/eurozone-inflation.html>
- (2) See at: <https://www.forbes.com/sites/kenrapoza/2023/02/01/europe-didnt-escape-an-energy-crisis-just-yet/?sh=1834a16969e1>
- (3) See at: <https://theconversation.com/global-economy-2023-how-governments-could-make-the-energy-crisis-worse-this-year-196986>
- (4) See at: <https://ember-climate.org/insights/research/european-electricity-review-2023/>
- (5) See at: <https://www.euronews.com/my-europe/2023/01/31/imf-improves-economic-forecast-for-the-eurozone-and-russia-amid-energy-crisis-and-raging-w>

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<https://www.nytimes.com/2023/02/01/business/eurozone-inflation.html>  
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## Macroeconomic trends in Romania 2023

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**Abstract.** *Romania in 2023 has been forecast by the specialists to present high economic stability and great recovery after the impact of the COVID-19 pandemic. Therefore, the inflation rate, the unemployment rate, and the GDP deflator will be continuously decreasing, while the GDP, the employment rate, and the FDIs will be increasing, driving the economic growth. Meanwhile, the government, after understanding the need for sustainability and the role of digitalization and innovation, will be supporting even more the SMEs and the IT industry, and its main economic pillar – the agriculture, while encouraging and supporting young entrepreneurs to establish their own business.*

**Keywords:** macroeconomics, trends, economic behavior, innovation, macroeconomic opportunities.

**JEL Classification:** E00, E60, E70, A10.

## Introduction

Both at national and European level, 2023 represents a year that can bring valorous perspectives on macroeconomic trends. Those trends are specifically sustained by overcoming the crisis period and the post-pandemic macroeconomic stabilization, as well as by the new tendencies in consumers behavior as a general, which nowadays are focusing more on achieving the sustainability goals.

Even if at a first glance, the European macroeconomic trends are not particularly opportune, with a contraction of real Gross Domestic Product (real GDP) expected by approximatively 0.1% by the first quarter of 2023 and an average inflation rate of 10.40% in the European Union (European Central Bank, 2022); on the market itself, the trend of inflation rate reduction is significantly present. However, the macroeconomic prognosis is developed from optimistic perspectives, giving an average inflation rate of 3.6% by the end of 2023.

Regarding Romania's situation, which has been powerful impacted by an inflation rate of 16.37% at the end of 2022, the macroeconomic specialists did forecast a deflationary trend, reaching the level of 6.5% by the end of 2023, value similar with Bulgaria, Czech Republic, Hungary, Poland, and Slovenia – countries with similar economic particularities. Meanwhile, the extremities of the inflation rate's range at European level by the end of 2023 will be recorded by Turkey (29.6%) and Greece (1.5%).

The importance of macroeconomic trends and forecast at the level of the real economy is directly emphasized by the composition of the macroeconomic indicators, such as GDP and GDP per capita, which includes crucial information about economic growth, inflation rate, wages level, unemployment rate and international trade.

## Literature review

The introduction and the implementation of modern technologies represented a crucial step for economic development and the business environment, since the quantifiable effects at the microeconomic level can be directly observed at the macroeconomic level as well, in the development of the socio-economic environment and the growth of macroeconomic indicators.

Reason for which, it led indirectly to an increase in the quality of effective management of decisions and in the efficiency of processing information and services, with the final result of improving the general socio-economic environment, the technological environment, the cultural environment, and the sanitary environment, directly imposing an increase in the country's Gross Domestic Product (GDP). Therefore, it can be observed how the current trend of the macroeconomic level are based on the digitalized environment, in which Information Technology (IT) has led to the emergence of new opportunities at national economic level, including all three sectors of economy: agricultural, industrial, and services.

Hence, changing the general trend of the business plan towards successful business models, based on digital technologies and processes, while using the Artificial Intelligence (AI) in



their activities and operations. At the same time, the period determined by the sanitary crisis represented a good opportunity to reconfirm the need for economy's sustainability, especially at macroeconomic level, following more carefully the transition measures towards circular economy and green economy, focusing on a better management of the limited available resources to meet the unlimited needs of individuals (Kuzior et al., 2023).

As the society has been developing rapidly, nowadays for conducting a sustainable and well-organized economic environment, governments and businesses must understand that macroeconomic decisions should be based on strong microeconomic foundation, so organizations and households need to pursue the principle of optimization and to base their optimality on rational expectations. The studies have also shown that only by concluding macroeconomics with microeconomics and with behavioral economics, the economic environment will align to develop through sustainability and economic growth, starting from the Keynesian principles (Olesen, 2022).

Although, as the research conducted by Syverson (2019) has highlighted, the macroeconomic market should be analyzed in order to identify and to offer better understanding for the existing connections between trends, such as: increasing firms' profits, increasing margins and concentrations, labor force's declining share of income, slower growth in productivity, and the reduction on investment rates which conclude with a decrease in firm entry and dynamism. All of those aspects should be investigated in order to outline the current development trends of the economy, especially focusing on the macroeconomic environment, which should be either influenced by the microeconomic environment or might as well to influence directly the microeconomic environment, and therefore to set the rules and regulations for small firms to play on specific markets.

But today, one more important aspect is to be taken into consideration while analyzing the macroeconomic environment: digitalization. Especially digitalization in its form as *megatrends* which briefly represents complex combinations of several factors, such as: economic, cultural, politic, technological, and philosophic, which can impact the development of the economic environment and in addition, the social environment as well, affecting the business environment and consumers behavior (Mittelstaedt et al., 2014).

This is also sustained by the fact that digitalization and innovation are the main drivers of sustainability, which had developed several trends over the last past years, for instance: agricultural innovation, clean tech, ethical consumption, circular economy, zero waste, and energy harvesting. Therefore, innovation and digitalization, hence the implementation of the latest digital technologies in business processes and daily activities, are extremely important in reshaping the microeconomic environment, which will affect forward the macroeconomic environment, in order to drive further the sustainability of the economy and to achieve more economic growth while still paying attention to the limitations and concerns imposed by the current circumstances (Gaudig et al., 2021). Another aspect that is crucial in outlining the macroeconomic environment of a country is represented by its demographics. Demographics, understood both as households and labor force, can influence the macroeconomy through three general channels: life-cycle consumption, incentives to alter human capital accumulation, and influence of young workers on the innovation process (Aksoy et al., 2019).

Hence, there are several key factors that directly influence the macroeconomic environment of a country, so by analyzing them, an overview of the general trend of the macroeconomy can be concluded.

### Macroeconomic trends in Romania 2023

Considering that the end of 2022 has led to certain concerns, supported in particular by the economic and political situation of the European continent, fairly prosperous stability of the labor market is generally expected. However, considering the possibility of short-term labor shortages, a slowdown in GDP growth rate is expected at the European level in 2023. The slowdown will be mostly supported by the cessation of financial support granted by the governments and EU institutions to the business environment for overcoming the impacts of the crisis determined by the COVID-19 pandemic. Therefore, the most important research topic that the specialists should focus on is to shape the new mainstream that will be driven by the current macroeconomic trends, directly affecting the paradigm that the national economies are based on, taking into consideration the new environment shaped by the last several years.

According to the latest report published by The National Commission for Strategy and Prognosis on 26<sup>th</sup> of January 2023, the projection of Romania's main macroeconomic indicators following forecasted data for 2023 can be observed in Table 1 (CNP, 2023).

**Table 1.** Romania's main macroeconomic indicators. Trends for 2023

The Gross Domestic Product (GDP) will register a real growth of 2.8% compared to 2022, with a main gross added value especially in agriculture, forestry, and fishing – approximately 10.6%.
The GDP deflator will continue to decrease, after the increase registered between 2021 (5.2%) and 2022 (14.5%) to 9.1% in 2023, following to an estimated value of 5.3% in 2024.
The Consumer Price Index (CPI) will behave similar to the GDP deflator, decreasing towards a forecast annual average value of 10.8% in 2023, after the increase registered between 2021 and 2022 (from 5.1% to 13.8%).
The Balance of Trade (BoT) will deepen instead with approximately six million euros, from -34 million euros in 2022 to -40 million euros in 2023, although a 10.6% increase in exports and a 12.5% increase in imports are expected.
The Current Account Balance (CAB) in 2023 is expected to represent approximately -9% of GDP and to have an estimated value of -27.5 million euros, in the same range with the registered data from 2022.
The average gross salary is expected to increase by 12.2% in 2023, compared to its value registered in 2022, reaching values around 6850 RON (1387 EUR – using the average EUR/RON 2023 exchange rate of 4.94 RON to 1 EUR).
The average number of employees will increase by 1.5% in 2023 compared to 2022, leading to a decrease in the unemployment rate through the value of 2.7% at the end of 2023 and a 1.7% increase in real wage earnings.
The average EUR/RON (Romanian New Leu) exchange rate is forecasted to remain relatively constant in 2023, at a slightly higher value than the ones registered in 2021 and 2022, of 4.94 RON to 1 EUR.
Final consumption, private consumption and government consumption are forecasted to register a lower growth rate in 2023, compared to the growth rate registered in 2022.

**Source:** Data processed by the authors from cnp.ro

After 2022, a year in which Romania showed increased economic growth compared to the European Union average, private consumption and investments have been in continuous increment, as a result of lifting the pandemic restrictions. This fact also allowed the increasement in the aggregate demand, supported by a stable labor market, and outlined by an increase in the employment rate, especially during the pandemic period (2pp, alongside Poland), and in salaries, therefore directly impacting the disposable income. Hence causing an increase in private consumption, which has also been pushed by the measures and

regulations adopted by the government in order to mitigate the impact of high energy prices (Eurostat, 2022a).

Although, private consumption has increased through the significant increase in disposable income, following the financial support given by the government. Meanwhile, government spending has also increased, the reason for which balancing the Current Account Balance will be a long-term race that will have to be completed gradually. One step further will be achieved in the moment when the investments realized for overcoming the impact of the COVID-19 pandemic will start to give the expected returns at an effective level.

At the same time, regarding to the level of Foreign Direct Investment (FDI), it can be observed that the FDIs came mainly from other European Union states, and have been injected to Romania's key industries, especially in the production of goods and services available for export, such as: industrial manufacturing, international trading, financial analysis tools and instruments, and agriculture. Besides directly impacting the level of production, FDIs also impacted the level of employment, bringing new job opportunities for the individuals and therefore leading to economic growth, and an increase in the GDP. The Balance of Trade (BoT), on the other hand, will keep its *tradition* of always being in favor of imports, which are still significantly higher than Romania's exports of machinery, transport equipment, raw materials and textile products to other EU countries; with Germany, Italy, and France being the main partners of trade (Foreign Investors Council, 2020).

Even if in 2021 an increase in the unemployment rate can be observed as a result of the crisis situation imposed by the COVID-19 pandemic, the implementation of the latest digital technologies and the possibility of working remotely led to the remedy of the labor shortage, bringing with it the possibility for the active population to find a lot easier a working place, reducing the time allocated for commuting, or even for the employed population to enroll in a second job, increasing their disposable income. In this situation, the increase in the marginal propensity to consumption and therefore the private consumption of the general population led to an increase in the GDP. However, in the short term, the level of investments is expected to decrease, taking into account the completion of the period in which the financial aid was granted by the government. Therefore, the business environment will aim instead to extinguish the debts made during the crisis period to the financial-banking institutions.

### Macroeconomic opportunities for young entrepreneurs in Romania

As for the macroeconomic opportunities for young entrepreneurs in Romania, there were and are still booming possibilities, especially due to the implementation of the new digital technologies in the economic activities, business environment, and in the strategic and operational management of business models. As in the other states like Romania, the business environment provides multiple possibilities, especially for the young people who desire to establish their own business. Predominantly, it can be concluded that at the moment there are several trends in the field of business, such as: tourism and catering services, entrepreneurial consulting, medical assistance services, transport and logistic

services, software and mobile applications development, agricultural consultancy, e-commerce, and repair and maintenance services. Hence, it should be borne in mind that most fields have been propelled by the implementation of modern digital technologies in the conduct of economic activities.

Business opportunities do not necessarily represent innovative ideas or first experiences. Instead, they once again emphasize the importance of business and macroeconomic sustainable environment, effective in terms of managerial decisions and in meeting the unlimited needs of individuals with the production determined by the limitation of the available resources, with an increased tendency to follow the use of renewable and recyclable resources. This is specifically important in order to achieve the goals of sustainable development (SDG) and to implement the transition from the linear consumption model to the consumption model described by the characteristics of the circular economy, in which the available resources are reused in order to obtain the highest possible added value from them, specifically focusing on using secondary materials in manufacturing industries. The action plan includes as well strategic measures such as: making sustainable products the norm in the EU, empowering consumers and public buyers, focusing on the sectors that use most resources and in which the potential for using the secondary materials is high (electric and electronic equipment, Information Technology equipment, batteries, vehicles, packing, and constructions), and ensuring waste reduction (European Commission, 2020). This is one more step forward for new business ideas that can be determined and established with more sustainability by the young entrepreneurs that are aiming to start their own business, especially in an economic environment in which resources are becoming harder to obtain and the secondary materials are gaining more popularity due to their ability to acquire more added value once reintroduced in the production processes.

But, as could be observed during the COVID-19 pandemic period, the need for self-support also appeared within the economic unions as well, which is the reason why although the EU represents a unitary of the majority of European states, the need for insurance in the national level economy is crucial. Based on the three great pillars of macroeconomics: agriculture, infrastructure and social security, multiple scenarios have been introduced into debates by the supporters of the economic concepts of nationalism. Therefore, most governments have decided to support the key sectors even stronger by introducing and implementing strategic economic recovery programs.

In the case of Romania, it can be observed how agriculture is supported directly both through the Romania's Recovery and Resilience Plan – PNNR and the 2023-2027 National Strategic Plan – PNS, which propose complimentary support for income destined to young farmers, investments in consolidating holdings of young established farms, especially in installing and supporting the establishments, while strengthening the support given by the government to stimulate investments in hospitality, construction and manufacturing.

Also, the importance of the IT sector remains valid in the current post-pandemic context in which the Romanian Government continues to provide financial support for the digitalization of small and medium-sized enterprises (SMEs), but also for the implementation of the necessary conditions for SMEs to be able to increase their level of

sustainability and to become more effective, following the typologies of business models described by the circular economy and the business environment developed during the COVID-19 crisis. At the same time, the Romanian Government, through the Ministry of Investments and European Projects, offers micro-enterprises and small non-IT businesses in Romania grants between 20.000-100.000 euros to be able to finance the digitization of their activity. This is particularly important for the development of Romania's business environment; hence this objective is pursued by the PNNR, allocating separate budgets and grants for IT SMEs and for those who are aiming for going publicly on the stock market. Moreover, the companies and small businesses from Arad, Caraş-Severin, Hunedoara, and Timiş counties will be able to receive financial aid from the government, depending on their financial results and their economic activities' NACE codes, available as well for the established business which are still in the phase of developing, especially if the activity is owned and coordinate by young entrepreneurs.

Meanwhile, SMEs funds in spa resorts represent a good opportunity for young entrepreneurs in Romania, willing to start their own business in the hospitality sector, with more than 15.000.000 Romanian Lei (RON) guaranteed as allocated budget, representing minimis aid scheme for economic operators in order to modernize the old spa resorts, including investments in tourism, spa activities, cultural and leisure facilities infrastructure.

In addition to all of this, the entrepreneurial opportunities for young people determined by the macroeconomic environment are quite attractive for young entrepreneurs in Romania, as evidenced by the high number of start-ups that have been established in Romania recently, with various fields of activity, from e-commerce to cafes, and small, ecological and biological farms, based on green economy systems, a trend that has also imposed changes in consumers behavior and therefore in production, mainly in the last decade, together with the general trend of lifestyle changes towards sustainability, recycling and regeneration.

However, although the European Commission has suggested in its forecast an economic growth of 2.5% for Romania (EC – Economic forecast for Romania), there are certain risks that must be taken into account when discussing the impact of macroeconomic forecast for Romania, especially considering the uncertainty regarding the final net impact of energy market measures, slower GDP growth and the deficit of the Current Account Balance that can deepen even more due to the political pressures related to the 2024 presidential and parliamentary elections.

Meanwhile, one fact that can be noted in general as a small overview can be the preference of both entrepreneurs and government to use at macroeconomic level all the available technological resources in the establishment, implementation and development of business models, focusing on digitalization and processes' automatization for achieving sustainability and higher economic growth.

## Conclusions

The macroeconomic trends forecast a stable economic environment for Romania in 2023. In terms of sectoral growth, Romania might see significant development in its services sector, particularly in areas such as IT and outsourcing, due to its geographical position on the European continent and its salary levels, which are remarkably lower than the EU average (Eurostat, 2022b). At the same time, alongside the services sector, the manufacturing sector has also experienced growth in the past several years, noticeably in industries such as automotive and electronics.

Meanwhile, the unemployment rate overall has been decreasing in recent years, even if the COVID-19 pandemic strongly impacted it. Although, the unemployment rate remains at a higher value, compared with other EU countries. Simultaneously, the inflation rate has been kept under control and the country has maintained a stable fiscal policy, outlining once more Romania's stability of macroeconomic trends in 2023.

Looking forward to 2023 and further, Romania's economy is expected to continue growing, although at a slightly slower pace due to the current global factors, such as: trade tensions and rising interest rates. The country will remain attractive for foreign investors, particularly in the technology and manufacturing sectors. Initiatives to improve and develop the infrastructure, such as the expansions of highways or railways, and the expansion of the IT connectivity network are expected to boost the economic environment even more while increasing connectivity and therefore leading to higher economic growth for Romania.

However, even if the current trends highlight Romania's capability to achieve great economic growth and economic prosperity since its macroeconomic stability represents an important advantage, challenges such as corruption and wage disparities between urban and rural, and urban and urban, alongside the disparities from public sector to private organizations, might hinder country's progress to great economic achievements and sustainable economic development.

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## **Fiscal integration of the monetary union – the solution against fragmentation**

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**Abstract.** *Lack of faith in national debt sustainability and country-financial market fragmentation are frequently two sides of the same coin in a monetary union. With the start of the global financial crisis in 2007, the fragmentation has significantly expanded, thus the effectiveness of interest rate pass-through has become more heterogeneous across euro-area countries, making single monetary policy more challenging. Since the start of the COVID-19 pandemic, financial fragmentation was overturned by a set of European Central Bank monetary policy expansionary measures and by the EU's decision to implement a fiscal capacity centered on temporary Support to mitigate Unemployment Risks in an Emergency (SURE) and the program of the Next Generation EU (NGEU). Our aim in this article is to examine financial market fragmentation in the euro area and discuss solutions on how to reduce it.*

**Keywords:** fragmentation, next generation EU, fiscal integration, monetary union.

**JEL Classification:** F02, H53, H55, H81.



## Introduction

The results demonstrate that the discussion of fiscal integration becomes more prominent with each economic and political crisis and that these shifts can be either in favor of increased fiscal integration, decreased fiscal integration, or no fiscal integration at all.

Since the start of the global financial crisis (2007-2009), the euro area's financial markets have frequently been fragmented, and there is a vicious cycle between the crisis of its sovereign debt and the crisis of its banking sector (2010-2013).

The issue, which was made worse by the overburdening of the ECB's function (2015-2018) and the associated fiscal and financial "dominance", was not resolved by the partial implementation of the Banking Union and Capital Markets Union procedures.

The pandemic emergency purchase program (PEPP) and strengthened targeted longer-term refinancing operations of the ECB, as well as the EU's decision to implement a central fiscal capacity focused on the temporary Support to mitigate Unemployment Risks in an Emergency (SURE) and the program of the Next Generation EU (NGEU), helped to reverse the financial fragmentation that had been present in the euro area since the beginning of the COVID-19 pandemic. With this new policy combination, hazardous domino effects and significant differences in economic cycles across EU member states were avoided.

The economic recovery in the United States (US) and the euro area in 2021 indicated that the worst economic slump to have occurred during peacetime in the past two centuries had reached its apex and had been overtaken within a few quarters.

The new phase was aided by gains in aggregate demand in the US and, to a lesser extent, in the EU. The fresh COVID-19 waves in China, the Russian invasion of Ukraine, and the pandemic's medium-term detrimental effects on logistics and global value chains have led to chronic supply-side bottlenecks and sharp price increases for food, other raw commodities, and energy.

Radical uncertainty and a lack of faith in the viability of national debt are once more causing the dispersion of financial markets in the euro area in this environment marked by high inflation and a growing and asymmetric danger of economic stagnation.

The danger is increased by the ECB's gradual introduction of a restrictive attitude since March 2022 in an effort to oppose inflationary pressures and adhere to US monetary policy.

Episodes of stress in a sovereign debt market can produce fragmentation in money and credit markets across euro-area countries so that the singleness of monetary policy is impaired, divergences arise in the transmission mechanisms of monetary policy.

Our aim in this article is to examine financial market fragmentation in the euro area and discuss solutions on how to reduce it. In this context, the Next Generation EU is proof of fiscal integration that contributed to the reduction of fragmentation by eliminating a common debt.

### Literature review

Jones et al. (2021) stressed that the European Council's decision in July 2020 to stimulate economic recovery from the COVID-19 pandemic with the 750-billion-euro Next Generation EU package could mark a critical juncture in the development of the European Union toward a stronger redistributive function.

Crises, such as a pandemic, have widely been identified as opportunities for learning (Kamkhaji and Radaelli 2017). With respect to NGEU, Ladi, and Tsarouhas (2020) maintain that policy learning from previous crises by national and supra-national actors led to profound changes, which modified the norms, policies, and objectives of the EU.

In their work, Armingeon et al. (2022) show that NGEU is mainly a response to the economic and political imbalances left over from the Eurozone crisis. It is clear from the RRF's grant allocation formula that the true immediate effects of the pandemic, such as excess mortality rates, the number of bankruptcies caused by the pandemic, or the rise in income inequality and poverty, were never taken into account when determining the size of grants. Instead, the grants were based on economic criteria and population size.

The first tranche of NGEU (70% of grants) is solely based on pre-crisis economic conditions, in particular, a member state's average unemployment rate over the period of 2015-2019 relative to the EU average over this period. The second tranche of NGEU (30% of grants) takes the fall in GDP since the onset of the crisis into account, in addition to population size and GDP per capita.

In reaction to the pandemic, the main focus of the decision-makers was to address the political and economic repercussions of the poorly managed sovereign debt crisis in order to prevent the collapse of the Eurozone and additional political and economic instability inside the EU.

There is no cause to minimize the accomplishments of the European Commission and leaders of state and government in creating a solution to the COVID-19 situation (Schmidt 2020). Together with the multi-year budget, the program's gross numbers are excellent. However, in light of the following, any assertion of a significant and historic policy shift must be balanced against and perhaps revised:

1. Claims of joint debt liability are exaggerated. Within the EU budget, paying back the collective "Corona debt" is a fixed expense. Only the EU's own resources, i.e. the payments each member state sends to the EU budget on the basis of gross national income, are available to hold member states accountable.  
Also, the actions are clearly transitory and have a narrow focus (European Council, 2020). So, the stigma associated with shared debts has only been slightly tainted. However, even before the present NGEU program, the Union (or the Community) borrowed on the capital market multiple times.
2. The overall size of the stimulus within NGEU is moderate. According to its provisions, the July 2020 agreement's maximum distribution of up to €750 billion would be made over a three-year period. 1 billion each year. The average yearly stimulus would amount to around 1.8% of GDP with a total EU GDP of €13,965 billion. Yet, the yearly stimulus would be considerably lower if the loans were not fully repaid (Jones, 2021).

In contrast, the March 2021 adoption of a US stimulus package of \$1.9 trillion is at least five times larger than the NGEU and represents 9% of the US GDP.

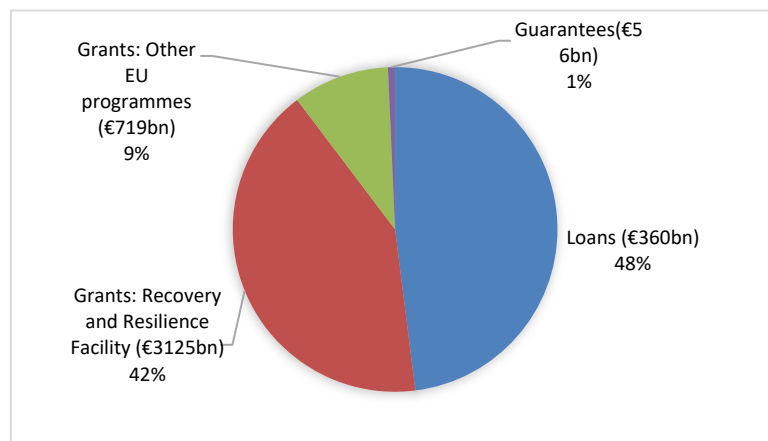
3. The ECB saved the Eurozone and perhaps the EU once more. Based on its experience with the sovereign debt crisis and the subsequent implementation of quantitative easing, the ECB intervened at the start of the epidemic. With some initial hesitancy, the ECB supported the euro by launching the Pandemic Emergency Purchase Programme (PEPP), which was eventually raised to €1,850 billion in order to prevent the collapse of the Eurozone. PEPP was created to be adaptable, enabling customized intervention based on need. All (net) purchases made under the program as of 16 April 2021 were €976.5 billion. PEPP's launch gave the EU Commission and member states some time to come to an agreement on a common tool to head off future crises.

### A closer review of next generation EU

The new European Recovery and Resilience Fund (RRF), a post-COVID-19 EU rebuilding initiative, would distribute grants to member states totaling €312.5 billion, the largest and most economically significant portion of the Next Generation EU package.

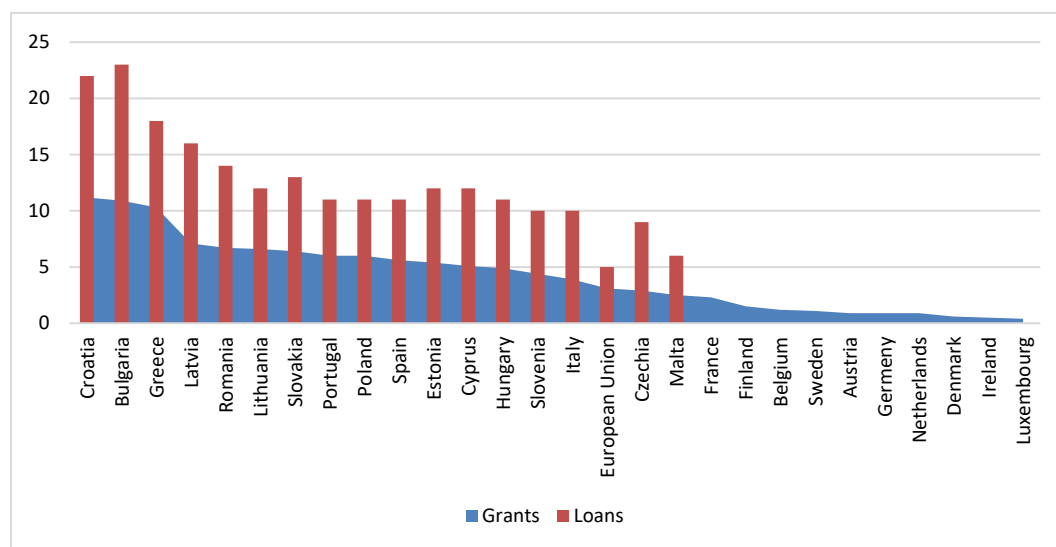
As seen in Figure 1, a lesser amount of the awards (€71.9 billion) will be distributed and carried out through current EU programs independent of the new RRF. It is anticipated that member states would borrow around €360 billion, which will result in useful interest rate savings on loans for member states that refinance themselves above the anticipated interest rates on EU bonds. A minor amount of assurances round out the deal.

**Figure 1.** Breakdown of Next Generation EU (€750 billion)



**Source:** Author estimates based on European Commission data.

All countries get grants that are paid for by loans that are due to be returned beginning in 2028 and continuing through 2058. Because economic stimulation can increase development and employment for all member states but payback happens much later and over a longer time period, the allocation of the money cannot be viewed as a zero-sum game.

**Figure 2.** Distribution by country of total spending (in % of expected GDP 2020)

**Source:** Author estimates based on Kafsack (2020) and Darvas (2020a, 2020b, 2020c) data.

Given the accommodating response of the European Central Bank to the crisis, it has been argued that loans are not an efficient means to increase expenditure in the economy since they essentially refinance national expenditures that would have occurred otherwise.

In any event, it is currently uncertain and challenging to evaluate the potential impact of loans and guarantees. So, for the purposes of this research, we assume the stance that only grants will result in extra future spending that raises demand in the block's crisis-affected economies.

From the overall package amount of €750 billion, loans and guarantees are subtracted, leaving around €384.4 billion in grants. 3.1% of (the crisis-reduced) anticipated GDP in 2020 for the European Union as a whole is distributed through grants, and 1.9% is distributed through loans, over a six-year period.

The strategy calls for a clear division of nations into those that have been hardest hit by the crisis and have weaker economies (Southern and Eastern Europe) and those that can easily afford the costs of the crisis due to an unequal capital flow within the single market and their ability to attract funds from other EU and euro area nations due to their status as safe havens (Northern and Western Europe).

Only until 2022 does the majority of expenditure on grants take place. The formulas for allocating the monies among the nations take into account factors like GDP per capita, COVID-19's economic impact (a decline in GDP in 2020), and unemployment rates. Depending on the funding source and specific programs, they vary.

## Conclusion

The financial markets in the euro region have frequently fragmented. Yet in the past, this risk materialized in scenarios with low inflation rates. These days, it may alternatively manifest in an environment marked by high inflation, which necessitates the adoption of a restrictive monetary policy that will see the end of asset purchase programs and the possible increase of the policy interest rate.

It is not impossible that a monetary policy stance consistent with price stability and the achievement of the quantitative inflation target over the medium horizon triggers financial fragmentation in the euro area due to their effects on the sovereign debt risk, despite the complexity and uncertainty of the current macroeconomic situation necessitating appropriate considerations on the timing and pace of monetary policy tightening.

The Next Generation EU is proof of fiscal integration that contributed to the reduction of fragmentation. NGEU can be viewed as an early intervention to prevent a repeat of the humiliating and strife-filled bailouts that were sought during the EU's previous big crisis from 2010 to 2015. Due to the creation of a single currency without ongoing fiscal transfer to economies with structural weaknesses, it repeats earlier imbalances that were caused and exacerbated by the Great Recession.

The majority of resources are given to those nations in order to avoid or lessen the impact of further austerity measures that would be necessary following the economic catastrophe brought on by the epidemic. It can also be viewed as a response to political weaknesses that unavoidably result from tensions and economic weaknesses.

Strongly anti-EU nations have been eligible for particularly large NGEU grants per person. In contrast, NGEU grants are not correlated with the severity of the health crisis in the first half of 2020.

EU fiscal architecture remains unchanged, but the EU introduced NGEU as an innovation to avoid future bailouts.

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## **Tax avoidance methods practiced by MNEs in the European Union\***

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**Abstract.** *In the context of globalization, some companies have developed beyond the perspectives of their borders, becoming multinational companies. This way of development confers multiple advantages that can generate efficiency, competitiveness and profit.*

*The decisions on which companies base their choice of states take into account aspects such as economic growth or corporate tax rates. In the context where some countries have strong economies and represent promising markets but have a high level of taxation compared to other countries, multinational companies choose to access promising markets while using various methods of tax avoidance.*

*The purpose of this paper is to determine the tax avoidance methods practiced by multinational companies in the European Union and their mode of operation. We hope that this research can provide a broad perspective on ways to avoid taxation when debating fiscal policies.*

**Keywords:** tax avoidance, tax evasion, multinational enterprises, European Union, tax haven.

**JEL Classification:** F23, F36, H26.

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## 1. Introduction

In recent years, with globalization, with the economic integration initiatives, namely with the elimination of trade barriers between countries and with the digitization and accelerated growth of electronic commerce, companies have developed strongly outside the borders of their countries and at the same time, they made their activity more efficient, increased their competitiveness and generated more profit.

In this context, the companies that have adopted the intention of expanding their horizons beyond the borders, have closely followed certain characteristics that a country should have in order to be attractive, in the sense of the development prospects that it can offer to the company.

From this point of view, among the most important criteria for the selection of countries are the economic growth rate, population, wages and, less significantly in certain cases, the level of corporate tax rates (Kersan-Skabic, 2015).

Probably, in most cases the level of tax rates should be as important as the growth rate or the level of wages, but in fact, this is not validated due to the possibilities that companies have to partially or even completely avoid paying taxes.

Thus, through this paper we will gather together the possibilities by which multinational enterprises can avoid taxation and their mode of operation so that we can firmly answer two research questions, namely what are the methods and how do they work.

In recent years, various initiatives have been initiated to balance this global tax avoidance phenomenon. The most impactful being currently, an attempt to completely reform the tax system, establishing a global consensus. This consensus was agreed within the OECD/G20 by a number of 137 jurisdictions and aims to establish a minimum tax rate at global level and reallocate a part of the residual profit generated by companies to the country where it was made.

This paper is a part of a wider research through which we aim to determine the impact that this global consensus has at the level of the European Union states.

## 2. Literature review

Multinational enterprises operate in several countries, even owning dozens or hundreds of subsidiaries around the globe. This business model participates significantly in global trade and production, but less is known about the methods by which multinational enterprises organize their interactions between subsidiaries (Francois et al., 2023). Precisely at the level of relations between these subsidiaries, aggressive tax avoidance tactics can be undertaken.

In the paper of Dyreng et al. (2019) it was mentioned that those who develop research in the field of accounting have been studying the phenomenon for decades and tax evasion has been included in specialized literature precisely to include the activities undertaken by enterprises in order to reduce their taxes. These can vary from fiscally beneficial investments, for example certain tax-exempt activities, to aggressive practices that can hardly be contested.



Contractor (2017) presents some frequently practiced tax avoidance methods in his work, among them are: Exemption/Deferral of Foreign Affiliate Income; Transfer Pricing; Royalty Payments; Intracorporate Loans; Other Central MNE/Parent Overheads and Costs; Other uses of Tax Havens: Round-Tripping and Evading Currency Convertibility Restrictions; Inversions.

Dyrenge et al. (2019) mentions: Shifting income across countries and state; Holding municipal bonds; Increasing net operating losses; and Engaging in complex financial arrangements.

All these strategies are used depending on the tax policies of the country where the company operates. For example, the member countries of the European Union tax the company's income made in the country, without taking into account the income made at the level of the other subsidiaries in other countries, what ensures the land of profit transfers in tax havens.

Tax havens represent countries that offer companies low tax rates, thus attracting foreign direct investments and thus increasing their economy. Tax havens are generally small, rich and well-governed countries (Hines Jr., 2008).

On the other hand, there are also states, such as the USA, that tax the global income of multinational enterprises, both those made in the USA and those made by subsidiaries in other countries. But their subsidiary taxation system has a weakness through which the taxation can be postponed indefinitely, and the funds can be blocked in tax havens or reinvested (Contractor, 2017).

### **3. Research methodology**

In this paper, we aim to find out what are the tax avoidance methods used by multinational enterprises in the European Union and what is their mode of operation.

In order to fulfill this goal, we will develop a descriptive and explanatory research to describe the phenomenon, its causes and effects and to explain the functioning of the methods practiced by multinational enterprises to avoid taxation.

### **4. Results**

In the European Union, taxation strategies vary significantly from one state to another. There are countries that practice high tax rates, such as the case of France, which practiced 27.5% in 2021, Spain and the Netherlands, which practiced 25%, but there are also countries with very low rates, even considered tax havens, such as the case of Germany, which applied a rate of 15% in 2021 or of Romania which applied 16% (European Commission, TEDB, Accessed 30 March 2023), although it is not classified as a tax haven.

Therefore, we will describe and explain the tax avoidance strategies from the specialized literature so that we can understand if they can be applied by multinational enterprises operating in the European Union.

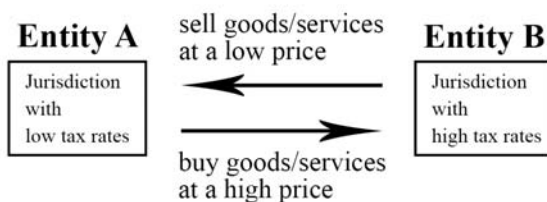
### *Exemption/Deferral of foreign affiliate income*

In the European Union, the member countries tax the incomes of multinational enterprises made in the countries where they carried out their operational activity. In this sense, a multinational company's strategy of deferring taxes obtained by subsidiaries abroad is not conclusive for multinationals from the European Union, but for those that have their headquarters in a state that taxes the companies' global income. Therefore, if a company from the European Union allocates its profits in a tax haven, those profits will be taxed in tax havens.

### *Transfer Pricing*

The method of transfer prices is among the most commonly found in specialized literature. This implies the existence of at least two affiliated entities, one must be located in a state where low tax rates are practiced, and the other is located in a state where high rates are practiced. According to specialized literature, the reasons why a company chooses to stay in such a state where it practices high rates would be: accelerated economic growth, the population, the level of salaries and so on.

**Figure 1.** *Transfer prices between two entities located in different fiscal regimes*



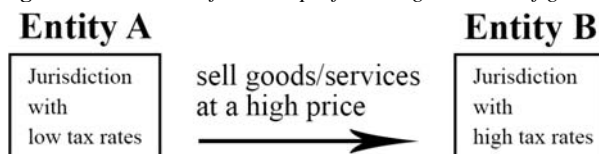
**Source:** own processing.

According to Figure 1, transfer pricing works as follows: entity B, which is in a jurisdiction with high tax rates, sells goods or services to entity A at low prices, in this way a small amount of taxable profit is recorded, after which entity B buys goods or services at a high price from the entity A, in this way the taxable profit is reduced due to the increase in expenses. After this interaction, the large part of the income obtained in the jurisdiction of entity B will be taxed in the jurisdiction of entity A, the one with low taxes.

### *Royalty payments/Consulting/Management or various services*

The sale of copyrights or various services that do not necessarily involve the existence of a tangible product is another way to reduce the taxable profit of the entity in a jurisdiction with high tax rates.

**Figure 2.** *Reduction of taxable profit through the sale of goods/services at a high price by an affiliated entity*



**Source:** own processing.

According to Figure 2, in the situation where there are at least two affiliated entities, entity A operating in a jurisdiction with low taxes can sell various services or copyrights to entity B that operates in a jurisdiction with high taxes. In this case, entity B reduces its taxable profit by increasing expenses. It is a faster method compared to transfer pricing as it involves a single sale/purchase interaction.

#### *Intra-company loan*

An intracompany loan involves a loan between two affiliated companies whose purpose is to reduce the taxable profit through the deductible expense generated by the loan.

#### *Postponing the taxation of companies through provisions*

It is a very common practice, especially in the case of banking companies. The provision implies the establishment of a fund based on anticipated or likely future expenses or losses. The provision represents a deductible expense, and by establishing it, the taxable profit is reduced.

#### *Investments made by the company*

This is the most common practice and the easiest to achieve. By investing the income in various assets, the entity reduces its taxable base. Investments can vary from tangible assets, machinery or land through which the company aims to expand or make its activity more efficient, to portfolio assets such as municipal bonds, through whose investment both taxation is deferred and income from the bond coupon is generated.

## **5. Conclusions**

There are various ways to avoid taxation, but their use must be correlated with the policies of the jurisdiction in which the entity operates.

In the European Union, some member states practice both low tax rates, being even considered tax havens, but others also practice very high rates, becoming targets of tax avoidance.

In this context, the most appropriate ways to avoid taxation in the European Union are represented by: the use of transfer prices, which involve two sales/purchase transactions between two affiliated entities, located in different jurisdictions; the acquisition of copyrights or various management or consulting services involving a single transaction between two affiliated entities located in different jurisdictions; intracompany loans or provisioning; and also the easiest practice, reducing the taxable base by investing in assets, be they physical or portfolio such as municipal bonds that also generate income from the coupon.

This paper is a part of a wider research through which we want to determine the impact of the new global consensus on taxation undertaken by the OECD/G20 in the European Union. Obtaining these data on taxation methods and their functioning, we can test if the methods by which the new reform plan proposed by the OECD/G20 is effective in improving the collection of taxes at the state budget. For this answer, we will have to see if discouraging the use of transfer prices, for example, leaves room for the use of the other methods mentioned.

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## Europe's Digital Decade a keystone of gender convergence

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**Abstract.** *In addition to the negative effects generated by the pandemic period, nowadays, the digital and ecological transition exerts additional pressure on the economy and society, especially on the labor market. Digital transformation is changing people's lives, offering new opportunities to increase productivity and to improve the well-being of the citizens. To get the desired results, the EU's policies and measures must put people at the center of the actions by ensuring an equitable transition. Gender equality is a key factor in promoting an inclusive and sustainable growth. The digital transformation provides new tools to increase the participation of women in the labor market and to close the gender gap. In this context, the main objective of this paper is to examine the evolution of gender disparities between Member States and to show how Europe's digital decade can contribute to remarkable progress towards gender convergence by improving the labor market conditions.*

**Keywords:** digitalisation, gender inequalities, convergence, green and digital transition.

**JEL Classification:** D04, J2, O3.

## Introduction

We live in a digital era that influences the social, economic, and environmental aspects of our lives. The term ‘green and digital’ have become a key component in policy agenda of EU. The Digital Decade program sets up concrete targets for 2030 by which European economies must develop in the future. The Europe’s digital transformation has four dimensions: skill, government, business, and infrastructures. In this way, a multidimensional impact is desired in order to promote benefits for all the people and entities involved. Policies and measures that put people and their rights first are in the center of this Strategy.

A digital society can bring many opportunities for businesses and people but like any other reform, it implies many challenges that require an inclusive perspective on implementation. Businesses can increase their productivity using technology, people from all areas, even the most difficult to access, can participate and benefit from the internet, administrative authorities can reduce the distance between procedures, the governing act, and citizens due to connectivity.

From a social perspective, the digital transformation must be inclusive and sustainable by ensuring equal access to digital technologies. This implies the removal of socio-economic barriers, such as age, area where they live, level of knowledge, status, etc. From many aspects, the disparities between the urban and rural areas remain accentuated, including the digital infrastructure, the level of connectivity or digital skills. Closing the digital gap is vital for gender convergence because digital technologies can help people develop and benefit from new opportunities on the labor market.

Digital skills represent an important factor both in achieving the digitization goals and in ensuring a sustainable transition. This transformation involves changing the model in which we live, work, learn, so that in order to benefit from all these opportunities, people must have the right skill. The digital decade is a key to realizing the vision of achieving The European Social Right. Member States must take advantage of these financial opportunities and promote measures to achieve these objectives.

The motivation for this subject is given by the fact that the sustainability of the European model in the new digital era depends on the qualification of human capital. The welfare state that the EU member states support will no longer be feasible without policies that mobilize the productive potential of citizens and especially women. We often hear about the need for the technologization of industries or the digitization of the administrative system, but still the European Commission emphasizes that the second reason why European citizens do not use the Internet is the lack of digital skills. These statistics can change through a joint effort of the EU, member states, social actors such as researchers, etc. Also, in the context of the ecological and digital transition, the labor market will undergo major structural changes that could deepen gender inequality and undermine the prospects for progress. Therefore, there is a need to ensure a gender convergence in terms of equipping human capital with digital skills so that member states can take full advantage of the opportunities brought by the transition without leaving no one behind.

Therefore, the aim of this paper is to highlight the role that digitalisation has in achieving gender convergence, and for that we have focused specifically on the human capital component. During the pandemic, many businesses quickly developed the digital component, public administrations accelerated the digitization process, but the development of digital skills lagged behind. If we accept that the future is digital, the EU must act firmly to develop a society with advanced digital skills. In order for this to become a reality, it is necessary to integrate digital education into courses from the first years of school. In this way, equal opportunities are ensured for the entire population regardless of gender, area of residence or status.

### Literature review

Digitalisation fundamentally changes industries and society in general by adopting the digital technologies in a large scale. The impact of this transformation can be analyzed through a sustainable development lens, social, economic, environmental and governance (Randall and Berlina, 2019). In the social field, digital access can increase people's participation in the labor market, citizen participation and democracy and can promote new ways of knowing, acting, and interacting. For economic perspective, new business opportunities can be made, or increase the productivity of the existing ones, in this way the creation of new jobs is also supported. Digitalization also contributes to the green transition by promoting businesses that are environmentally friendly. It also improves governance by simplifying the way of interaction between public administrations and citizens, businesses, etc.

If above we have mentioned the benefits of digitalization, we also need to highlight the main challenges that these processes cause. According to the OECD (2019), this process will determine gender gaps in terms of well-being, social connection, or work-life balance. Women would be more advantageous than men in terms of opportunities on the labor market (they use the internet much more to look for a job and are more appreciative if they have knowledge in IT) and regarding health (they use more the internet for medical information and appointments). However, men use government digital services more and benefit from working from home.

In order to promote an inclusive digital progress, a high level of digital skills among women it requires. At the European level, in 2019 the percentage of women who have never had access to the Internet is 10.2, while that of men is 8.7 (Panie and Nae, 2021). An analysis of the degree of digitization at the EU level in the period 2019-2020 showed that the best performing states are the Nordic ones and the least developed are Bulgaria and Romania. Among the components that make up DESI (the indicator that expresses the level of digitization), the greatest divergence was observed in human capital (Paraschiv et al., 2022). The development of digital skills among the population not only helps them to integrate into the new economic and social reality but is a stimulating factor for the digital transformation itself. EIB (2022) notes that in countries where people have above-average digital skills, companies are driven to invest more in advanced digital technologies.

At the European level, the use of the Internet has increased, but certain barriers still persist. The European Commission (2020) centralizes the main reasons as the lack of interest 46% of households without internet access in 2019, insufficient skills (44%), equipment costs (26%) and high-cost barriers (24%).

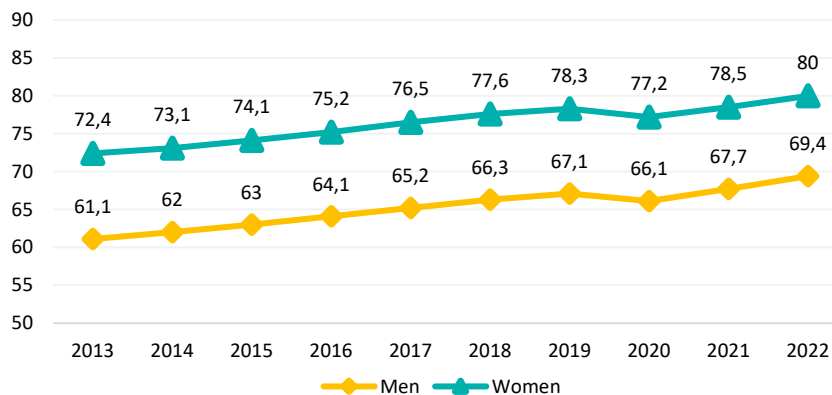
### Digital decade, human capital component

The digital transition is an unfolding reality. During the pandemic, EU states, as well as companies, have accelerated the digitization process by implementing urgent measures as a response to the effects of the crisis. These days, the investment process continues. European Union through The Recovery and Resilience Facility offers about 127 billion for investments and reforms in the area of digital. Also, when developing this plan, one of the important conditions was that each EU country should dedicate 20% of the Recovery and Resilience Facility to the digital transition.

It is often mentioned the need to develop businesses with artificial intelligence and big data, the digitization of public and administrative institutions, or the development of 5G infrastructure. However, the increase in digital skills among the population is needed for the previously mentioned measures to have the desired effects. The development of human capital is a strong point in increasing the productivity of enterprises, but it is also a way to increase gender convergence and ensure a fair transition. The new digital age will be a source of well-being for the population if they have the necessary knowledge to benefit from the new technologies as well as to adapt to the new requirements of the labor market.

Currently, at the EU level in terms of the employment indicator by sex, it can be seen (Figure 1) that there is a gap between women and men. Even if during the analyzed period the evolution of the employment rate was favorable, the gender differences remained constant at over 10 percentage points. The current situation may even be worsened by the digital transition which may favor people who are already involved in the labor market. More than ever, measures must be promoted to reduce the current gender gap on the labor market but to provide equal opportunities for the generations to come.

**Figure 1.** *The evolution of employment and gender employment gap in EU (%)*

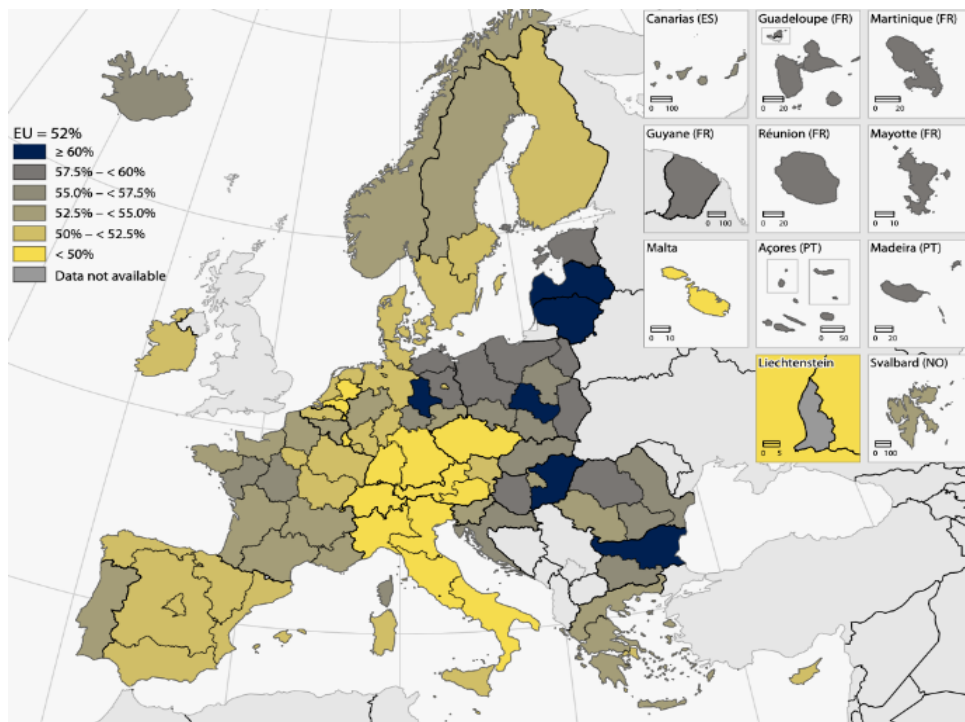


Source: Eurostat.



In the context of a digitally advanced future, it is important that society relies on human capital with advanced digital skills so that it can benefit from the opportunities brought and actively contribute to the Digital Decade in order to strengthen the resilience of the digital economy. One of the main objectives of this digital transition is to reach a percentage of 80% of the EU population that has basic skills, but also to train an additional 20 million ITC specialists by 2030, according to the European Pillar of Social Rights Action Plan. Also, these objectives should simultaneously ensure a convergence between women and men by reducing the gap between them in the field of digitization of human capital. At the moment, the situation of women employed in science and technology at the EU level is not uniform. We can see in Figure 2 that the EU average is 52% and the regions that register results above the average are in the Eastern European countries and the Baltic countries. Economically developed countries such as Italy, Austria or Germany have much weaker results in this aspect.

**Figure 2.** *Women employed in science and technology*



**Source:** European Commission.

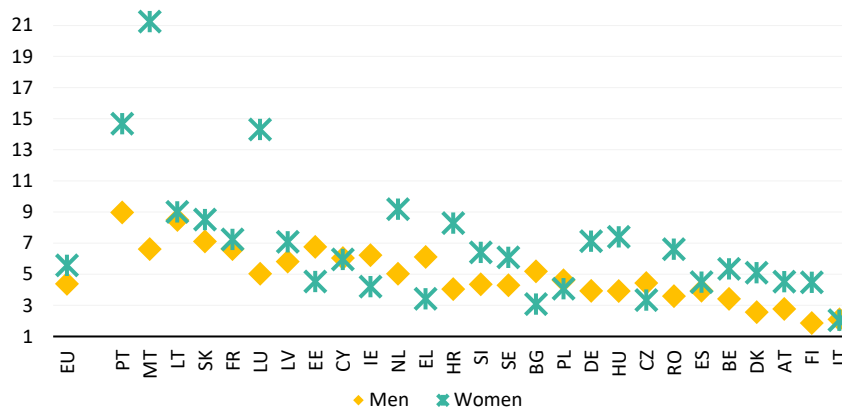
While at the European level, strategies and measures aimed at advancing the digitization process are developed and undertaken, there remain considerable differences between countries, but also gender differences in terms of the digitization of human capital. One of the major challenges that call for convergence between men and women is the fact that women are under-represented in the Digital Economy. According to official data, 53% of companies trying to recruit ICT specialists report difficulties in finding qualified people.

The importance of including more women in the digital economy is given on the one hand by the potential of EU digital workers that is not covered, by the growing demand for workers with advanced digital skills who can work in advanced fields, using big data and using artificial intelligence, or other complex programs aimed to make people's lives easier and helping to change production processes that are harmful to nature and people. On the other hand, the importance of including women in the digital transition process is given by accepting the truth that the diversity of a team leads to the adoption of balanced and advantageous decisions from the economic progress point of view.

The effects of the policies adopted at the EU level can be seen in Figure 3, there has been significant progress in recent years in advancing the average annual rates of change in employment among ICT specialists and, on average, the number of women in the period 2012-2021 employed in the ICT field increased by approximately 5.9% per year, and that of men by only 4.4% per year.

There are many countries that have introduced various tax facilities to people employed in IT to boost this sector of the economy. For example, Romania is among the leading countries both in the percentage of women employed in science and technology and in the number of persons employed as ICT specialist, and is the second country in the EU that has the highest percentage of women employed as ICT specialist. In Romania, employees in the IT field benefit from fiscal facilities starting in 2001 and reformed in 2013 that are still maintained, they consist in the exemption from paying income tax, as it generated, according to Manelici and Pantea (2021), positive long-term effects for the IT sector development, as well as positive externalities for other sectors of the economy, they also suggested that the measure adopted in Romania to support the IT sector contributes to the emergence of new quality jobs with significant remuneration, a fact that can contribute to the consolidation of social well-being and economic resilience. According to ANIS (2021), approximately 104,000 people are beneficiaries of this facility in Romania and the software and IT services industry contributes to the state budget with approximately 1.3 billion euros with an impact of these sectors on GDP formation by approximately 6.2%.

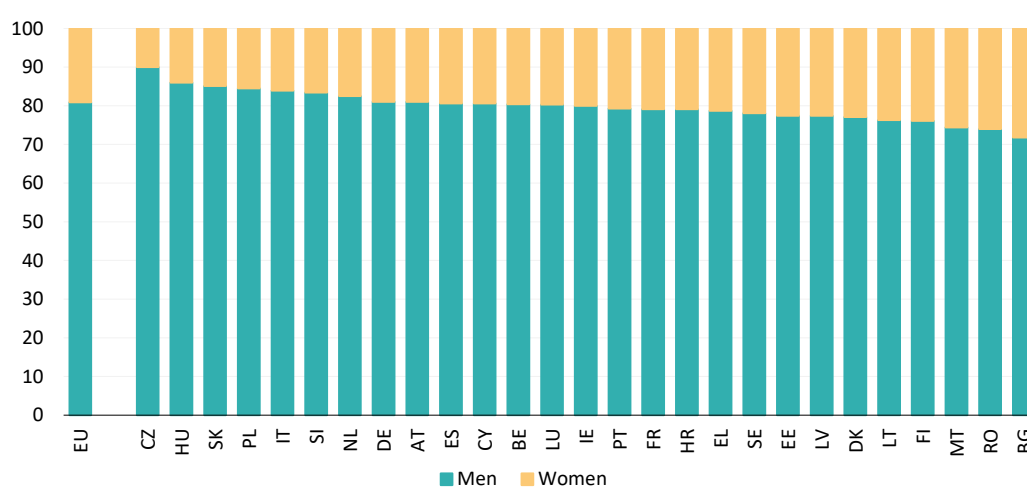
**Figure 3.** Average annual rate of change for the number of persons employed as ICT specialists by sex, 2012-2021 (%)



Source: Eurostat.

Although the evolution of the number of women in the ITC has a higher rate compared to that of men, the overall gap remains quite large, according to Figure 4, at the European level, of the total ITC specialist, only 19% are women. This fact once again underlines the need for inclusive measures by which women are actively integrated in the digital transition. According to the European Commission, the involvement and encouragement of women's active participation in the digital field is very important to contribute to a sustainable, equity and above all fair economy and society that supports the premises of a successful digital and ecological transition.

**Figure 4.** Distribution of ICT specialists by sex, 2021 (%)



Source: Eurostat.

During the pandemic period, member states and businesses had to accelerate the digitization process. Movement restrictions changed the way we shopped, interacted with authorities, worked, etc. In the following table we can see the evolution of the 4 components of the DESI indicator. In the analyzed period 2017-2022, all components had a favorable dynamic, connectivity and integration of digital technology almost doubled their percentage, while human capital increased by only one percentage point in 6 years. We could conclude that the investments in human capital were minor, but the truth is that the development of digital skills is a long-term process that involves a rigorous coordination of the channels for making investments.

**Table 1.** The evolution of DESI dimensions in EU

DESI index in EU				
DESI Year	Human Capital	Connectivity	Integration of Digital Technology	Digital Public Services
2017	10.40%	6.19%	5.46%	11.70%
2018	10.50%	6.65%	6.14%	12.70%
2019	10.70%	7.65%	6.73%	13.60%
2020	11%	8.78%	7.32%	14.60%
2021	11.20%	11.10%	8.18%	15.80%
2022	11.40%	15%	9.02%	16.80%

Source: European Commission.

The effects of investments in human capital are observed over time, but the multiplication coefficient is much higher compared to other types of investments. Often, they opt for measures that have a faster effect, for example training courses for a limited period that can increase the digital skills of a group for a specific technology. However, to build a resilient and sustainable society, investments in digital skills must be included in primary education. The Nordic countries have started a process of increasing digital skills among the population by including it in the national curricula. What differentiates the perspective the Nordic countries compared to the other states is the fact that in terms of digital skills they approach them in accordance with societal issues and promote a critical and ethical point of view (Godhe, 2019). Estard et al. (2021) carried out an analysis on the countries of Sweden, Norway and Finland and concluded that digital competence has become an important component of the national curriculum in the last decade. These countries have adopted similar measures to introduce coding and programming into school lessons. The development of digital skills starts from preschool age and the professional development of teachers is seen as a necessity to achieve these results.

At the level of the European Union there are several initiatives aimed to develop the digital skills of the population, we mention the European Skills Agenda, Digital Education Plan and Digital skills and jobs coalition.

- The European Skills Agenda aims to increase the digital skills of both individuals and businesses through a series of actions: the formation of a joint action to achieve the objectives, the development of digital skills for certain jobs, the stimulation of lifelong learning, the unlocking of investments in skills. Quantifiable targets have also been established, for example for the indicator share of adults aged 16-74 having at least basic digital skills which in 2019 had 56% level, the objective for 2025 is 70%.
- Digital Education Plan - is an initiative adopted in 2020 that proposes a common vision at the European level in relation to the development of an inclusive and high-quality digital education. It is desired to develop a high performing digital education ecosystem and increase digital skills. The specific actions target education plans and courses adapted to the digital transformation, connectivity and digital equipment, the inclusion of AI and data-related skills in European digital competence, raising women's participation in STEM.
- Digital skills and jobs coalition aims to reduce the digital skills gap through actions to increase digital skills for all citizens, by developing specific digital skills for certain employees in certain sectors or for employees who had to readjust to the labor market, by promoting digital skills for ITC professionals and digital skills in education through teacher training and lifelong learning.

### Conclusions and policies recommendation

Given that the future is a digital one, it is important to be able to rely on a competent workforce, endowed with both basic skills and especially advanced skills in order to actively participate in the transition process. Addressing the substantial skills gap requires urgent responses to help policy makers successfully manage the transition. As a result of the evidence presented, where we found the digital gap to be a structural problem that

hinders economic and social progress, we propose a set of solutions to be considered at the European level in order to contribute in mitigating the gender gap in digital:

- The introduction of digital education within the educational plans and school programs from the first year, so that the problem of digitization no longer represents a structural problem that is difficult to support on the labor market.
- Measures to involve girls and women in STEM, in the world there are already countries that financially support and promote the activity of women in STEM ex: (Australia, Brazil, Japan, USA), and at the European level, the most involved in promoting women in the fields of science, technology, engineering and mathematics is Germany, which since 2008 has developed a National Pact for the promotion of women in STEM, in 2017 developed a program to promote the employment of women in the digital economy, also has public-private partnerships through which they help improve gender equality in the workplace by increasing digital skills among women.
- Considering that a barrier strongly correlated with the use of the Internet and the motivation to acquire digital skills in general is represented by the low level of Internet connectivity of households, an important recommendation is to facilitate access and Internet connectivity of households experiencing problems in this sense.
- At the same time, at the European level, the DESI component - Human capital - shows the least evolution over time, advancing by only 1 pp from 2017 to the present, therefore continuous training measures for citizens by facilitating access to training programs are necessary of digital skills (advance and basic); however, it should be noted that, as could be observed in the Nordic countries, although intensive measures aimed at this aspect have been adopted, the results are slow to appear as the measures may consist of major structural reforms with long-term sustainable effects.
- A recommendation that actively involves both the Government and the business environment can consist in granting some facilities to companies that organize digital training programs, so that there is a win-win result.
- The introduction or maintenance (in the case of Romania) of fiscal facilities granted to persons employed in ITC.

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## Central Bank digital currency: Challenges and opportunities

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**Abstract.** *Digital assets have launched a real revolution, bringing about the necessary changes in payments and banking services. Traditional banking actors and technology firms are taking a serious interest in these assets and want to embrace this movement to stay caught up. In the current developments in the broad spectrum of digital currencies, particularly CBDCs, the article aims to provide a global overview from different perspectives: the central bank and the regulators, the financial companies, and the citizens.*

*Issues like competition in the banking sector with the possibility of disintermediation and the monetary policy options that the central banks explore by the valuation of their CBDCs through a policy rate different from cash, along with strategic technology decisions to be taken related to the infrastructure architecture and implementation and information privacy are only some of the challenges that the current pilot programs run by various countries are trying to address. The benefits include improved access to domestic and cross-border payments and the financial system, reduced costs, substitutes for undesirable cryptocurrencies and risky stable coins, counter tax evasion and illegal currency use, and competition between CBDCs suppliers worldwide.*

**Keywords:** digital asset, cryptocurrency, CBDC, blockchain.

**JEL Classification:** E42, E58, F31.

## 1. Introduction

One hundred and twenty countries, which account for 90% of GDP, are exploring CBDCs. Many central banks have actively explored the possibility of launching CBDCs, some of which are already in the pilot phases (i.e., Canada with the E Dollar launched in 2020, India using digital rupees from 2022) or even launched (e.g., Bahamas will use Sand Dollars in 2020, Eastern Caribbean consisting of 8 countries, Nigeria will use eNaira in 2021, and China will use e-CNY widely in the country in 2023) (Atlantic Council, 2022). The Central Bank Digital Currency (CBDC) represents a digital fiat currency issued and regulated by a country's central bank, and is gaining importance as innovations in the global financial landscape. CBDCs are different from decentralized cryptocurrencies such as Bitcoin or Ethereum. While cryptocurrencies operate on decentralized networks and are not controlled by any central authority, CBDCs are issued and regulated by central banks. CBDCs leverage the underlying blockchain or distributed ledger technology (DLT) to provide secure and efficient digital transactions.

## 2. Technological infrastructure, architecture and design

The technological infrastructure of CBDCs consists of the underlying systems, networks, and protocols that enable transactions in digital currencies. It involves the integration of advanced technologies such as distributed ledger technology (DLT), blockchain, and smart contracts. These technologies ensure secure and transparent transactions, enabling scalability, efficiency, and real-time processing. The infrastructure must be robust, scalable, and capable of handling large volumes to meet the demands of a modern digital economy.

CBDC infrastructure requires a well-defined architectural design to support its functionalities. The architecture comprises multiple layers, including the core banking system, digital wallets, payment gateways, and interfaces with commercial banks. The core banking system interacts with the CBDC ledger, ensuring secure digital currency issuance, redemption, and transfer. Digital wallets act as custodial solutions, allowing users to store, manage and transact with CBDC. Payment gateways facilitate transactions between different parties, while interfaces with commercial banks ensure interoperability and liquidity.

There are two main types of CBDCs: wholesale and retail. Wholesale CBDCs are designed for use between financial institutions, such as banks or clearinghouses, and facilitate faster and more efficient settlement of financial transactions. Retail CBDCs, on the other hand, are intended for use by the general public and can be used to make everyday transactions such as paying for goods and services (Bank for International Settlements, 2021).

A single-tier design consists of the central bank being directly involved in all the payments and operating the retail ledgers, with the benefit of accessing all the information. The disadvantage is that there is a need for large-scale capital expenditure for heavy technical infrastructure and the disintermediation of the private sector, banks, and financial



institutions, limiting their involvement to financial advisory, consumer platform integration, or consumer credit (Böhme and Auer, 2020).

The two-tier retail CBDC refers to the case where the central bank is responsible for the issuance and redemption of CBDC, which are then distributed to consumers and businesses. This model maintains the role of banks and financial institutions in the current banking system.

Central banks can take several different approaches when designing and implementing CBDCs. For example, some CBDCs may be token-based, which means that they are represented by digital tokens that can be stored and transferred using blockchain technology. Others may be account-based, linked to a user's bank account or digital wallet.

An important consideration when designing a CBDC is privacy. While CBDCs can provide greater financial inclusion and improve the efficiency of payments, they also raise concerns about privacy and the potential for government surveillance. Some designs may involve the use of digital identities or other forms of authentication to ensure that CBDC transactions are secure and anonymous.

### 3. Potential benefits and opportunities

One of the main benefits of CBDCs is that they can provide greater financial inclusion, particularly for people who may be excluded from traditional banking services. CBDCs can help bring people into the formal financial system and improve their access to financial services by providing a digital currency that the government or central bank backs. Additionally, CBDCs can make payments faster, cheaper, and more convenient, which could reduce cash use of cash and encourage greater adoption of digital payments.

CBDCs can provide financial services to underserved populations, allowing inclusion, reducing dependence on physical cash, enhancing financial security, and empowering individuals to participate in the digital economy, thus allowing accessibility and financial inclusion.

CBDCs can update payment processes, reducing transaction costs and settlement periods. Digital currencies can facilitate instant cross-border transactions, potentially boosting international trade and economic activity. Efficiency would also be a significant benefit.

Security can be improved with CBDC compared to physical cash, as digital transactions leave a digital trail that can be monitored and protected against fraud, money laundering, and other financial crimes.

Financial innovation: CBDCs can catalyse financial innovation, fostering the development of new digital payment solutions, smart contracts, and programmable money. This can unlock possibilities for automation, efficiency, and novel financial services.

CBDCs also provide improved data collection capabilities. As a digital currency, CBDC transactions can be recorded on a distributed ledger, providing real-time data on economic activity. This allows for better monitoring of monetary policy transmission and the ability

to make informed policy decisions based on timely information. Enhanced data collection can also help detect financial risks and prevent fraudulent activities.

Furthermore, CBDCs can improve the effectiveness of monetary policy tools. With traditional monetary policy, central banks primarily influence the economy through interest rate adjustments and open market operations. However, these tools have limitations in terms of spread and efficiency. CBDC, being a digital currency, can allow central banks to directly influence households and businesses by implementing more targeted and effective monetary policies (Bank for International Settlements, 2021).

Furthermore, CBDC can enable more precise control over the money supply. Central banks traditionally rely on commercial banks to distribute money, and the transmission of monetary policy depends on their lending practices. With CBDC, central banks can bypass commercial banks and have direct control over the money supply. This allows them to implement policies such as quantitative easing more efficiently and precisely. Central banks can directly inject funds into the economy by distributing CBDC to specific sectors or individuals, stimulating economic activity when needed, and moderating inflationary pressures (Bank for International Settlements, 2021).

In conclusion, CBDCs have the potential to significantly influence monetary policy. Its introduction can enhance the effectiveness of monetary policy tools, provide more precise control over money supply, improve transparency and data collection, promote financial inclusion, and contribute to financial stability. However, challenges such as the impact on bank deposits need to be carefully managed. Central banks must navigate these complexities to ensure that CBDC supports their policy objectives and benefits the overall economy. The design and implementation of CBDC should be done in a prudent and thoughtful manner, considering the potential implications for monetary policy and the broader financial system.

#### 4. Challenges

The implementation of CBDCs also presents challenges and considerations. One of the main concerns is privacy, data protection, and security. CBDCs require robust security measures to protect against cyber threats and ensure user privacy. CBDCs raise concerns about privacy and the collection of transactional data. Striking a balance between privacy and regulatory requirements is essential to prevent abuse and protect individuals' rights. Central banks must establish frameworks safeguarding user information while complying with regulatory requirements, such as anti-money laundering (AML) and know-your-customer (KYC) regulations.

Interoperability is another challenge. In most cases, the success of a particular application will depend on the connection with the legacy infrastructure, databases, and technologies, raising the question of who can be trusted in the management of the transfer of assets and information between blockchains or chains. For CBDCs to be effective, integration and compatibility with existing payment systems and infrastructures must be seamless. Although it is possible, a lot of work is needed to achieve seamless data and application

transfer between new DLTs and existing architectures. The achievement of interoperability between CBDCs and private digital currencies will facilitate cross-border transactions and global financial integration (Casey et al., 2018).

The introduction of CBDCs also poses challenges to monetary policy. One concern is the potential impact on bank deposits. If CBDC becomes widely adopted, individuals and businesses may choose to hold CBDC instead of bank deposits. This can reduce the amount of money available for lending by commercial banks, affecting their ability to create credit and potentially limiting the effectiveness of monetary policy transmission. Central banks must carefully manage the coexistence of CBDC and traditional bank deposits to maintain a stable financial system.

Furthermore, digital currencies are susceptible to cyberattacks, and CBDCs must be designed with robust security measures to prevent hacking, data breaches, and other cyber threats. Maintaining the integrity of the CBDC system is crucial to user trust and confidence. Encryption, multifactor authentication, and secure communication protocols are implemented to protect transactions and user data, including specific hardware and software wallets.

Furthermore, adopting and implementing CBDCs require significant investment in technology infrastructure and regulatory frameworks. Central banks must collaborate with other stakeholders, such as governments, financial institutions, and technology providers, to ensure a smooth transition and widespread adoption.

In conclusion, CBDCs can transform the financial landscape by providing efficient, secure and inclusive digital payment solutions. They can improve the implementation of monetary policy, promote financial inclusion, and streamline cross-border transactions. However, privacy, security, interoperability, and impact on the banking system must be carefully addressed. Successful implementation of CBDCs will require collaboration, robust infrastructure, and thoughtful regulation.

## 5. The digital euro

The first Report on a Digital Euro was issued by the European Central Bank and the national central banks of the countries that adopted the euro (EUROSYSTEM) in October 2020. It highlights the need for a digital euro to address the evolving financial domain, including the rise of private cryptocurrencies and the decline in the use of cash. The ECB believes that a digital euro would enable the Eurosystem to maintain control over money and payments, increase financial stability, improve cross-border payments, and offer better financial inclusion for all citizens (Report on a Digital Euro, 2020).

During the research phase, various pilot projects and experiments were launched to assess operational aspects of the digital currency, such as transaction speed, scalability, privacy, and security. These tests provided valuable information and helped identify areas that needed to be developed or improved.

Legal considerations played an essential role in the research phase, as the introduction of digital currencies would require compliance with existing rules and frameworks, analysing the potential impacts on financial stability, financial sovereignty, and data protection to ensure the existence of robust and well-regulated digital currencies.

The design principles proposed are accessibility, security and privacy, efficiency, interoperability, innovation, and technological neutrality.

The report outlines the potential features of a digital euro, account-based instead of token-based, while favouring the first and allowing users to have a direct claim against the central bank. This approach aligns with the Eurosystem's responsibility for monetary policy and ensures that it remains the trusted authority for currency issuance.

In terms of usability, the digital euro should be usable when there is no internet connectivity, ensuring its reliability and availability. At the same time, privacy is essential, providing a degree of pseudonymity rather than complete anonymity. However, the report acknowledges the need to strike a balance between privacy and compliance with anti-money laundering (AML), know-your-customers (KYC), and counter-terrorism financing (CTF) regulations.

The report suggests that a digital euro could earn interest, incentivising users to hold and use it. However, this is an essential monetary policy, as the digital euro might enter competition with bank deposits if remunerated. On the other hand, if interest is not charged, the currency can still be used as a payment method, but its value will decrease as it no longer fulfils the store-of-value function. No interest digital euro could limit the ability to achieve a negative interest rate monetary policy, and the attractiveness of bank deposits would decrease compared to the digital euro. A possible solution would be a digital euro with an interest rate lower than the policy rate (CBDC Think Tank, 2022).

However, from a legal perspective, Corinne Zellweger-Gutknecht argues that while central banks are mandated to issue cash and consequently a digital equivalent, the situation would change significantly when the same currency, i.e. the digital euro, would have properties and functionalities that tangible cash does not have. This is consistent with the separation of Art. 128 TFEU regulating the issue of cash separately and autonomously from Art. 127 on monetary policy tasks (Central Bank Digital Currency: Considerations, Projects, Outlook, 2021).

Limitations and safeguards on digital euro holdings and transactions are often used to prevent potential risks and illicit activities. The latest progress report dated April 2023 mentions that there will be a limit in terms of individual holdings, individual account limits, and the number of accounts per individual (European Central Bank, 2023).

The ECB acknowledges the potential role of intermediaries, such as banks or payment service providers (PSPs), in the distribution and provision of digital euro services. This partnership would ensure seamless integration of the digital euro into existing financial ecosystems, onboarding for the digital euro being the process of opening a digital account with the intermediaries consisting of formal identification and authorisation.

The digital euro should be interoperable with existing payment systems, ensuring compatibility and facilitating the use of digital euros alongside traditional currencies. The report stresses the importance of designing a user-friendly interface that meets users' needs with varying levels of digital literacy and accessibility requirements.

The ECB highlights the need for rigorous testing and experimentation before launching a digital euro, ensuring its scalability, efficiency, and resilience in different scenarios. The European Commission intends to propose a regulation establishing a digital euro in the second quarter of 2023.

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## Digital transformation and innovation of the European SMEs. How Romania replies to the digitalization phenomena?

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**Abstract.** *Digital technologies and digitalization represent a growing trend across countries in Europe, especially for developed economies and markets. Today, it is commonly acknowledged that an important factor for the SMEs' competitiveness, growth, and success, is the implementation of digital innovation and new tools. The varied and multidimensional reasons that either help or prevent SMEs from adopting digital tools and innovation, nevertheless, are numerous, and the ability of SMEs in Europe to obtain digital advancement and innovation is examined in this paper in relation to the influence of external factors such as governmental policies. By analysing different governmental policies among the EU, the aim of this paper is to establish a connection between various regulations and the innovation performance of Romanian SMEs.*

**Keywords:** EU SMEs; digital progress; business environment; governmental policies, innovation.

**JEL Classification:** M21, L25, O30.

## Introduction

Since the beginning of the 20th century, there has been an important topic about how SMEs contribute to innovative activities, and how new technologies and digital activities have the potential to influence SMEs. Nowadays, considering the highly competitive and dynamic business environment, small and medium-sized enterprises (SMEs) are actively trying to find ways to keep up with the latest developments, which may not always be an easy task. Digital technologies and innovation have become relevant tools for enterprises to improve performance, reduce their costs and increase efficiency, being seen as key drivers for competitiveness and economic development and growth.

New marketplaces and unheard-of business prospects have been generated by digital technologies, as they can create new opportunities for businesses to incorporate client demands and choices into their product development and manufacturing processes, aid them in improving product quality and avoiding manufacturing errors, as well as foster openness and flexibility throughout entire process chains. 'In Europe, the key challenge is to ensure that such opportunities are fully captured by industry and service companies, leveraging digitization to create growth and new jobs' (European Commission, 2018, p. 6).

It is often considered that the most relevant factors that can impact the success of an SME are the following: internal factors such as financial capabilities of the business or the organizational and managerial culture among others.

The adoption of digital and new technologies by European SMEs can be either aided or hindered by external variables such as business regulations or government policies. On one hand, there are government initiatives that offer financial incentives to companies for investing in digital technology or provide training programs to assist SMEs in acquiring the essential skills and expertise that can promote the uptake of digital innovation and progress (SMEs Growth; IMM Invest; UpGradeSME). On the other hand, the use of digital technologies by SMEs, can be hampered by regulations that place substantial taxes on technological investments or make it difficult for enterprises to obtain financing.

The effects of these outside variables can differ between nations and industries. For example, some governments may implement laws and policies that encourage digital innovation more than others, depending on the region. In accordance with this, there are also industries that might be subject to stricter rules and access barriers, compared to others, which can influence the motivation and capacity of SMEs to invest in innovation and new technologies (automation, e-commerce, digital marketing, Internet of Things, cloud computing etc.). "Cybersecurity, blockchain technology and artificial intelligence are the three most popular technologies and technological solutions on online media channels in 2017" (European Commission, 2018, p. 5).

The European Union (EU) has been making efforts to improve innovation and technological advancement throughout the continent, and the Digital Single Market policy, which aims to establish a single market for digital goods and services throughout the EU, is one of its main initiatives in this sector. "At a time when the internet and digital technologies are transforming our world, a Europe fit for the digital age is one of the European Commission's 6 political priorities, aiming to empower people with a new

generation of technologies" (European Union). Furthermore, programs like Horizon Europe and the Digital Europe Program can offer funding and guidance to SMEs for research and innovation projects in a variety of fields, including digitalization. This might also make it possible for SMEs to create innovative products and services, boost their level of competitiveness, and broaden their customer base.

To better understand the influence of external factors on the performance of SMEs, it is important to conduct research and analysis on the subject. This study can provide important insights and help to identify best practices and potential areas for improvement. The research questions of this paper are the following:

*RQ.1. What role do external factors, such as government policies, play in facilitating or hindering the adoption of digital progress and innovation among European SMEs?*

*RQ.2. What are the main sources of financing for SMEs in Romania, and how is the innovation process regarded in the SMEs field in Romania?*

The purpose of this paper is to examine how external factors influence digitization and innovation strategies of SMEs in the European Union by analysing how governmental policies can either encourage or prevent SMEs from embracing new digital technologies.

## Literature review

Today's economy and globalization have made it necessary for SMEs to innovate continuously to remain competitive. Digital technologies are nowadays having a significant impact on how people live their daily lives, conduct business, travel, and interact with one another, especially considering the world is gradually changing because of digital communication, social media interaction, e-commerce, and digital enterprises (European Commission, 2019). To keep and enhance their relevance in the current technological business world, SMEs were thus persuaded to adopt innovative business practices, and some of the top reasons for SMEs to implement innovation in their operations are the decrease of expenses, time-to-market, and risks, as well as acquisition of experience in case there is a lack of it (Vrande et al., 2009). For instance, as per Bouwman et al. (2019), digital transformation is inherent to the modern world of today and implies that enterprises innovate their business models. Additionally, the authors are also considering that the relation between innovation and business model (BM) can lead to a quicker expansion to international markets: "if the strategic choice is to expand to international markets, BM experimentation practices will intensify by" (2019, p. 5).

An increasing amount of recent literature on the significance of small and medium-sized enterprises (SMEs) has argued that SMEs can help encourage economic expansion, as they can provide creative ideas and opportunities in the business environment in addition to producing revenue for its owners. "Technology exploration refers to those activities which enable enterprises to acquire new knowledge and technologies from the outside" (Vrande et al., 2009, p. 425), and the idea that SMEs that participate in innovation activities perform better is supported by significant research (Terziovski, 2010; Expósito and Fernández-Serrano, 2029); Westerberg and Wincent, 2008, etc.).



SMEs are a very heterogeneous group, which includes a wide variation of firms, and a subset of SMEs is dynamic, innovative, and growth-oriented. Innovative SMEs are defined as having introduced innovation in at least one area, such as products, services, marketing, production or management (Vasilescu, 2015, p. 37).

This is confirmed also by Saridakis et al. (2019), who conducted a study regarding the role of innovation in products, services in the internationalization of British SMEs and concluded that innovation can be extremely relevant for the process of going international and that innovative SMEs are more likely to go beyond national borders compared to non-innovative SMEs. "Many scholars believe that innovation assists firms in crossing borders by means of exporting, because, through innovation, firms can produce new competitive products that enable them to overcome the barriers to penetrating a foreign market" (Saridakis et al., 2019, p. 250).

In accordance with Terziovski (2010, p. 1), because of their simpler hierarchies and quick decision-making processes, SMEs are often characterized as reactive, agile, and risky enterprises that might profit from a slightly faster and more adaptable reaction to environmental changes, which conducts to innovation being an opportunity for small businesses to enhance their commercial success and differentiate themselves from the competition. However, the introduction of new, therefore expensive, technologies and solutions – requiring high-class specialists – is a difficult process due to their lower potential and investment possibilities. The problem of their adaptation to the changes taking place is, however, made very serious by the role and significance of SMEs in the global economy and, in many cases, even crucial for the economic and social development of countries and regions (Linder, 2019). According to Vasilescu (2015), for helping new firms get started, supporting company investments, and ensuring that companies fulfil their growth potential, SMEs must have access to capital. A lack of funding may limit cash flow and have an impact on a business' chances of surviving (Vasilescu, 2015, p. 36).

In conformity with Vrande et al. (2009), although innovation gained more and more attention from scientists, governments, and other institutions, it was mainly analysed at large, focusing on multinational enterprises with only a few studies focusing on smaller firms and their engagement in open innovation. For example, Bouwman et al. (2019) also add that the connection between the business model innovation and resources and activities dedicated to it "affect firm performance, partly mediated by the capacity to innovate. Although research on BM and performance is increasing, research with a focus on SMEs is lagging behind" (2019, p. 13).

Jerry Jasinowski, President of the National Association of Manufacturers declared for the Wall Street Journal that "Small firms need to get in the e-commerce game or they are going to be shut out of a critical part of the marketplace" (2000), and as such, it is not unusual that numerous parties, including governments and institutions such as the OECD or the European Commission, give encouragement to SMEs to use technology to improve their enterprises.

Innovative IT, such as cloud ERP, is one of the many resources that, when procured through GFS, can provide firms with CA. (...) SMEs that obtain GFS can successfully acquire and

implement cloud ERP through intensive use and strategic alignment, resulting in a CA and improved performance (Jayeola et al., 2022, p. 2).

The European Commission (EC) has worked for the past 20 years to provide a wide variety of financial regulations and tools to assist SMEs with the most suitable sources and forms of funding at each stage of their development. In accordance also with Jayeola et al. (2022, p. 1), government funds are essentially an external resource and an indirect input that can be used to obtain more tangible and intangible resources (new machinery, product innovation, information technology etc.), although the discussion regarding the influence governmental funds have on the performance of SMEs led to various approaches, both positive and negative. For example, Sheng, Zhou, and Li (2011) stated that government incentives are crucial for boosting a sustained level of competitive performance in emerging economies. As per Jayeola et al. (2022), the results of this discussion are considered inconclusive; on one hand, there was identified a positive association by some researchers (Wei and Liu, 2015), and on the other hand, a negative connection has been identified, or even an insignificant one "(...) the linkage between government assistance and the performance of SMEs has attracted little empirical attention. (...) some studies show that government support has little effect on SME performance" (Nguyen, 2018, p. 103).

According to the subsidiarity concept, the Member States and the Commission are both responsible for supporting SMEs. Based on Article 173 of the Treaty on the Functioning of European Union, this EU strategy is aiming "at enhancing SME competitiveness through initiatives to improve the business environment and increase the productivity of an industrial base with the potential to compete globally, while ensuring job creation and resource efficiency" (European Court of Auditors, 2022: 7). However, the implementation of SME-related policies is mainly regarded as the responsibility of Member States, while the Commission only assists SMEs through legislative actions, funding, educational programmes or sharing of best practices (ECA, 2022).

As per the OECD (2000), SMEs have the advantage of being able to make decision quickly, as opposed to most large firms where the level of bureaucracy can be higher, and therefore, can exploit opportunities more efficiently and bring an impact to breakthrough innovations (Eurostat, 2014, p. 6).

Moreover, the EC mentions in the publication *Shaping Europe's Digital Future* (2020, p. 5), that numerous European enterprises, and especially SMEs have not been very quick at adopting digital solutions, which led to the Commission setting up new strategies to facilitate the transition towards a more digital EU industry, and also acknowledging the fact that SMEs require regulations that are clear, reasonable, and consistently applied throughout the EU in order to give them a hugely powerful domestic market from which to enter the global arena.

SMEs have been slow at taking up digital solutions, and therefore have not benefitted from them and missed opportunities to scale up. (...) To start up and grow in Europe, SMEs need a frictionless single market, unhampered by diverging local or national regulations that increase administrative burdens for smaller companies in particular (2020, p. 5).

Consequently, it is beneficial to the economies of different nations, regions, major corporations, as well as SMEs, to adjust to the changes brought on by the development of new technologies and the digitalization of the economy as soon as possible. This suggests that management practices including planning, resource consumption, regulating production/services, and assessing operational performance must be continually improved in addition to adapting to current trends. SMEs are responsible for the creation of a significant number of jobs both in developed and developing countries; therefore, their role in the national socio-economic policies is extremely weighty. As per Cravo and Piza (2019, p. 753), business support initiatives are frequently founded in developing nations on the idea that institutional limitations (or failures) prevent SMEs from realizing their full potential to provide jobs, earnings, and economic progress. As such, the significant sums of money that governments and development organizations devote to the growth of the SME sector are meant to eliminate institutional limitations and enable SMEs to run more effectively, which would result in increased productivity.

However, as well as a lot of opportunities, it is obvious that the process of adopting Industry 4.0 measures, also brings a series of organizational and economic challenges and risks, especially considering the EU space, as due to the fragmentation of the region (27 countries), the digitalization process presents different levels of development. For example, as per Prelicean and Boscoianu, "innovative SMEs are characterized by agility, high return perspectives but also high risk and fragility (...) The use of grants and the inspiration from collaborative projects could offer new ways for decoding the typical mechanisms of advantages and limitations" (2014: 739). Unfortunately, their findings suggest that the opportunities to obtain different types of financing are severely constrained. For SMEs, the innovation process is hampered by limited financial resources, skills, and possibilities to hire professionals, as well as by a lack of knowledge of the most recent technology and plain old lack of time. As such, to continue being innovative, SMEs need to work with partners (Mercandetti et al., 2017, p. 25).

Regardless of these challenges, the EU is committed to supporting SMEs across the continent, as main contributors to multiple industries and countries, to adopt and introduce new technologies as well as to providing financial aid. For example, the EU adopted many documents such as A Digital Agenda for Europe, The EU's New Digital Single Market Strategy, Building a European Data Economy, or The Digital Europe Programme (DIGITAL). DIGITAL is a new funding programme implemented by the EU which has the goal of proposing digital technology to businesses, citizens, and public institutions. It aims to accelerate the economic recovery and influence the digital transformation of Europe's society and economy with an overall budget of €7.5 billion, benefiting everyone but especially small and medium-sized businesses (European Commission, 2022).

The Digital Europe Programme will provide strategic funding to answer these challenges, supporting projects in 5 key capacity areas: supercomputing, artificial intelligence, cybersecurity, advanced digital skills, and ensuring a wide use of digital technologies across the economy and society, including through Digital Innovation Hubs (European Commission, 2022).

Digital transformation policies come in a variety of forms throughout the landscape of European nations. Other types of initiatives, such as strategies for the advancement of the innovation programs, have also been established by EU Member States, and these initiatives are closely related to each country's digital growth strategy (European Commission, 2018). For example, Horizon 2020 is considered an important measure for encouraging the SMEs culture and start-up ecosystem in Romania – "the strategy aims to develop a viable entrepreneurial ecosystem for businesses by implementing ambitious objectives, such as: (...) facilitating SMEs' access to adequate financing through specific operational instruments; stimulating innovative SMEs by encouraging technology transfer" (European Commission, 2018, p. 125). Unfortunately, according to the European Commission (2018:125), "Romania scores lower than the EU average regarding companies' access to investment and finance".

Also Berinde and Herța (2021, p. 2) further support the idea that "Romanian SMEs" overall poor performance affects their sustainability and represents a negative aspect engendering effects of diminishing profits and equity value accumulated by the shareholders from the activity performed', and explain that SMEs are competent to a limited extent of obtaining funding through the capital market, with their only viable choice being to turn to external financing through the monetary market, although they do possess strengths such as high flexibility and rapid market response.

To sum up, the literature review above highlights the importance of innovation for SMEs, as it enables them to remain competitive and adapt to different market conditions. The EU, the OECD, and national governments have recognized the importance of innovation when it comes to the progress and performance of SMEs and provided support through multiple programs and initiatives.

## Methodology

In this article, we will explore the relationship between governmental funding and SMEs' performance in terms of innovation. The research will be conducted using a mixed-methods approach, which will involve analysis of confirmed data, comparison between these results, and a SWOT analysis. According to the European Innovation Scoreboard 2022, there are four performance groups regarding innovation level in the EU. This section of methodology is divided into three parts which are also the aims of this paper:

1. The first aim is to analyze the group where Romania is placed, which is the *Emerging Innovators*, and to observe if there is a connection between the number of SMEs in those countries, and their level of innovation, taking into consideration: a. the Innovation Score in 2022; b. the number of SMEs in 2022, and c. the country's R&D expenditure.
2. The second is considering Romania's level of innovation, and we aim to analyze the sources of funding used by Romanian SMEs, as well as their interest in innovation. The most recent set of data is from the year 2021 and is available at the White Paper on SMEs in Romania.
3. Finally, we set as a goal a SWOT analysis regarding the strengths, weaknesses, opportunities, and threats of the innovation process in the SMEs sector in Romania.

**Results and discussions**

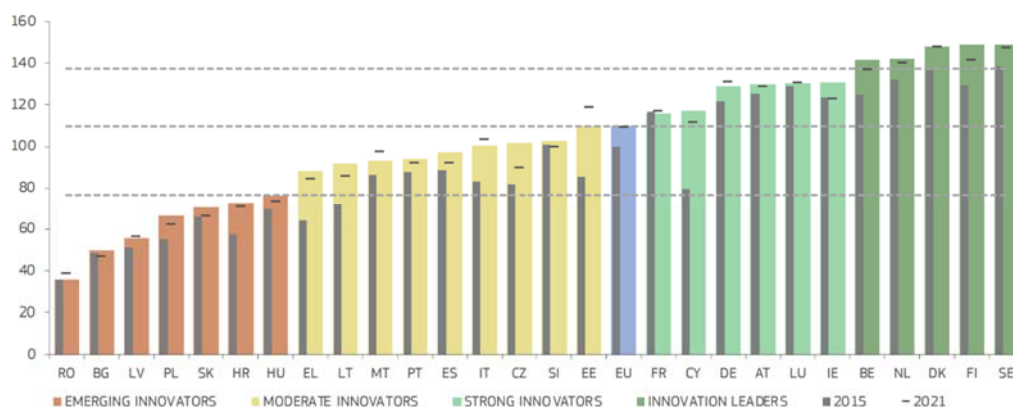
To respond to the first point of the methodology, we have selected the European Innovation Scoreboard which is a complex assessment of innovation performance across the EU, focused on understanding the innovation level of each country, while providing insights into their economic development and potential for growth. It presents 12 innovation dimensions and a total of 32 indicators, and the 2022 version distinguishes between four key categories of activities: Framework conditions (human resources, attractive research systems), Investments (financing, support, investments by firms etc.), Innovation activities (innovators, linkages etc.), and Impact (on employment and sales).

The EIS categorizes countries into four performance groups based on their level of innovation.

- a. Innovation Leaders: Countries with a high level of innovation performance that are leaders in innovation at a global level (Sweden, Denmark, Finland, and Germany).
- b. Strong Innovators: Countries with above-average innovation performance, and that are particularly strong in some areas of innovation (Austria, Belgium, France, Ireland, and the Netherlands).
- c. Moderate Innovators: Countries with average innovation performance, but with some strengths and weaknesses in different areas of innovation (Cyprus, Czechia, Estonia, Greece, Italy, Slovenia, and Spain etc.).
- d. Emerging Innovators: Countries with below-average innovation performance but that are improving their innovation capacity and performance (Bulgaria, Romania, Poland, Croatia, Hungary etc.).

We have decided to focus on this scoreboard to explore the connection between the number of SMEs and innovation levels, as we consider this can provide valuable information for both policymakers and business leaders in these countries. Analyzing the performance of Emerging Innovators like Romania, we are trying to identify the challenges they face in developing their innovation capacity and suggest potential solutions.

**Figure 1.** Groups of innovators of the EU countries

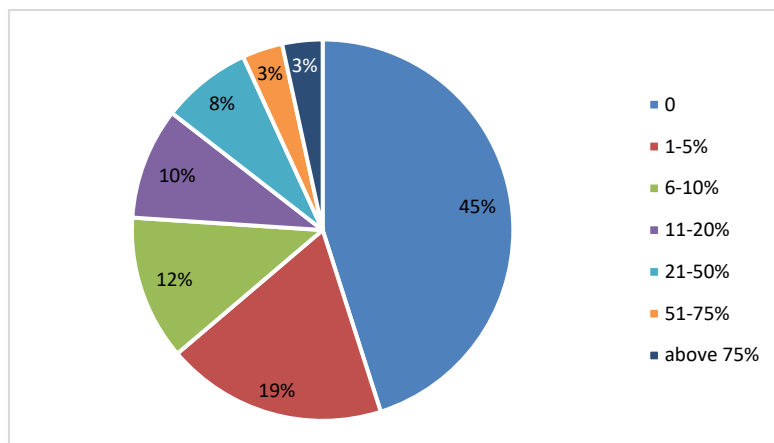


**Source:** European Innovation Scoreboard 2022, p. 20.

According to the EIS 2022, in comparison to the EU average, Bulgaria and Romania exhibit the lowest performance levels and very slow performance growth, extending their performance gap with the EU and most of the Member States. For example, Romania's level of performance in terms of innovation have either remained stagnant or declined in recent years, which can be considered concerning for the country's economic growth and development. "The performance level for Romania dropped in 2016, 2017, 2018, and 2022, remaining at the same level as in 2015. The performance for innovation expenditures per employee and innovative SMEs partnering with others suffered the most in 2022" (EIS, 2022, p. 26).

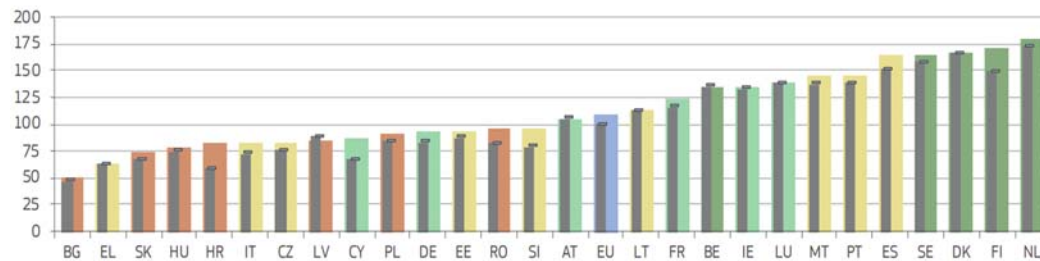
Unfortunately, innovation performance has decreased in Romania compared to 2021, and only increased by 0.2% in 2022, registering the lowest performance in the EU. This is also reflected in Figure 2, where it is possible to observe that almost half of the Romanian SMEs are not interested in making investments in innovation. Unfortunately, only a small percent of the SMEs population of Romania appears to have been making investments in innovation.

**Figure 2.** Investments in innovation at SMEs level in Romania



**Source:** White Paper on SMEs in Romania.

However, as per the EIS 2022, it is interesting to observe that out of the group of Emerging Innovators, in terms of digitalization, Romania is the best performer, being the only one that performs above the EU average. For example, Romania may perform well in terms of digitization due to investments in technology and IT infrastructure but may not allocate enough funds for research and development in key sectors. Regarding digitalization of SMEs in Romania there is currently a program in place, through which specific activities/actions will be supported to support SMEs in the adoption of digital technologies. SMEs in Romania can benefit from these European funds of up to 100.000 euros in the adoption of digital technologies thank the National Recovery and Resilience Plan (MIPE, 2023).

**Figure 3.** Digitalization ranking across the EU

**Source:** European Innovation Scoreboard, 2022.

However, according to the R&I and Infrastructure Report (2022: 39), Romania's research and innovation systems are fragmenting, making it difficult to incorporate EU RDI dimensions into effective domestic policies. This is impacted by a widening gap in research and development between Romania and Western EU members, as well as insufficient funding, and a brain drain of tech industry workers. Romania earned the least amount of EU funding for RDI as a result of those setbacks. Unfortunately, the European Union's largest research and innovation program, Horizon 2020, saw minimal participation from Romania, which led to the country being placed in the 20th position out of the 28th, based on the funding received. "A new in-depth analysis of all research projects funded by the European Research Council (ERC) under Horizon 2020, reveals 55% of all grants combined went to the UK, Germany, France and the Netherlands" (Science Business, 2022).

**Table 1.** Dimensions of the innovation process in Romania

Country	European Innovation Score (European Commission, 2022)	Research & Development expenditure (The World Bank, 2022)	Number of SMEs (European Commission, 2022)	Number of SMEs per capita
Romania	32.6	0.47% GDP	530.050	0,027
Bulgaria	45.2	0.81% GDP	332.225	0,049
Latvia	50.8	0.71% GDP	104.668	0,055
Poland	60.5	1.39% GDP	2.040.017	0,054
Slovakia	64.3	0.91% GDP	497.173	0,091
Croatia	66.5	1.25% GDP	178.333	0,045
Hungary	69.8	1.61% GDP	673.524	0,069

**Source:** Author's own creation.

In the above table (Table 1) we have selected four dimensions relevant to the innovation process in Romania: the score according to the European Innovation Scoreboard for each country, the per cent spent by each Member State for RD&I, the number of SMEs per country, and the number of SMEs per capita. We can observe there is a significant variation in innovation scores, R&D spending, and the number of SMEs between the countries analyzed.

Countries with higher innovation scores, such as Hungary and Croatia, tend to allocate a higher share of GDP to research and development. At the same time, countries with lower innovation scores, such as Romania and Bulgaria, invest less in research and development. The number of SMEs per-capita also varies significantly between the countries in the table.

The countries with the highest number of SMEs per capita are Slovakia and Hungary, while those with the lowest number of SMEs per capita are Romania and Bulgaria.

For example, a positive correlation can be observed between the European Innovation Score and R&D expenditure expressed as a percentage of GDP. Countries with higher spending in this area, such as Hungary and Poland, score higher in innovation. Conversely, countries with lower spending, such as Romania and Bulgaria, score lower on innovation. There is also a possible positive correlation between the European Innovation Score and the number of SMEs per capita. Countries with more SMEs per capita, such as Slovakia and Hungary, score higher in innovation.

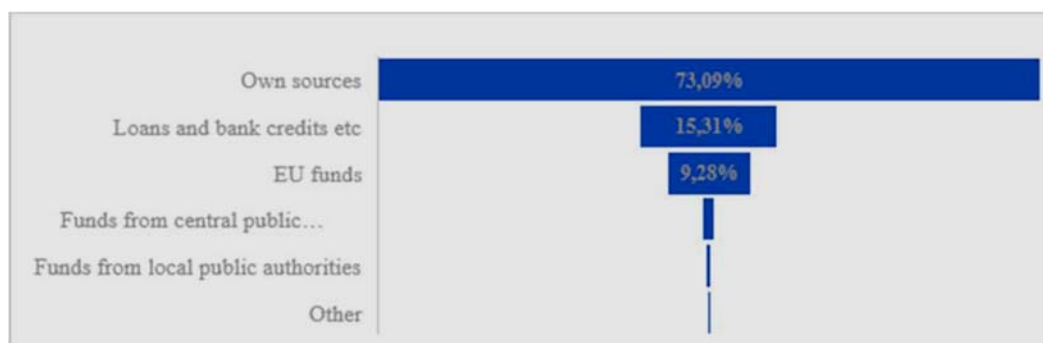
However, there is no clear correlation between the absolute number of SMEs and the innovation score. For example, Romania and Bulgaria have lower innovation scores but have a relatively high number of SMEs per capita.

In general, we consider these correlations to be suggestive and may be influenced by several factors, such as government policies, education levels and entrepreneurial culture in a country. We believe it is important to take these factors and other relevant indicators into account to adequately assess a country's level of innovation.

To respond to the second point of our research, regarding the main sources of funding for investments in research, development and innovation in the case of SMEs in Romania, data provided by the White Paper for SMEs in Romania confirms that most funding for investments in RD&I comes from the enterprises' sources, which suggests the companies are interested in their growth and development (Figure 4).

However, it is also worth noting that the amount of funding coming from the EU is relatively low. As a potential explanation for this, regarding access to finances, the Commission (2022) mentions that in Romania there have been both developments as limitations. For example, there was an increase "in the number of SMEs that did not apply for loans (77% in the first part of 2021), thus limiting themselves to internal resources, which can limit company growth".

**Figure 4.** Funding areas for investments in RD&I



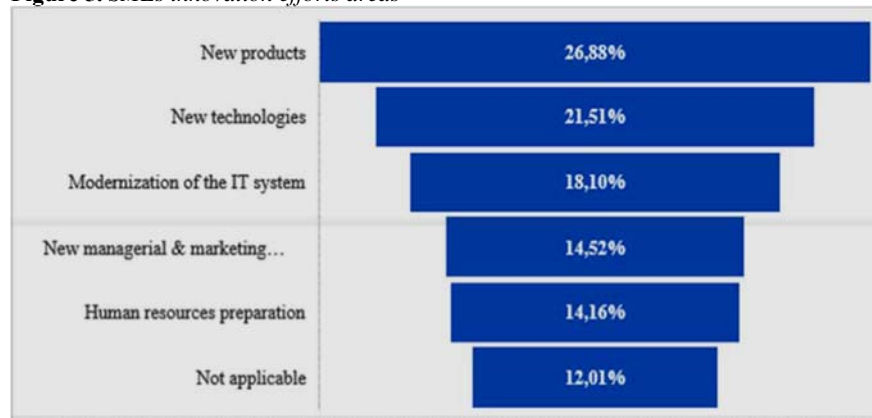
**Source:** Author's own creation, based on White Paper on SMEs in Romania, 2021.

Based on the WPS (2021), it appears that the innovation efforts carried out by SMEs were mainly focused on new products, new technologies, the modernization of the IT system,



new managerial and marketing approaches, as well as the training of human resources (Figure 5). Unfortunately, we see interestingly that the absence of innovative approaches is recorded in a proportion of 12.01% of enterprises, which could be a cause for concern as a significant part of Romanian SMEs could not be prioritizing innovation, which may hinder their ability to compete in the market and could impact their growth and sustainability in the long term.

**Figure 5.** *SMEs innovation efforts areas*



**Source:** White Paper on SMEs in Romania, 2021, p. 312.

To respond to the third question of our methodology, we have decided to realize a SWOT analysis presenting the strengths, weaknesses, opportunities, and threats of the innovation process for Romanian SMEs (Figure 6). Our goal was to provide an analysis that covers essential factors that SMEs should consider.

On one hand, in terms of strengths and opportunities, it is worth mentioning that "In the first three quarters of 2022, Romania's annual real GDP grew by 4.3%, due to strong gross fixed capital formation and private consumption, which was supported by a strong labour market and wage growth" (EC, 2023), registering a growing economy, although the real GDP growth is set to 2.5% in 2023. Various programs support innovation and digitalization that Romanian SMEs can benefit from as members of the European Union. For example, the total value allocated to the most recent program is 347.50 million euros (MIPE, 2023). On the other hand, as weaknesses and threats, we have identified bureaucratic inefficiencies and inadequate infrastructure in certain areas, which could be real challenges that SMEs need to navigate when operating in Romania. Additionally, considering multiple countries from the group of Emerging Innovators are facing similar challenges, Romanian SMEs may face competition from countries in the same group.

**Figure 6.** SWOT Analysis of the innovation process of SMEs in Romania

<p style="text-align: center;"><b>STRENGTHS</b></p> <ol style="list-style-type: none"> <li>Romania has a growing economy, which can make it an attractive location for businesses to operate (EC, 2023).</li> <li>The Romanian government has implemented several initiatives to support SMEs, including tax incentives and funding programs for innovation and technology adoption.</li> </ol>	<p style="text-align: center;"><b>WEAKNESSES</b></p> <ol style="list-style-type: none"> <li>Romania has a relatively high level of bureaucratic inefficiency, which can make it difficult for businesses to operate and access government support.</li> <li>The country's infrastructure, particularly in rural areas, may not be fully developed or equipped to support the adoption of digital tools and innovation.</li> </ol>
<p style="text-align: center;"><b>OPPORTUNITIES</b></p> <ol style="list-style-type: none"> <li>Romania is a member of the European Union and has access to EU funding and support programs for SMEs.</li> <li>There is a growing demand for digital solutions and innovation in Romania, which can create opportunities for SMEs that are able to meet this demand.</li> </ol>	<p style="text-align: center;"><b>THREATS</b></p> <ol style="list-style-type: none"> <li>Romania may face competition from other countries in the region (for example from the group of Emerging Innovators) that are also looking to attract foreign investment and promote innovation.</li> <li>Economic instability or political changes in the country could impact the availability of funding or support programs for SMEs.</li> </ol>

Source: Author's own creation.

## Conclusions

This paper aimed to provide an analysis regarding the connection between innovation, digital progress, and the performance of European SMEs, with a particular focus on Romanian SMEs. We consider this topic relevant in the current globalized society, as digital progress and innovation are increasingly critical to the performance of European SMEs.

Overall, we believe that Romania with its expanding economy and support for entrepreneurs, has the potential to be a significant player in the digital economy, although, its current ranking in the innovation index is considerably lower than the EU average, as illustrated in Figure 1. Accordingly, while making choices about digital advancement and innovation, SMEs operating in Romania should carefully assess both the benefits and constraints given by the country's business environment.

We would recommend that a consistent and thorough approach to monitoring and evaluating innovation indicators and results is necessary considering the general knowledge that SMEs contribute to growth, job creation and competitiveness in general. For Romania, prioritizing innovation and investments in RD&I could help support the overall growth of the Romanian economy, and this could include governmental incentives or funding programs for innovation, as well as training to assist SMEs to develop their innovation knowledge and abilities.

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