

COMPREHENSIVE EVALUATION OF DIGITALIZATION IN ROMANIA

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The need for digitalization is increasingly present among companies, public services and people's lives. With the outbreak of the Covid-19 pandemic, the importance of digitalisation has led to a sharp and significant reduction in transport, production and consumption, and the increased use of digitalization technology has attenuated energy-intensive work practices and lifestyles.

The article presents a method for monitoring across EU member states, both in terms of the current state of digitization and the pace of development. This is done with the help of indicators of the digital economy and society, and the country under analysis is Romania.

Although the IT industry is booming throughout Europe, Romania is still in a lower position in the European ranking of digitization, ranking 26th out of 27 countries.

It is found that the main causes of these poor results are: lack of investment in research and development and education, lack of strategies, specialists and government coherence, resilience of the bureaucratic apparatus, corruption and lack of interest in the private sector.

Keywords: digitalization, indicators, implementation, indicators of the digital economy and society

Classification JEL: C820, M150, O320

Introduction

The role of digitalization in the development and evolution of society could be better observed. With the outbreak of the Covid-19 pandemic, when digital skills, networks and connectivity between them, computer data as well as artificial intelligence have supported the economies of EU Member States and allowed the business to continue even in isolation.

Recognizing the importance of digitization, EU Member States they provided data on their state of digitization, and thus identified areas that require priority investment and action.

In the context of the Covid-19 pandemic, EU member states they took immediate steps to minimize contagion by developing applications and platforms to facilitate telecommunications and coordinate resources in various fields, and digital public services were developed or improved to promote digital inclusion.

Actions also focused on promoting and funding research using advanced digital technologies and infrastructure.

The path of EU member states, both in terms of the current state of digitalisation and the pace of development, can be tracked using indicators from the digital economy and society.

Literature review. The first research dealing with digital transformation was conducted by (Henriette and CO, 2015), (Gebayew and CO, 2019), Reis and CO, 2018), and (Vukšić and CO, 2018), which developed a framework that establishes the connection digitalisation, business model innovation and sustainability in industrial environments.

The European Commission's February 2020 Communication, "Shaping Europe's Digital Future", together with the "White Paper on Artificial Intelligence" and the "European Strategy" are important documents for all EU Member States. , because it provides data for an inclusive use of technology that works for people and respects fundamental European values.

The development of a methodology for the comprehensive assessment of the level of digitization has determined the need to consider methodological approaches to understanding the digitization of the economy, in order to clarify this concept.

The digital economy is considered as a set of types of economic activities related to different degrees to digital technologies. The implementation of digital technologies largely depends on the level of digitalization of the economy. Digitization involves the use of digital data in organizational and social processes, including economic activities. The quantification of these data is done with the help of digitization indicators.

Digitization indicators. Digital capabilities are essential to ensure a country's growth and economic resilience. In order to have an overview of the situation in the EU, we will compare the current state and

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the continuous impetus of the digital development of the different economies of the Member States.

In this sense, the specialists classified the countries in four categories: Stall Out, Stand Out, Break Out and Watch Out, considering the current level of digitization, as well as the current digitization, as well as the pace of development possibilities.

Each of these four categories has different characteristics that differentiate them from the others. Thus, Stall Out economies are the ones with digital maturity, and have a smaller momentum for continuous progress. This is due to the natural slowdown in growth that accompanies maturity, but many countries in this category have opted for a slowdown in economic growth, with a view to inclusive and responsible development. The countries whose economies fall into this category in 2020 are: Belgium, Denmark, Ireland, Spain, France, the Netherlands, Austria, Portugal, Slovenia, Finland, Sweden.

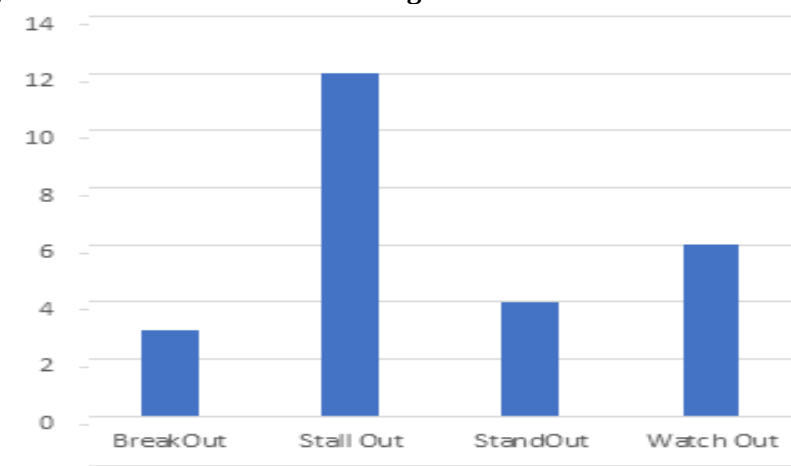
Countries with Stand Out economies have high levels of digital training and economic growth continues on an upward trajectory, and those with Break Out economies have a low degree of digitization, but have a very high potential for its development. These countries have a constant improvement in digital training and a great potential to ensure their entry into the higher category (Stand Out).

The Czech Republic, Germany, Estonia and Lithuania are the countries that were part of the Stand Out category in 2020, and Latvia and Poland are the countries in the Break Out category with great potential to move to the top category in a short time horizon.

Watch Out economies face challenges and are characterized by shortcomings in both existing digital capabilities and the momentum of future development. This category includes countries such as Greece, Croatia, Hungary, Romania and Slovakia.

Figure no.1. provides an overview of the current level of digitization of EU Member States in 2020.

Figure no.1.: The current level of digitization of EU member states in 2020



Sources: the author's conception

It can be seen from Figure no. 1., the fact that most EU member states have economies of the Stall Out type, with a digital maturity, but with a small impetus for continuous progress, the second place being occupied by countries with Watch Out economies that have deficiencies in capabilities and in the impulse of future development (a category that includes Romania).

Digital Economy and Society Index (DESI). The Digital Economy and Society Index (DESI) monitors Europe's overall digital performance and tracks EU countries' progress in digital competitiveness. By providing data on the state of digitalisation of each Member State, it helps them to identify areas that need priority investment and action.

The structure of the digital economy and society index (DESI) includes the following components: connectivity, human capital or skills of internet users and advanced skills, citizens' use of internet services and online transactions, integration of digital technology or business digitization and e-commerce, digital public services (e-Government), cyber security.

Implementation of digitalization in Romania. The COVID-19 crisis has shown that adequate digital skills that provide citizens with access to information and services are crucial for the entire population. Similarly, digital skills are also essential for the effective use of distance learning solutions, including support for schools and families, with a particular focus on those at risk of social exclusion (eg

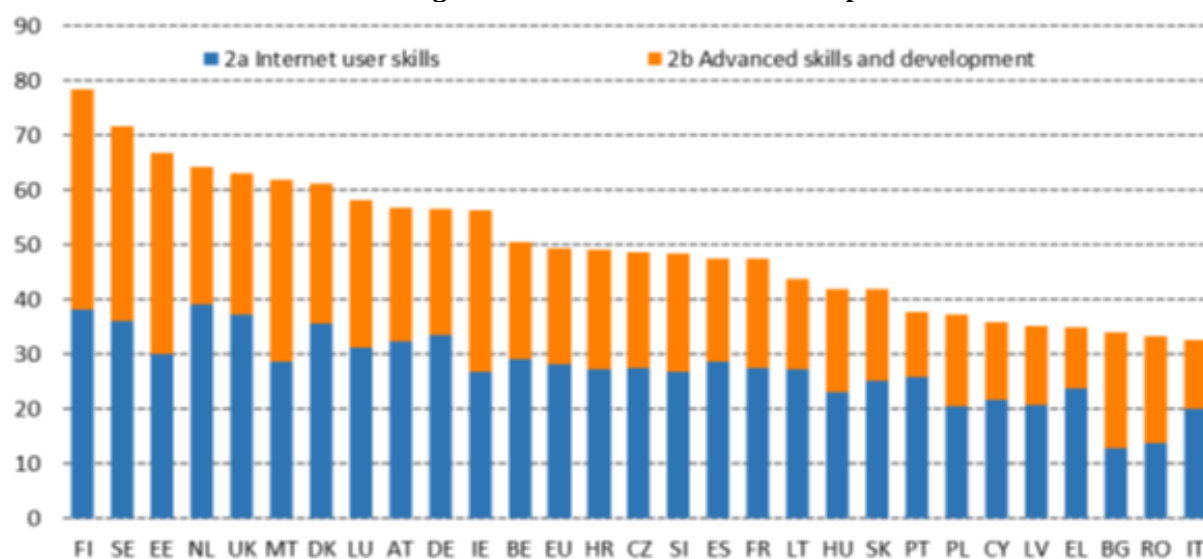
providing hardware, as well as training).

The human capital dimension of DESI has two sub-dimensions covering "internet user skills" and "advanced skills and development". The first is based on the European Commission's digital skills indicator, calculated on the basis of the number and complexity of activities involving the use of digital devices and the Internet. The latter includes indicators on TIC specialists and TIC graduates.

In the last year, in Romania there has been an improvement in both the skills of internet users (at least basic digital skills) and advanced skills (TIC graduates and TIC specialists). However, there is still a shortage of TIC specialists on the Romanian labor market, where at least 80% of companies that have recruited or tried to recruit specialized labor, have reported such difficulties. There is also an issue of gender balance, as only one in six TIC specialists are women.

According to the latest data, Romania, along with Bulgaria and Italia, is on the last places in the ranking (Figure no. 2.).

Figure no. 2.: The size of human capital



Source: DESI 2020, European Commission.

Today, software skills have become a prerequisite for employment. It is found that the biggest skills deficit, both among the active workforce and the general population, is in the use of software for manipulating content, only 35% of Romanians have basic software skills. This indicator is also strongly influenced by socio-demographic issues, so that 80% of companies that have recruited or tried to recruit TIC specialists have reported difficulties.

Businesses are increasingly training their staff to develop or update their TIC skills. Despite this fact, Romania qualifies only 6% of the required specialists.

People in the EU engage in a wide range of online activities; however, there are still large disparities between EU Member States in the use of internet services. Romania, Bulgaria and Italy are the least active countries, which have not seen significant improvements in this dimension compared to the previous report (2017).

In some EU member states, such as Denmark, Sweden and the Netherlands, the vast majority of the population (95%) use the Internet at least once a week. However, in some Member States, such as Romania (28%) and Bulgaria (33%), more than a quarter of the population still does not use online regularly.

It was found that in Romania the most active internet users are young people aged between 16 and 24 years and are regular internet users, with a high level of formal education (97%) and students (98%).

The upward trend in e-commerce continued in 2019, with around 71% of EU internet users ordering goods and services online. E-commerce varies considerably between EU Member States. In 2019, 91% of internet users in the UK and 86% in Denmark bought online, compared to only 29% in Romania. The highest annual increases were in Croatia (10 percentage points) and Hungary (8 percentage points).

E-commerce is influenced by age, level of education and employment status. Young people are the most active age group of online shoppers (16-24 year olds), while the proportion of internet users with a higher level of education who shop online, higher than those with a lower level of formal education. There

is no significant difference by gender, internet users shop online.

Cyprus, Romania and Greece are the countries with the lowest performance (below 5%) among other EU Member States.

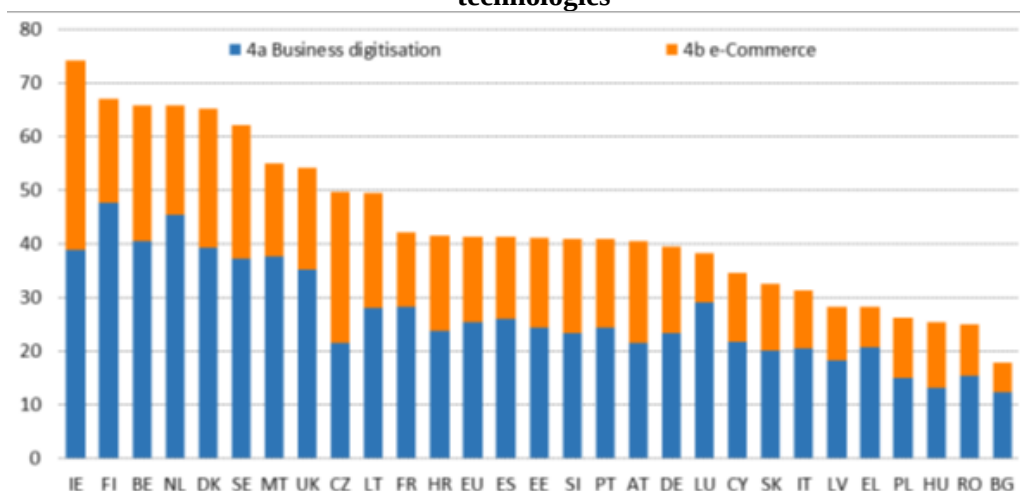
Digital technologies enable companies to gain competitive advantage, improve their services and products, and expand their markets. The digital transformation of business opens up new opportunities and stimulates the development of new and reliable technologies. This dimension measures business digitalisation and e-commerce.

Romania is also at this end at the end of the ranking with a score below 35 points (out of 100), significantly below the EU average of 43 points, and in terms of the adoption of e-business technologies, it also has a low score below 40 points.

In e-commerce, on all three indicators of e-commerce (for example, SMEs selling online, e-commerce turnover and cross-border online sales), Romania behaves the worst with scores below 25 of points.

Both types of digital technologies in the U.E. are illustrated in Figure no. 3.

Figure no. 3.: Digital Economy and Society Index (DESI) 2020, integration of digital technologies



Source: DESI 2020, European Commission.

Digital intensity index. The Digital Intensity Index (DII) measures the use of different digital technologies at the enterprise level. The DII score (0-12) of an enterprise is determined by how many selected digital technologies it uses and shows the degree of penetration and speed of adoption of the different monitored technologies. Large companies are more digitalized than SMEs.

In Romania, most companies (over 55%) have made only a small investment in digital technologies, ie they have a very low digital intensity index.

In the joint study of the 2021 digital density index, Accenture Strategy and Oxford Economics confirmed the link between increased use of digital technologies and higher productivity. According to them, a 10-point improvement in digital density (on a 100-point scale) could lead to an increase of up to \$ 1.36 trillion in GDP in the world's top 10 economies.

Digital public services. Digital public services can provide a wide variety of benefits, including greater efficiency and savings for both governments and businesses. It can also increase transparency and openness, measuring the demand and supply of digital public services, as well as open data.

In this regard, too, Romania has a score below 60, significantly below the EU average of 72,2.

National Cyber Security Index (NCSI). Following the outbreak of the COVID-19 pandemic and the widespread use of digital tools, ensuring internet security and preventing cybercrime, the misuse of data or fraud have become major concerns.

The National Cyber Security Index (NCSI) is the one that measures the readiness of U.E. member countries for online attacks.

At the level of 2020, Romania ranks 18th in the ranking made by the EU, with the NCSI index of 71.43 points and the allocation of the percentage of TIC in GDP of 3.74%.

Table no. 1: Percentage of GDP allocated to ICT and NCSI indices in preparation for cyber attacks in Romania

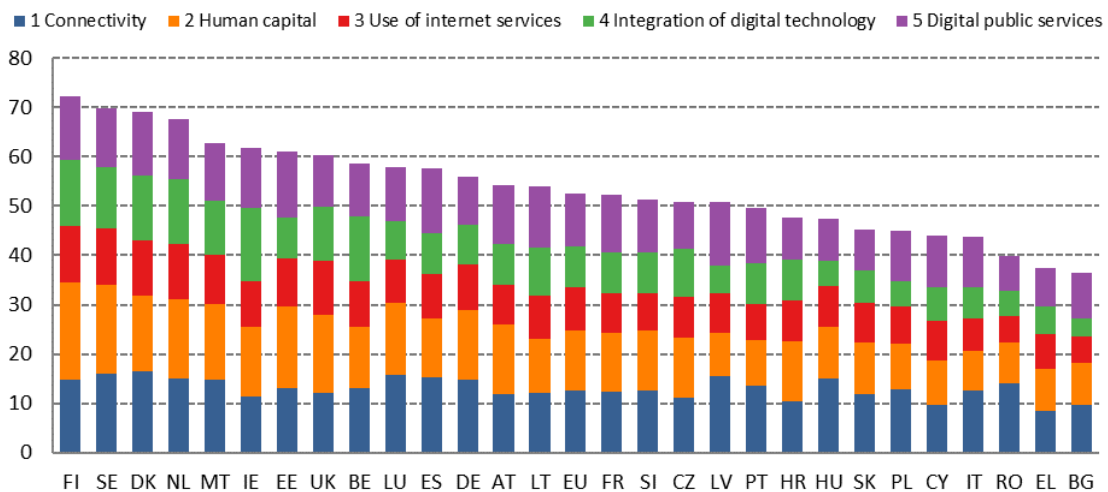
Country	Percentage of GDP allocated to ICT (%) - 2018	Percentage of GDP allocated to C&D - 2018	NCSI 2020	DDL 2020	The difference (NCSI-DDL) 2020	Ranking NCSI 2020
Romania	3,74	0,5	71,43	61,69	9,74	22

Sources: the author's conception

The allocation for research and development is only 0.5% of GDP, placing Romania on the 22nd place in the world, with a score of 9.74 registered in terms of cyber security training.

The progress of Member States in terms of the overall level of digitalisation of the economy and society over the last 5 years is illustrated in Figure no. 4. Progress is measured according to the progression of the DESI score over that period.

Figure no.4.: Progress of Member States in terms of the overall level of digitalisation of the economy and society



Source: DESI 2020, European Commission.

For Romania progress is measured according to the progression of the DESI score over that period is illustrated in Table no. 2.

Table no. 2.: Romania progress (DESI score)

DESI	Place	Score	U.E. Score
DESI /2020	26	40	52
DESI /2019	26	36,5	49,4
DESI /2018	26	35,1	46,5

Source: the author's conception

The most significant progression is in Ireland, followed by the Netherlands, Malta and Spain. These countries also perform well above the EU average, as measured by the DESI score. Common to these Member States are sound policies and targeted investments in all areas measured by DESI.

Conclusions

Romania will develop its own adapted national recovery plan, based on investment and reform priorities identified as part of the European Semester to be supported by the new strong EU 560 billion recovery and resilience mechanism.

With the help of the index of the digital economy and society, as well as of the other indicators, we made a specific analysis of Romania, which can support the digital recommendations of the European semester and the modeling of the digital future of Europe.

However, for the digital transformation to be fully successful, it will be necessary to create the right frameworks to provide the necessary technologies to increase the skills for accelerating digitization in Romania.

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