

# THE EVOLUTION OF THE DIGITAL ECONOMY IN ROMANIA IN THE CONTEXT OF THE EU DIGITAL SINGLE MARKET

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## **Abstract:**

*Digital transformation or digitisation is one of the global megatrends leading to structural and organisational reforms in the public and private sector by adopting information and communication technology (ICT) solutions to optimise operations and provide improved services to customers or citizens. The first and last parts of the paper present the content and strategic objectives of the European and Romanian Digital Single Market as well as the risks involved in the development of the digital economy. The measures adopted by the European Commission to support digitisation in the Member States are also presented, as well as those to reduce the risks generated by cyber-attacks. The paper also includes a quantitative analysis of the evolution of digitisation in Romania compared to the EU 27 average. This analysis highlights the significant gap between Romania and the majority of Member States in the field of digital services.*

**Keywords:** *Digital economy, Digitalization, Digital Single Market, cybersecurity, cybercrime*

## **Introduction**

In recent decades, in the context of profound technological transformations, the digitisation of services has become one of the essential conditions for adapting the public and private environment to changes in the consumption behaviour of the population and businesses in the Member States of the European Union.

Technological transformations affect all areas of modern life, from education and jobs to the social security system. Changes are happening at a rapid pace. At the moment, in some job categories, 90% of positions require digital skills. Consequently, Europe has to do these changes in order to protect its citizens and to allow them to take advantage of new opportunities. On the other hand, the advantages are also of an economic and financial nature, the digitization of production being estimated to bring to EU, 1.25 trillion euros, by 2025 [1].

Thus, digitalization is becoming more and more important, becoming a strategy issue that must be managed responsibly.

Digital transformation or digitization is one of the global megatrends leading to structural and organizational reforms in the public and private sectors through the

adoption of information and communication technology (ICT) solutions in order to optimize operations and provide improved services to customers or citizens.

In the first part of the paper we presented some aspects of the Digital Single Market concept and the need to achieve the EU Digital Single Market.

Some of the objectives of the EU and Romania's Digital Market Strategy are also presented. The second part of the paper includes a quantitative analysis of the progress made by Romania's digital economy in the context of the European Digital Single Market, as well as comparisons with the average level of the EU 27. At the end of the paper we highlight some of the risks involved in the development of the digital economy as well as some measures taken at EU and Romanian level to reduce them.

### **The European Union Digital Single Market**

The technological progress made by Member States and the changes in services brought about by digitisation have led the European Union to introduce the concept of the *Digital Single Market* (DSM) to ensure that the economy, industry and society take full advantage of the new digital era [2].

The digital single market is based on the concept of a common market, aimed at removing trade barriers between Member States, in order to increase economic prosperity and contribute to a deeper union between the peoples of Europe, which later developed into an internal market concept, defined as an area without internal frontiers in which the free movement of goods, persons, services and capital is ensured [3].

The Digital Single Market means that all connected devices - phones, computers, sensors - will be able to communicate without compatibility problems, regardless of manufacturer, technical details or country of origin.

Since 2015, the European Commission developed a Digital Single Market strategy (DSM strategy) which aims at uniting individual digital markets across the Union. "For the member states, DSM is an opportunity to transform and adapt to the new economic and social context that characterizes the informational era and an opportunity to reduce the economic and social disparities for states whose European integration needs to be deepened, as is the case with Romania. The involvement of Romania in the digital single market should not only be an objective in itself, but a way of developing the national digital

economy, especially in the context in which the DSM is being under construction rather than finding itself at a decisive stage” [4].

For Romania, the creation and development of the Digital Single Market is of particular importance, but at the same time it is also an opportunity.

The DSM is indeed a major opportunity for Romania, but it involves certain economic and technical risks, strict regulations on intellectual property protection, cybersecurity, identity protection, electronic payments, e-commerce, e-services, quality assurance, consumer protection etc.

Romania has not yet made sustainable progress related to society, economy, education and digital services, but is difficult to predict exactly where the digital single market is heading and how Romania’s digital economy will look like in the coming years. For Romania, these issues are very important, because these significant disparities shall be recovered [5].

### **Quantitative analysis of Romania's digital progress in the European context**

Romania's progress in the digital economy will be analysed on the basis of indicators calculated by EUROSTAT but also by reference to a more complex index (DESI) through which the European Commission has been monitoring the evolution of digitisation in the Member States since 2014.

Among the indicators calculated by EUROSTAT we considered the following more representative:

- share of households with internet access
- share of people accessing the internet daily
- share of people who used the internet in their interaction with public authorities
- share of ICT sector in GDP

A very suggestive indicator of digital progress is the share of households with internet access. Table 1 shows the evolution of this indicator for Romania, compared to the EU27 level.

The widespread expansion of the use of information and communication technology, through easier access due to the growth and diversification of IT devices and means,

more affordable prices, has contributed to an increase in the number of users and in the population, i.e. people with access to the Internet.

The data in the table and graph no.1 clearly show a much more pronounced dynamic in the share of households with internet access in Romania compared to the European Union in the period 2011-2020.

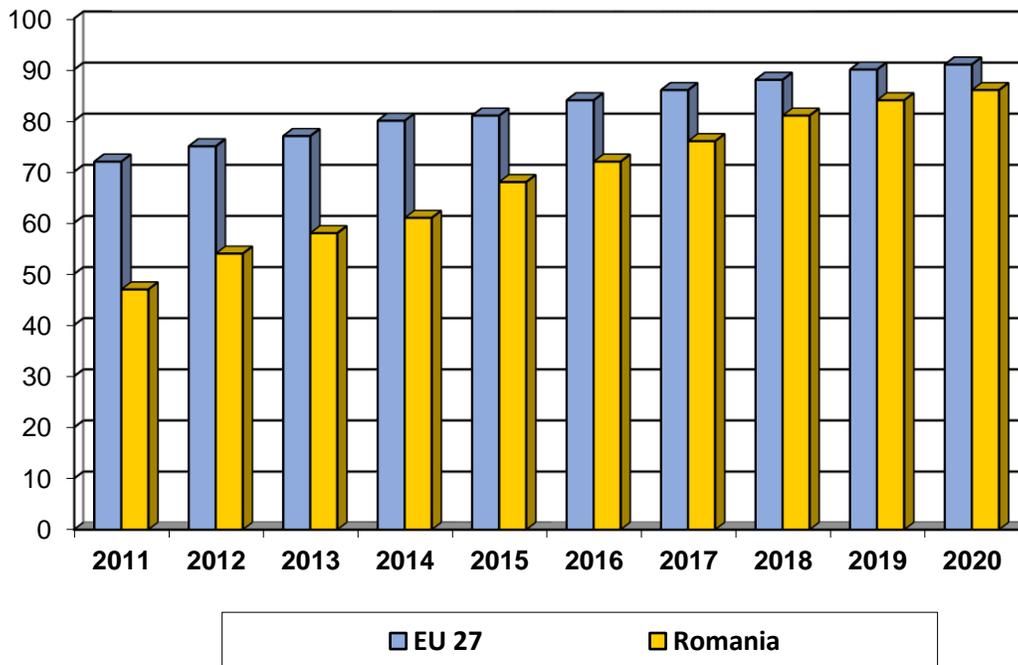
Table 1 The evolution of the share of Households with internet access, in Romania compared to European Union, between 2011 and 2020

Years	Percentage of households with internet access		Dynamic index ( 2011=100)	
	Romania	UE 27	Romania	UE 27
2011	47	72	100.0	100.0
2012	54	75	114.9	104.2
2013	58	77	123.4	106.9
2014	61	80	129.8	111.1
2015	68	81	144.7	112.5
2016	72	84	153.2	116.7
2017	76	86	161.7	119.4
2018	81	88	172.3	122.2
2019	84	90	178.7	125.0
2020	86	91	183.0	126.4

Data source: processed data from EUROSTAT, available at *Statistics | Eurostat (europa.eu)* [accessed on November, 18, 2021] [6].

It can be seen that in the case of Romania this indicator recorded an increase of 83.0% in 2020 compared to 2011, compared to only 26.4% in the case of the EU 27.

Figure 1 The evolution of the share of Households with internet access, in Romania compared to European Union, between 2011 and 2020 (%)



Data source: processed data from EUROSTAT, available at Statistics | Eurostat (europa.eu) [accessed on November, 18, 2021] [6].

In assessing the degree of digitisation, it is important not only the number and proportion of people with access to the Internet but also the frequency of its use, which is expressed by the share of individuals who accessed the Internet daily.

Table 2 shows the evolution of this indicator in Romania in comparison with the EU 27 for the period 2011-2020. This indicator highlights not only the skills of people but also their interest in using the internet.

Table 2 The evolution of the share of individuals who accessed the internet daily, in Romania compared to European Union, between 2011 and 2020

Years	Percentage of individuals who accessed the internet daily		Dynamic index (2011=100)	
	Romania	UE 27	Romania	UE 27
2011	24	54	100.0	100.0
2012	29	56	120.8	103.7
2013	32	60	133.3	111.1
2014	32	63	133.3	116.7
2015	37	65	154.2	120.4

2016	42	69	175.0	127.8
2017	47	71	195.8	131.5
2018	53	74	220.8	137.0
2019	57	77	237.5	142.6
2020	62	80	258.3	148.1

Data source: processed data from EUROSTAT, available at Statistics | Eurostat (europa.eu) [accessed on November, 18, 2021] [6].

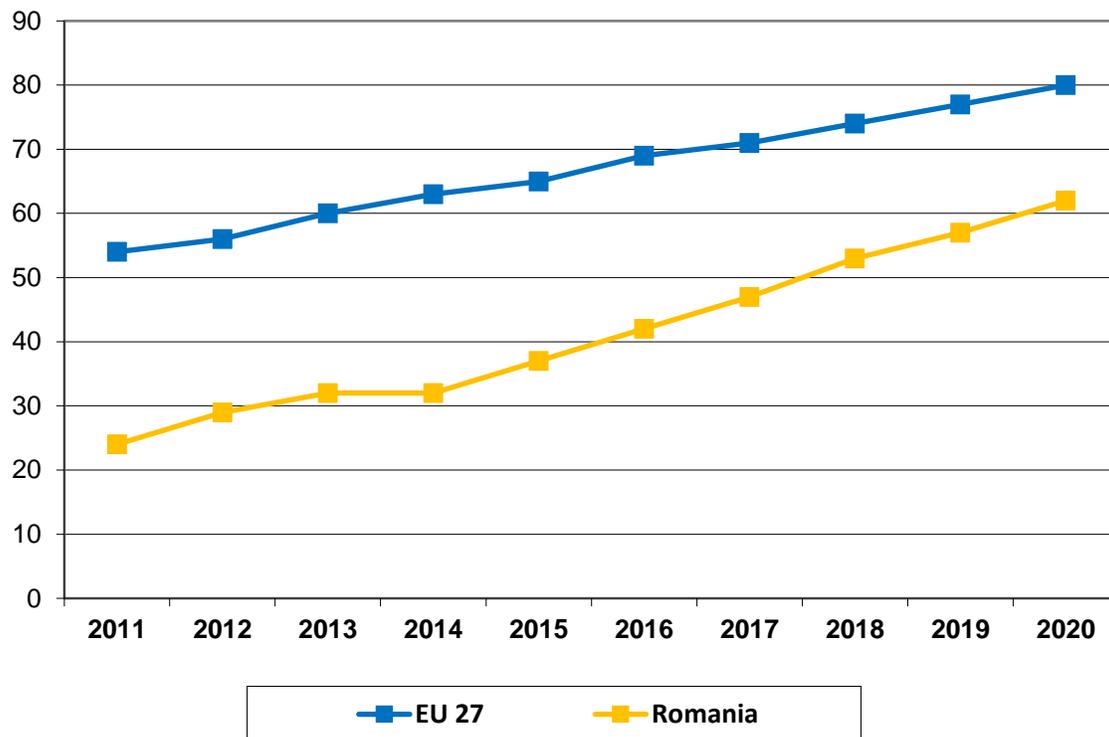
The data in Table 2 highlights several issues. First, the indicator shows a much faster growth in Romania, with the share of individuals who accessed the internet daily increasing by 158.3% in 2020 compared to 2011, while in the EU27 it increased by 48.1%. This much more pronounced dynamic in the case of Romania is explained by the basis of comparison (in 2011 in Romania 24% and in the EU 27 54%). Secondly, although the gap between Romania and the EU 27 has narrowed, it is still there

Thus, in 2020 in Romania the share of individuals who accessed the internet daily, reached 62% while in the EU 27 it was 80%.

Figure 2 shows the tendency of increasing the share of individuals who access the Internet daily, both in the EU 27 and in Romania.

It also highlights very clearly the faster growth rate of this indicator, recorded in the analysis period, compared to that of the EU 27.

Figure 2 The evolution of the share of individuals who accessed the internet daily, in Romania compared to European Union, between 2011 and 2020 (%)



Data source: processed data from EUROSTAT, available at Statistics | Eurostat (europa.eu) [accessed on November, 18, 2021] [6].

Among the main objectives of digitization in Romania, are:

- developing digital public services for both citizens and businesses;
- increasing the capacity of public bodies to operate in an advanced digital environment and provide mature electronic public services;
- strengthening the general digital skills of public sector employees;
- increasing the motivation and skill levels of public sector ICT staff.

A suggestive indicator for assessing these aspects is the share of individuals who used the Internet in their interaction with public authorities (Table 3).

This indicator is extremely relevant both in terms of the level of digitalization and functionality of public administration and in terms of public confidence in this type of interaction with public bodies and the ability of the population to use the Internet for this purpose.

Table 3 The evolution of the share of individuals who accessed the internet in interaction with public authorities, in Romania compared to European Union, between 2011 and 2020.

Years	Percentage of individuals who used the internet in interaction with public authorities (last 12 months)		Dynamic index (2011=100)	
	Romania	UE 27	Romania	UE 27
2011	7	41	100.0	100.0
2012	31	44	442.9	107.3
2013	5	42	71.4	102.4
2014	10	46	142.9	112.2
2015	11	46	157.1	112.2
2016	9	48	128.6	117.1
2017	9	49	128.6	119.5
2018	9	51	128.6	124.4
2019	12	53	171.4	129.3
2020	13	57	185.7	139.0

Data source: processed data from EUROSTAT, available at Statistics | Eurostat (europa.eu) [accessed on November, 18, 2021] [6].

The evolution of the digital economy in Romania can also be assessed by means of the ICT sector's share of GDP indicator, which reflects on the one hand the contribution of this sector to GDP and on the other hand the investments made by the state for its development.

Table 4 shows the evolution of the ICT share and dynamics in the period 2011-2018. The data shows a slight upward trend in the share of ICT in GDP over the period under review, from 3.1% in 2011 to 3.74% in 2018.

Table 4 The evolution of the share of ICT sector in GDP, in Romania, between 2011 and 2020 (%)

Years	Percentage of the ICT sector in GDP	Dynamic index (2011=100)
2011	3.10	100.0
2012	3.19	102.9
2013	3.14	101.3
2014	3.31	106.8
2015	3.36	108.4
2016	3.56	114.8

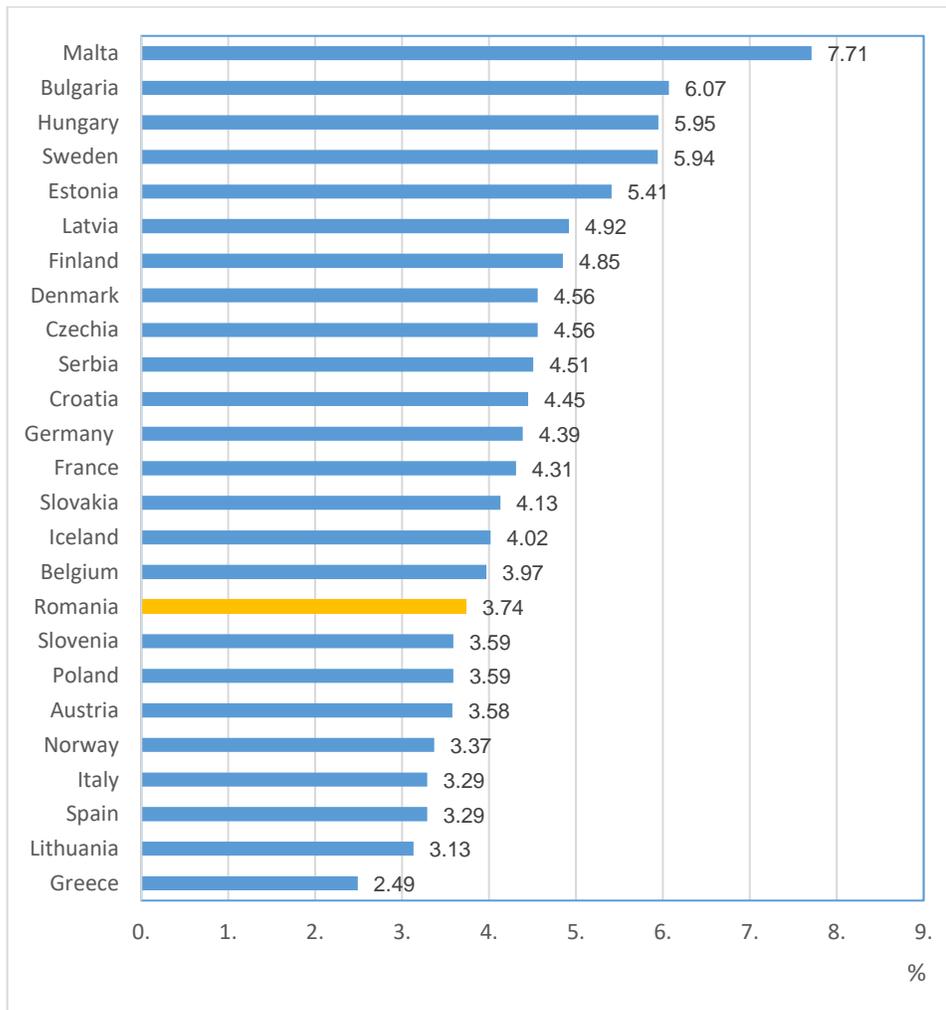
2017	3.53	113.9
2018	3.74	120.6

Data source: processed data from EUROSTAT, available at Statistics | Eurostat (europa.eu) [accessed on November, 18, 2021] [6].

Note: Last available data are for 2018

Figure 3 shows that Romania is among the countries with the lowest share of the ICT sector in GDP in 2018 (3.74%), lagging behind countries such as: Malta (7.71%), Bulgaria (6.07%), Hungary (5.95%), Sweden (5.94%), Estonia (5.45%). Among the countries with a lower share compared to Romania I mention: Greece (2.49%), Lithuania (3.13%), Spain (3.29%) and Italy (3.29%).

Figure 3 The share of ICT sector in GDP, in EU countries in 2018



Data source: processed data from EUROSTAT, available at Statistics | Eurostat (europa.eu) [accessed on November, 18, 2021] [6].

Note: Last available data are for 2018 and for the other countries data are not available

Regarding the 4 indicators analysed above, we can conclude that they had a very good dynamic but the fact that they started from a rather low level (in 2011) compared to the EU 27 and most of the member countries, determines an unfavourable situation for our country, which, overall occupies one of the last places in the digital economy.

This is evidenced by a comprehensive indicator called the Digital Economy and Society Index (DESI), calculated by the European Commission to monitor progress in digitisation by Member States since 2014.

In the 2021 edition of DESI, Romania ranks 27th out of 27 EU Member States.

The following table shows the value of DESI - 2021 for Romania compared to EU 27 and the position of our country.

Table 5 DESI Indicators by its components, for Romania and EU 27 – edition 2021

	Romania -rank	Romania -score	EU 27 -score
DESI	27	32,9	50,7
1.Human capital	26	33,1	47,1
2.Connectivity	10	53,2	50,2
3.Integration of digital technology	25	23,8	37,6
4.Digital public services	27	21,5	68,1

Data source: <https://digital-strategy.ec.europa.eu/en/policies/desi> [accessed on November, 25, 2021] [7]

Analysing the 4 DESI's indicators, it can be seen that the indicator where Romania has the worst situation is Digital public services.

To improve this situation, The Authority for the Digitalization of Romania (ADR) has developed a Public Policy on e-Government<sup>13</sup> (adopted on 3 June 2021). Its main objective is to increase the number and quality of electronic public services in Romania.

Additionally, the ADR launched in December 2020 a large project, creating a strategic national framework for the adoption of innovative technologies in the public administration for the period 2021-2027. The areas covered include artificial intelligence, block chain, open science cloud and high performance computing [7].

### **Cybersecurity issues in the context of the advancing digital economy**

In addition to the many benefits that the progress of the digital economy registered by the Member States generates, the risks generated by the use of information systems and the Internet must be taken into account, as well as the measures to manage the risks. All these aspects are related to the concept of cyber security.

“Protecting IT&C (Information Technology and Communications) systems and their content has been well known as cybersecurity, an extended concept which implies the assurance of confidentiality, integrity, availability, authenticity and non-repudiation of information, services, resources, or actions. The state of cybersecurity can be achieved by applying proactive security measures and reactive policies, security standards and models, risk management, and deploying solutions for network and information systems protection”[8]. The threats to cybersecurity can come from various attackers, depending on the aims pursued: from simple criminals looking for financial gains and spies who intend to steal classified or proprietary information to cyber terrorists who engage in attacks as a form of war, whether or not supported at governmental level.

In the foundation of risk mitigation measures for cyber-attacks, it is important to clarify their content and typology [9]. Depending on the purpose and intensity of cyber-attacks we can distinguish cybercrime, cyber-attack, cyber terrorism and cyber warfare [10].

The risks that arise from the use of computer equipment and the internet cannot be totally eliminated, but steps can be taken to mitigate them.

Managing the risks of cyber-attacks typically involves:

- eliminating the source of the threat (e.g. by shutting down botnets);
- addressing vulnerabilities by hardening ICT assets (through software patches or employee training);
- mitigating impact by mitigating damage and restoring function.

In addition to the purely ICT-related aspects, cyber security also raises many legal issues, in particular with regard to the punishment of cybercrime. The main theory that applies to cybercrime is that of territoriality, a theory proposed by the Council of Europe's Convention on Cybercrime (2015) which focuses on the place where the crime was committed [11].

“European Union has taken some measures to increase resilience and preparedness in cybersecurity. The European Union's cybersecurity strategy, adopted in 2013, sets out strategic objectives and concrete actions aimed at achieving resilience, reducing cybercrime, developing cyber defence capabilities, and establishing an international cyberspace policy” [8].

The recent surge in cyber security threats has prompted a review of this strategy and its alignment with the EU Digital Single Market Strategy. This has resulted in the European Cyber Security Strategy 2016-2020. The strategic objectives contained in this strategy are derived from European regulations, relevant contributions from Member States and communities, including the private sector.

An important aspect of the European cyber security strategy is the development of Member States' national capabilities, including the growth and effective functioning of national/government CSIRTs (Computer Security Incident Response Teams). It is also necessary to establish frameworks at national level to support the upgrading of national incident reporting systems and training to improve skills. The European Union Cyber Security Strategy 2016 - 2020 and the adopted national strategies reflect the need for a unified approach to cyber security, the need for collaboration/disclosure and continuous updating of policies and mechanisms to ensure the security of the European cyberspace.

An important moment in the implementation of this strategy is the adoption on 6 July 2016 by the European Parliament and the Council of the European Union of Directive (EU) 1148/2016 (NIS) on measures for a high common level of network and information security across the Union. This Directive is the first pan-European cyber security legislation and focuses on strengthening national cyber authorities, increasing coordination between them and introducing security requirements for key industry sectors. The Directive aims to ensure a common level of security of networks and information systems in the European Union [12]. It also requires operators, and digital

service providers, to take appropriate measures to prevent cyber-attacks and manage risk, and to report serious security incidents to the relevant national authorities.

Another important aspect of security at EU level is the protection of personal data. In this respect, the European Parliament and the Council adopted on 27 April 2016 Regulation (EU) 2016/679 on the protection of individuals regarding the processing of personal data and the free movement of such data and to repeal Directive 95/46/EC (GDPR - General Data Protection Regulation).

This Regulation [13] brings a number of significant changes by strengthening the rights guaranteed to individuals whose data are processed and simplifying the administrative formalities for controllers who process personal data.

Another novelty is the cooperation between supervisory authorities in the case of data processing involving persons from more than one EU country, giving powers to the authority of the country concerned, together with the authorities of the other countries involved, to ensure that data are processed in accordance with the rules and principles laid down in the Regulation. The application of this Regulation in Romania has led to the need for the adoption of several legal acts to ensure the legal and institutional framework in this field [14].

Regarding the measures taken by the Romanian state to protect against cyber-attacks, it should be noted that it has tried to constantly align itself with those taken at the European Union level. Thus, "Romania adopted the Cyber Security Strategy in 2013, having a common approach at the level of the European Union, in order to provide a prompt response to the attacks in the cyberspace. The objective of Romania's Cyber Security Strategy is to define and maintain a secure cyberspace with a high degree of resilience and trust" [8].

The strategy contains important principles and directions for action to prevent and combat the vulnerabilities and threats to Romania's cybersecurity.

The main objectives that the Strategy [15] had in mind were:

- adapting the regulatory framework to new threats in cyberspace;
- the foundation and application of minimum security requirements to protect national cyber infrastructures;
- ensuring the resilience of cyber infrastructures;

- conducting public information and awareness campaigns on the threats and risks present in cyberspace;
- developing public-private cooperation at national and international level.

## **Conclusions**

The digitisation of services is a global phenomenon and is changing business models, leading to irreversible changes in all areas.

Digitalization is radically interfering and changing the fundamental assumptions of the way of life and organization of work in a postmodern society, which is becoming more globalized and more digitalized than ever before.

For Member States, digital technologies are an opportunity to develop and gain competitive advantages in the development of new innovative products and services. The process of digitisation is already a fact, and EU Member States are now at a point where they need to act through policies to boost people's digital capabilities and encourage the private sector to operate in online markets.

Although the European Commission has declared the Digital Single Market as one of its top priorities, and has set out a number of important policy measures, sustained action is still needed to improve digitisation.

At the same time, the European Union must implement new measures to reduce the risks arising from the development of the digital economy and the strengthening of the Digital Single Market, which are the subject of the European Union's new Cyber Security Strategy.

As regards the evolution of digitisation in Romania, the analysis based on statistical data shows that our country, although it has made significant progress, ranks last among member countries in many of the indicators that measure the level of digitisation. Under these circumstances, it is necessary for the Romanian state to intensify its efforts to support digitisation and to adopt measures to modernise the infrastructure in order to provide citizens with easy interaction with public platforms, both in terms of communication and the use of functions for filling in and uploading forms.

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