

DEVELOPMENT PROCESS ANALYSIS OF DIGITAL ECONOMY TECHNOLOGIES

Laura-Andreea IAMANDACHE (FLOREA)⁶,
IOSUD-SDSE Valahia University of Targoviste, Romania

ABSTRACT: *Most countries are in the process of digital transformation of society and economy, but the process is very different from country to country. In some countries there are more innovation and social development projects than in other countries, these projects address global as well as local social difficulties. The potential for social innovation could be influenced by the different levels of digital transformation. This study investigates the degree of influence of the transformation of the digital economy on society and the capacity for Social Innovation. Based on the data processed within the framework of the article it is concluded that the digital transformation of the economy and society has a significant positive impact on the capacity for Social Innovation. In conclusion, digital transformation with all its advances has a beneficial role on the capacity for Social Innovation.*

Keywords: *digital economy, digital information, automation, digital society, technology.*

JEL Classification: D83, D84, O33.

1. INTRODUCTION

The digitization of economic processes is gradually turning into a broad trend, which covers both the communications and Information Industry and all areas of economic activity. Regardless of the direction we consider, the importance of digital evolution is felt everywhere, for example in digital agriculture, e-commerce, smart grid systems, and personalized healthcare. In this situation, individual countries, regions and companies begin to dynamically engage in the process of creating and implementing strategic decisions in the field of digital economy, trying to establish their long-term competitive advantages in new emerging markets, new types of technologies, goods and services. The orientation towards digitization requires, in addition to a well-organized implementation plan, a change in the mentality of the human factor corroborated with the evolution of the organizational culture of economic entities (Coman D.M. et al., 2022).

In actual society, man is significantly affected by the globalization of all processes, the digital economy, the import and exports of educational services, the increasing uncertainty of political and economic development, and the creation of a society of knowledge, and this forces us to consider all these aspects. But the human brain continues to trust traditions and not accept innovations that impede the development of professional careers and personal lives more quickly (Negrea M, 2009). Technology is an essential condition that contributes to the

⁶ Ph.D.Student, IOSUD-SDSE Valahia University of Targoviste, Romania, laura.andreea09@yahoo.com

influence of global economic competitiveness and European economies. High-tech industries are expanding in international trade and their strength of movement helps to improve performance within other sectors. A key EU policy area is investment in development, innovation and skills, which are fundamental to growth as well as the development of the knowledge economy.

2. LITERATURE REVIEW: DIGITAL TECHNOLOGY

The history of the modern computer did not begin with the Internet, as many believe, but begins in 1945 with the commercialization of technologies that were developed during the Second World War. The first machines of this kind focused on fast computing, but had little information retrieval and data storage capacity. In the year 1950, magnetic core memories began to have the ability to efficiently store digital information, and automatically then the first benefit of representing information in bits resulted, that is, automatically and the lower cost of reproducing information. Over the years these storage technologies, software and hardware have acquired a higher quality, resulting in greater processing and reproduction of information worldwide with a wide spread, these industries are expanding rapidly.

Although the advent of computers has made manual calculation easier, there is still limited communication between them due to the lack of internet. After the advent of the Internet, it was the starting point for cheap, commercial communications and the representation of information in bits, which had an increased effect on several markets. This development was reinforced on key advanced inventions due to US military funding in the 1960s and 1970s. For example, the Defense Advanced Research Projects Agency (DARPA) sponsored the invention of packet switching, which involved breaking down a long message into several shorter messages that can be sent over a network and reorganized upon receipt. DARPA funded the researchers, who made advanced improvements to the special packet-switching standards that are supposed to drive communication over the Internet, such as Transmission Control Protocol/Internet Protocol (TCP/IP). During 1980, the National Science Foundation (NSF) created the first part of a network based on that protocol, thus creating a reliable infrastructure, easy to adopt, but with a limited research area.

Between 1990 and 1995, privatization took place, transforming the modern commercial Internet. The commercial Internet spread rapidly, and universities played a key role in this spread. Over the years, new technologies have been layered over the TCP/IP-based consolidated core Internet, along with browsers, search engines, social networks, online shopping, mobile communication protocols, and more. These technologies, along with many others, have enabled the collection and application of data at an increased level.

All these development processes gave birth to the question of who should control the various aspects of commercial activity on the Internet, given the historical context of decentralization, standards being repeatedly agreed upon through the mediation of committees with delegates from academia and industry. Such standards have particular bearing on widely adopted technologies, their establishment creating winners and losers. Simcoe in 2012 examined the incentives in expanding standards for the standards-setting organization, the Internet Engineering Task Force, showing convincingly that the commercialization of the Internet has led to a decrease in the intensity of standards development due to competing commercial interests. Knowing their importance, the automatic control of hardware and software standards is a controversial one (Simcoe T., 2012). Combining emerging technologies (Artificial Intelligence (AI), Machine Learning, Virtual Reality (VR), Big Data Analytics, Internet of Things (IoT)) with improved 5G connectivity will significantly contribute to the metamorphosis of society and the economy to the 4th industrial revolution or Industry 4.0. Artificial intelligence, automation processes, Big Data, the cloud, algorithms, and 5G

technology contribute to machine activation and industries such as food, retail, and banking becoming more digitalized (Ionescu C.A. et al., 2021).

3. IMPACT OF DIGITAL TECHNOLOGIES TOWARDS ECONOMIC AND SOCIAL DEVELOPMENT

In recent years there has been a transformation of economic activities worldwide especially due to digitization, drastic mitigation of the costs of collecting, storing and processing data and increasing computing power (UNCTAD, 2019).

The UN reports present the volume of new opportunities that are allowed due to the development of the digital economy, including support for small companies in developing countries to access the global market, which allows freedom to integrate more effectively with the global market and achieve new opportunities for income generation. Information and communication technologies (ICT), new digital applications and e-commerce are used to advance entrepreneurship, as well as to support creative innovation and production activities and to achieve attractive new jobs, including supporting the skills of women as entrepreneurs and traders. The financial integration is also facilitated by mobile and digital solutions. Through free access to the internet, the small companies in the process of development can have the opportunity to access various services "in cloud" and of course to receive financing to carry out their activity on various internet platforms (Casella B., et al., 2019).

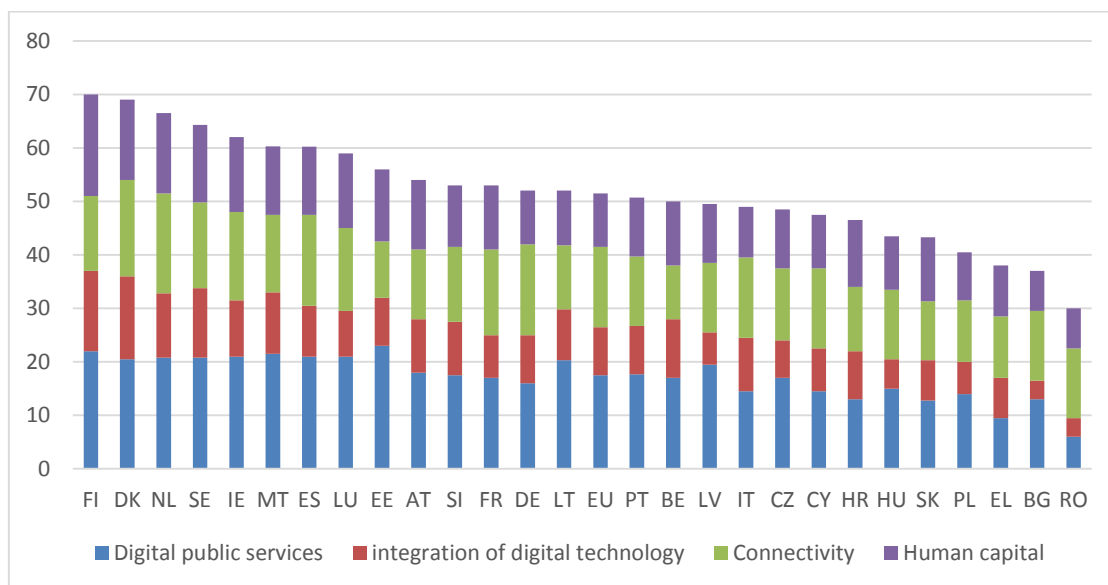
Although there are so many opportunities, UNCTAD experts say that many developing countries, especially the least developed countries (LDCs), are not yet sufficiently prepared to take advantage of these opportunities that digitization offers. As such, there is also a risk that digitalization will increase polarization and deepen income inequality, as the essential gains from labor productivity can be generated by a limited group of highly skilled professionals. The increased dynamics of development is specific for economies that use mainly internet platforms, where good functioning offers increased benefits, especially for first contractors. True, the world's top four companies by market capitalization - Apple, Google, Microsoft and Amazon - are closely tied to the digital economy. There are also concerns about how data streams are used in the context of online security and Privacy difficulties. The rapid evolution of the digital economy is due to innovations and technologies that are being used more and more often and that have developed in recent times. The digitization process was made easier by high-speed free access to increased computing power, storage, and reduced ICT hardware and data management costs. The technologies of particular importance underlying the development of the digital economy are artificial intelligence, advanced robotics, the Internet of things, big data analysis, cloud computing and three-dimensional (3D) printing.

Global digital platforms have taken a number of actions to stabilize their competitive position, including procuring potential competitors and expanding into new markets. Microsoft's acquisitions of LinkedIn and Facebook's of WhatsApp are the most important achievements. Both Google and Microsoft have made investments in telecommunications equipment, buying Motorola and Nokia. Of course, major companies have made multiple acquisitions in the retail, marketing and advertising industries, accessing non-residential real estate markets (Goldfarb A., & Tucker C. 2019). The other phases include strategic investments in research and development and lobbying in national and international decision-making areas. Also, the strategic associations between multinational companies in established sectors are explored.

4. INTEGRATION OF DIGITAL TECHNOLOGIES AT EUROPEAN LEVEL

On the European ranking, Finland, Denmark and the Netherlands have the most developed digital economies in the European Union, followed by Sweden, Ireland, Malta and Spain. Greece, Bulgaria and Romania have the lowest DESI scores (Figure 1.).

Figure 1. Digital Economy and Society Index (DESI) 2022 ranking



Source: Digital Economy and Society Index (DESI) 2022

Some of the most recently published data on the integration of digital technologies at European level in 2021 show that only 55% of SMEs have held at least a basic status to adopt digital technologies, of course with colossal differences between member states (86% Sweden, and 22%-Romania). At least 90% of SMEs in the EU to achieve the digital decade target need to have a core level of digital volume by the end of 2030. Basic digital intensity means that a company consistently uses at least 4 of the 12 chosen digital technologies. For example: social information platforms, the use of cloud technology, online sales platforms, artificial intelligence and enterprise resource programming software. Data published in recent years show that businesses are increasingly digitized, but the application of progressive digital technologies remains low and fluctuates differently depending on the type of technology used. Although data show that 34% of companies in the European Union in 2021 used cloud computing, AI-based technologies and Big Data research are much more unused: only 8% in 2021 of companies used AI and 14% in 2020 used large volumes of data. As a consequence, under the political agreement on the "path to the digital decade" programme by 2030, at least three-thirds of companies are required to start using cloud computing, AI-based technologies and large volumes of data (Evangelista R., et al., 2014).

The "path to the digital decade" programme establishes a way of economic, social and political organization of surveillance and cooperation which has the main aim of achieving the common objectives regarding the digital evolution of Europe. The main focus is on the digitization of online public services, infrastructure, connectivity, digitalization of enterprises and, last but not least, achieving the general objectives of respecting the digital rights and principles of the European Union (Hilbert M., 2022).

4.1. INTEGRATION OF DIGITAL TECHNOLOGY IN ROMANIA

Romania has one of the worst results regarding the integration of digital technologies, ranking last. Most of the indicators rank below the European Union's overall average, some have even declined or stagnated in the past year, although Romania ranks 15th out of 27 countries (Table 1). The share of small and medium-sized enterprises with at least a basic level of digital power was 22%, with the EU average of 55%, so more work is needed to achieve the digital decade target of 90% of SMEs reaching a basic level of digital intensity by 2030.

Table 1. Integration of digital technology

Integration of digital technology	Romania		EU
	rank	score	score
DESI 2022	27	15.2	36.1

Source: Digital Economy and Society Index (DESI) 2022

Romania has been outperformed by other EU member states, considering that it makes online sales only 12% of businesses and online sales across borders only 4% of businesses. The uptake of advanced technology, such as cloud technology, reached only 11% , compared to the Union average of 34%, no longer saying that only 1% of companies have introduced such technology in their activity. The share of large data processing is also low, at 5% (compared to the EU average of 14%) (Table 2).

There is also a major gap that needs to be addressed by 2030 to successfully achieve the Digital Decade goal of 75% of businesses using cloud, big data and AI technology. The only satisfactory percentage for Romania, which is slightly above the EU average of 66%, is that of enterprises that have medium to high intensity of green actions through the use of ICT.

Table 2. Indicators of digital technology integration in Romania compared to the EU

Indicators of digital technology integration	Romania			EU
	NA	NA	22% 2021	55% 2021
SMEs with at least a basic level of digital intensity % SMEs	23% 2019	23% 2019	17% 2021	38% 2021
Electronic information sharing % enterprises	8% 2019	8% 2019	12% 2021	29% 2021
Social media % enterprises	11% 2018	5% 2020	5% 2020	14% 2020
Big data % enterprises	NA	NA	11% 2021	34% 2021
Cloud % enterprises	NA	NA	1% 2021	8% 2021
AI % enterprises	NA	68% 2021	68% 2021	66% 2021
ICT for environmental sustainability	20% 2018	17% 2020	17% 2020	32% 2020

Indicators of digital technology integration	Romania			EU
	NA	NA	22% 2021	55% 2021
% enterprises having medium/high intensity of green action through ICT				
e-Invoices % enterprises	11% 2019	17% 2020	12% 2021	18% 2021
SMEs selling online % SMEs	5% 2019	8% 2020	7% 2021	12% 2021
e-Commerce turnover % SME turnover	6% 2019	6% 2019	4% 2021	9% 2021

Source: Digital Economy and Society Index (DESI) 2022

The government strategy called "The development of the SME sector and the improvement of the business environment in Romania towards the digital economy in the period 2021-2027" contains transversal measures, such as:

- expanding the network of centers for digital innovation. The process of selecting digital innovation centers that will participate in the network of European digital innovation centers is ongoing. Seven proposals regarding the European digital innovation centers in Romania have registered positive results following the evaluation, namely they are invited to draw up grant agreements (which do not represent a formal funding commitment). An additional proposal is expected to be selected in the coming year.
- opportunities to obtain useful skills for SMEs to benefit from new technologies;
- supporting SMEs for the easy transfer of data, when there is a change of digital service providers, in other words, the free movement of data without a personal character, as the regulation provides;
- would be to raise awareness among small and medium-sized enterprises about the security threat and activate investments in the cyber security sector.

Romania's main obstacles to the transformation of SMEs and most of the economy are structural obstacles. They require the adoption of cross-cutting and comprehensive measures aimed at increasing the level of digital education and the perception of the role of use of digital tools among business leaders. Another factor contributing to the adoption of digital management such as accounting among SMEs is the low level of progress of digital public services. Increasing efforts, in terms of supply in the form of a compelling compound of services and tools to improve business processes and train their employees and management on the use of those services and tools, can facilitate the development of demand from small and medium-sized enterprises.

All these percentages show exactly that there is a significant gap between Romania and the other more developed countries of the European Union. Let's hope that by 2030 with the help of the program "the way to the digital decade" Romania will succeed to align with the other EU countries.

5. CONCLUSIONS

As a result of everything I said in the article above, technology and technological innovation has rapidly infiltrated all areas of society, from business, education and health, to an ever-increasing range of services useful and appropriate to human life. However, it is very difficult for some countries to recover in terms of digital transformation.

Over the last few years, economists have been studying how digital technologies have contributed to the transformation of economic activity in various fields. Although all these articles often have different perspectives and cite different sources, most of them agree that digitization has benefited the economy, reducing a number of specific costs, such as search, tracking, verification, transport and reproduction costs.

Acknowledgement

This work is supported by project POCU 153770, entitled " Accessibility of advanced research for sustainable economic development - ACADEMIKA ", co-financed by the European Social Fund under the Human Capital Operational Program 2014-2020

REFERENCES

1. Casella, B., Bolwijn, R., Moran, D., & Kanemoto, K. (2019). Improving the analysis of global value chains: the UNCTAD-Eora Database. *Transnational Corporations*, 26(3), 115-142.
2. Coman, D. M., Ionescu, C. A., Duică, A., Coman, M. D., Uzla, M. C., Stănescu, S. G., & State, V. (2022). Digitization of accounting: The premise of the paradigm shift of role of the professional accountant. *Applied Sciences*, 12(7), 3359.
3. Digital Economy and Society Index (DESI), 2022. <https://digital-strategy.ec.europa.eu/en/library/digital-economy-and-society-index-desi-2022>
4. Evangelista, R., Guerrieri, P., & Meliciani, V. (2014). The economic impact of digital technologies in Europe. *Economics of Innovation and new technology*, 23(8), 802-824.
5. Goldfarb, A., & Tucker, C. (2019). Digital economics. *Journal of Economic Literature*, 57(1), 3-43.
6. Hilbert, M. (2022). Digital technology and social change: the digital transformation of society from a historical perspective. *Dialogues in clinical neuroscience*.
7. Ionescu, C. A., Fülöp, M. T., Topor, D. I., Căpușeanu, S., Breaz, T. O., Stănescu, S. G., & Coman, M. D. (2021). The new era of business digitization through the implementation of 5G technology in Romania. *Sustainability*, 13(23), 13401.
8. Nagy, S., & Somosi, M. V. (2022). The relationship between social innovation and digital economy and society. *arXiv preprint arXiv:2212.13840*.
9. Negrea, M. (2009). Managementul afacerilor in economia digitala. *Economica, Bucharest*.
10. Nosova, S., Norkina, A., Medvedeva, O., Aracelova, I., Grankina, V., & Shirokova, L. (2022, March). Digital Technologies as a Process of Strategic Maneuvering in Economic Development. In *Biologically Inspired Cognitive Architectures 2021: Proceedings of the 12th Annual Meeting of the BICA Society* (pp. 380-392). Cham: Springer International Publishing.
11. Simcoe, T. (2012). Standard setting committees: Consensus governance for shared technology platforms. *American Economic Review*, 102(1), 305-336.

12. Wysokińska, Z. (2021). A Review of the Impact of the Digital Transformation on the Global and European Economy. *Comparative Economic Research. Central and Eastern Europe*, 24(3), 75-92.
13. UNCTAD (2019) Value creation and capture: Implications for developing countries. https://unctad.org/system/files/official-document/der2019_en.pdf