

**The 5<sup>th</sup> International Conference on Economics and Social Sciences**  
**Fostering recovery through metaverse business modelling**  
**June 16-17, 2022**  
**Bucharest University of Economic Studies, Romania**

**All Aboard: Towards Digitalisation.**  
**Romania and Its ICT Sector**

Alexandra-Maria DANILEȚ<sup>1</sup>

DOI: 10.24789788367405072-033

**Abstract**

*The ongoing pandemic context has highlighted the need to adopt information technologies in all socio-economic activities in order to improve the efficiency of the workflows of various institutions, business organizations and other categories of entities, as well as to build a high-performance digital infrastructure adapted to the current demands of the knowledge society. The COVID-19 pandemic has, to some extent, led to an increase in the rate of adoption of ICT technologies at national level and beyond, generating a significant increase for all hardware and software components, i.e., products and services offered by ICT companies. Therefore, we consider it of great interest to highlight the performance achieved at national level in the area of digitalization and the role and position of ICT companies at national level in reshaping the way economic and other activities are carried out.*

**Keywords:** digitalization, information technology, performance, digital economy.

**JEL Classification:** M15, M21, O33.

**1. Introduction**

The business environment and the society as a whole have experienced many changes in the last decades due to the development of technology. In the same time, the needs and individual's preferences have evolved and become more complex. As a result, the strategies of business decision-makers have undergone major reconfigurations in order to respond effectively to the demands/needs of their customers. Within this framework, the adoption of information technologies becomes a necessity for business organizations to carry out innovative activities in order to perform and to be competitive in a business environment where the competition is increasing. Thus, a digital strategy, which involves more than the acquisition of IT equipment and software, but also the optimization of some

---

<sup>1</sup> "Ștefan cel Mare" University of Suceava, Suceava, Romania, alexandra.danilet@usm.ro.

processes through the use of digitalization, can have the expected effects on the activity of organizations. The challenge is higher when we take into consideration the human resources that needs to be prepared in order to use all the technology, so how will the integration of such tools improve companies' activities/processes? What is the role of the ICT sector in developing and implementing such solutions in the digital economy?

## **2. Research Methodology**

The aim of this research is to give an overview of how business organizations in Romania have incorporated information technologies in their workflow, highlighting the importance of the ICT sector in implementing digital solutions. As a subsidiary, we propose the following objectives:

**O1.** To explore the benefits of digitalization in the long-term development and progress of both companies and society as a whole.

**O2.** To analyse the progress made in the area of digitalization by business organizations in Romania in comparison with those in the European Union.

**O3.** To highlight the role of the ICT sector in the digital economy.

The research included a qualitative, and therefore theoretical, component and a quantitative dimension. On the one hand, it consisted in the analysis of the existing literature on the topic addressed in this research, and on the other hand, it implied the analysis of statistical data available on the online tempo platform of the National Institute of Statistics and the Eurostat database. The research included all four components that refer to the use of ICT by business organizations, i.e., internet connectivity, e-business, e-commerce and website and social networks, as they are available in the databases mentioned above. For each component a selection of indicators was made, based on criteria such as: availability of data for both Romania and the EU, existence of data for several years and the importance of the indicators for this research. Subsequently, we considered presenting some aspects related to the activity carried out by companies in the ICT sector at national level, whose contribution in the adoption of information technologies is essential (in fact, the activity carried out by such companies is conditional, i.e., based on software and hardware tools).

## **3. Literature Review**

The concern of business organizations to run efficient operations and achieve high performance has contributed to the reconfiguration of their business models and strategies. At the same time, the increasing global presence of companies and the changes in technology have, to some extent, forced the increasing use of information technology tools.

All the changes that have taken place in the last decade and are still in progress in business and not only, highlight the development of what we call the digital economy. The digital economy involves digital infrastructure, efficient management systems and content creation (Coates, Holroyd, 2015). In this new framework for the

development of socio-economic activities, information becomes digital (bits), communication takes place through digital networks and the internet becomes the basic component (Tapscott, 2015). These issues have also become of real interest to governments due to the impact on society, economic development and long-term progress. Therefore, the policies adopted aim to strengthen the infrastructure needed to operate/function digital technologies, more specifically to provide the connectivity component, the basic element of a digital ecosystem (Vagadia, 2020).

Regarding the digital economy, a number of its characteristics are mentioned in the literature such as digitalization and use of ICT tools/equipment, adoption/implementation of new processes/methods for business development, codification of knowledge, repositioning of information as an essential asset in the organizational infrastructure (Sharma, 2005).

According to EIB (2020), economic entities that incorporate digital technologies in their workflows are more efficient and perform better than non-digital ones. At the same time, digital companies are distinguished by management practices that promote and support innovative activity and higher efficiency in production processes and other operations carried out by an enterprise. At the same time, EC (2016) points out that the use of ICT tools has significant benefits for both SMEs and MNCs. Among the most obvious benefits we mention: a more efficient allocation of resources, increased product quality, reduction of waste and scrap, improved performance, improved innovation infrastructure through the development of partnerships/collaborations, etc. A study carried out under the initiative of the OECD (2011) highlights the need to make investments in the development of an efficient ICT infrastructure. According to the same study, such investments have positive effects on work productivity and, at the same time, contribute to high resource efficiency. In addition, they also have a direct impact on the development of networks and the enhancement of innovative processes, in the sense that the use of such tools allows companies to develop new processes, new ways of working and, therefore, new products/services. Moreover, digital technologies have a significant contribution to make in the development of IT/digital platforms which in turn encourages/facilitates partnerships/collaborations between different entities. Such ecosystems encourage creative and innovation processes as well as organizational processes that will reflect on a company's innovative capacity (BCG, 2019).

The interest in adopting new technologies, i.e., innovative activity and the adoption of new business practices can be found in the strategy implemented at management level (OECD, 2004). Inevitably, the results achieved in terms of the use of ICT tools will be influenced by the decisions taken by the management of the companies, by the vision of the managers towards all that represents the digitalization processes for the success of the company. As the interest in and need for the adoption of such tools grows, the ICT sector becomes essential for the digital economy. In addition, digital technologies produced by companies in this field have expanded at a faster rate globally than any other disruptive technology, with effects on many market segments (Coates, Holroyd, 2015).

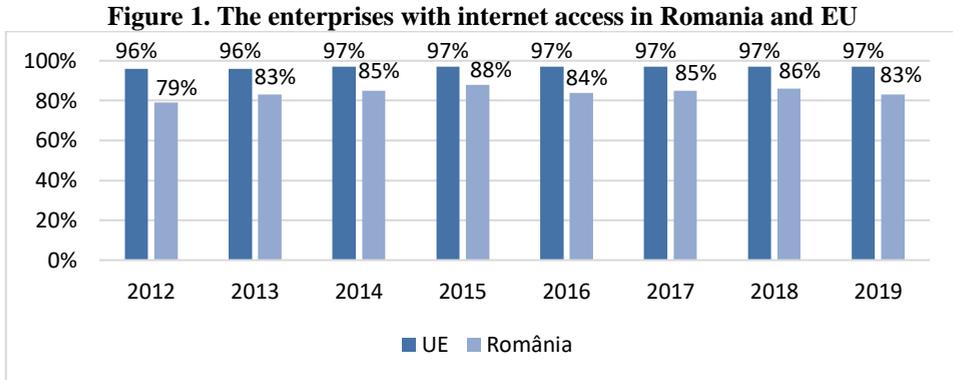
ICT companies are an essential part of the digital economy; in this respect Jordan (2020) shows that to some extent companies such as Apple, Microsoft, Google and Facebook are a component of the digital economy. Their activities focus on the development of ICT products, ICT infrastructure but also information and electronic content, highlighting the connection between information, communication and technology. The use of ICT products/services can be supported by a number of arguments that clearly highlight the benefits for companies: they have a significant impact on reducing operating or day-to-day costs, improve productivity, facilitate decision-making, improve customer relations and encourage the implementation/development of new strategies (Turban et al, 2004).

Charan (2021) emphasizes that we are experiencing a reconfiguration of what represents the competitive advantage for companies in the digital economy. Thus, according to the author the core/underlying elements of a business organization's competitive advantage are built around what are computing/artificial intelligence platforms and machine learning algorithms. Digital technologies are, to some extent, forcing business decision-makers to reconfigure their business strategy/model, which may entail a radical change in the way they do business, a rethinking of value chains or a transition to running operations globally. At the same time, it may foster the creation of digital businesses, improve the current business model or even replace it (Westerman et al., 2014). In this regard, we recall Bounfour (2016) who mentions a new type of economic entity called digital enterprise that has at its core data, including the way it is processed in order to achieve the firm's performance (more precisely the way data is monetized). At the same time, Laudon (2020) refers to the digital firm as an organization whose relationships with stakeholders are digital (ICT technologies connect the firm with its partners) and whose core processes are carried out through digital networks. Similarly, Turban et al. (2013) refers to e-business when they mention companies in which a significant part of the activities is carried out through e-business processes (using digital technologies, the internet to accomplish a task; for example, in the recruitment process, the firm may post information about available jobs on its website). There are companies where only a small part of the processes is e-business, but there are companies that do all their business online (e.g., in the ICT sector).

#### **4. Findings**

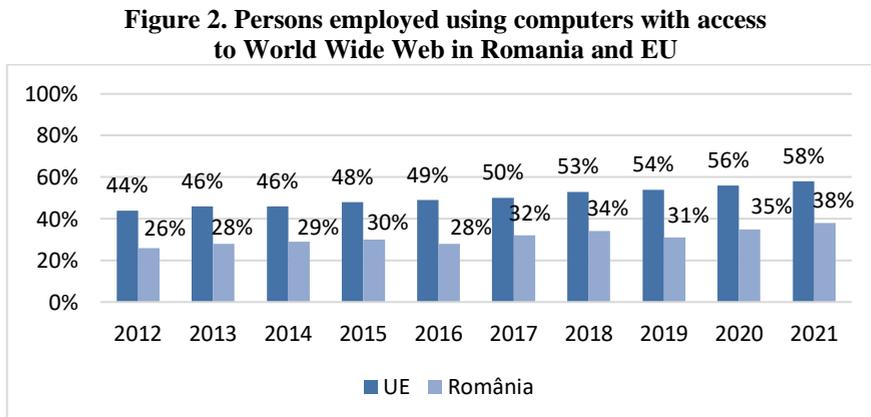
In describing the aspects related to the research topic on the business environment at national level, we have chosen a comparative approach with the situation in the European Union. In order to analyse the use of ICT in enterprises, we have considered the four components available on the Tempo Online platform of the National Institute of Statistics, i.e., Eurostat, as follows: internet connectivity, e-commerce, e-business and aspects related to websites and social networks. For each perspective we selected the indicators for which data were available both for Romania and for the EU average. Regarding Internet connectivity we analysed 2 indicators: the share of firms out of the total number of firms, excluding the financial sector (with more than 10 employees) that have access to the Internet

and the share of employees out of the total number of employees using computers with access to the World Wide Web. As regards Internet access of companies in Romania and the European Union, the figure below shows the situation for the period 2012-2019.



Source: Author's elaboration after <https://ec.europa.eu/eurostat>; <http://statistici.insse.ro>.

The available data show that, on average, in the European Union, approximately 97% of the firms in the sample analysed have access to the internet; in practice, we can see that from 2014 to 2019, this indicator has maintained its value. Regarding Romania, we find that the share of firms with internet access has increased in 2019 compared to 2012, but a broader analysis places Romania in last place in terms of the analysed aspect, being the only country at EU level for which less than 90% of companies have internet access. Regarding the use of computers with internet connection in the workplace, Figure 2 shows the data available for the period 2012-2021.

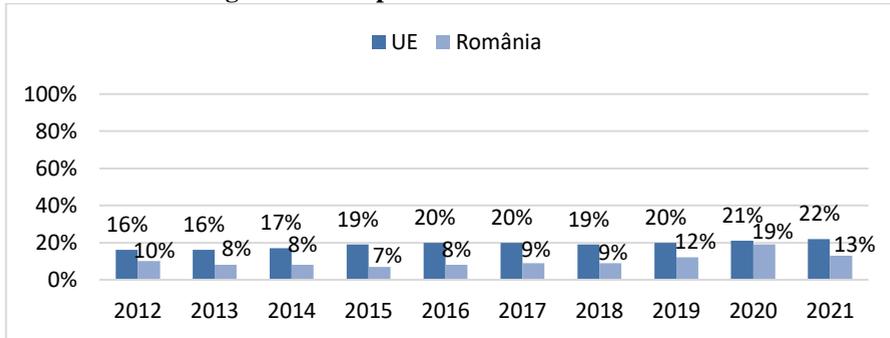


Source: Author's elaboration after <https://ec.europa.eu/eurostat>; <http://statistici.insse.ro>.

As we can see, the share of employees using computers with internet access has been evolving favourably both in the European Union and in Romania. However, the situation at national level is lower than the EU average, with Romania ranking

last in this respect as well. As far as the e-commerce component is concerned, we have analysed indicators showing companies that have recorded online sales and the turnover obtained from online sales. Regarding the share of companies that have obtained revenues from online sales, we show in the figure below the progress registered in the period 2012-2021:

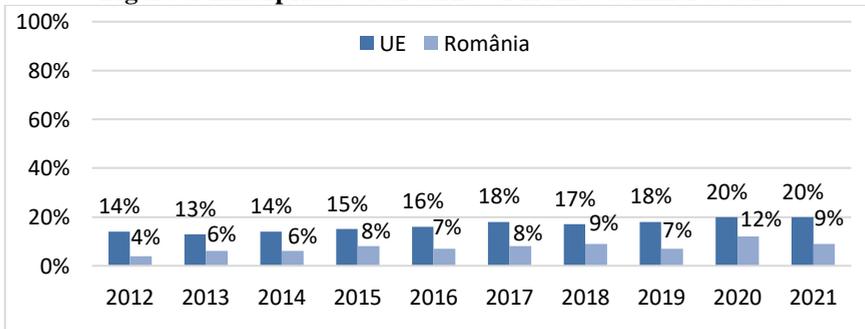
**Figure 3. Enterprises with e-commerce sales**



Source: Author's elaboration after <https://ec.europa.eu/eurostat>; <http://statistici.insse.ro>.

According to the available data we found that the share of companies that register online sales has shown an upward trend both at national and EU level. At the same time, we note that from this perspective, Romanian firms perform less well than the EU average. Regarding the turnover obtained from online sales, Figure 4 shows the evolution of this indicator between 2012 and 2021.

**Figure 4. Enterprises' total turnover from e-commerce sales**

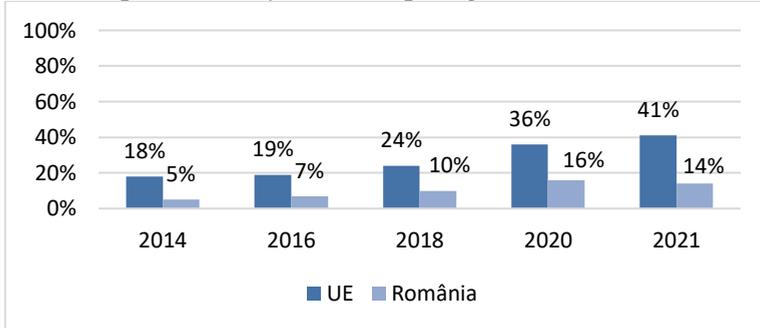


Source: Author's elaboration after <https://ec.europa.eu/eurostat>; <http://statistici.insse.ro>.

A comparative analysis of the data shows that the growth rate of the indicator for firms at national level was higher than at EU level. Thus, at national level the indicator increased by about 125% in 2021 compared to 2012, while at EU level it increased by about 40%. However, the position of the domestic firms is lower than the average for the European Union. As regards the e-business component, we have analysed companies that purchase cloud computing services used over the internet and companies that have ERP software package to share information between

different functional areas. As regards companies purchasing cloud computing services, Figure 5 shows the progress achieved in the period 2014-2021:

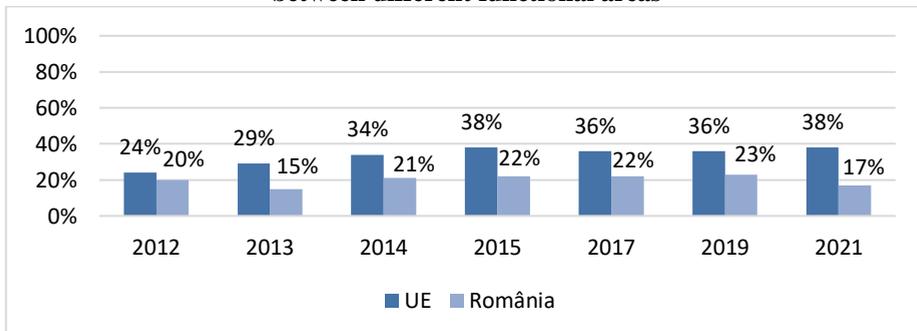
**Figure 5. Enterprise who buy cloud computing services used over the internet**



Source: Author's elaboration after <https://ec.europa.eu/eurostat>; <http://statistici.insse.ro>.

According to the figure above, we can see that the share of companies that have purchased cloud computing services has evolved favourably for both Romanian and EU companies. At the same time, we note that the value of the indicator recorded for the European Union as a whole is higher than that recorded at national level. Therefore, a positive pattern can be observed with respect to this component in the behaviour of business organisations operating on the EU market. With regard to the use of specialised software for running activities within organisations, the figure below shows the situation for firms using ERP (enterprise resource planning) software:

**Figure 6. Enterprises who have ERP software package to share information between different functional areas**

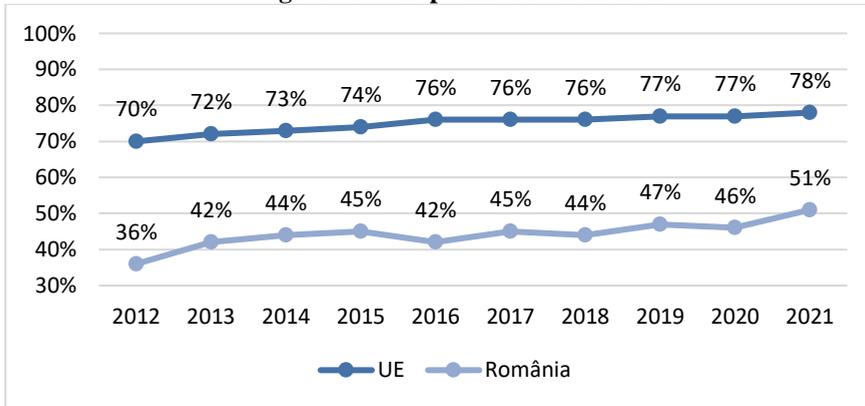


Source: Author's elaboration after <https://ec.europa.eu/eurostat>, <http://statistici.insse.ro>.

The share of EU firms using an ERP software package is much higher than for national business entities. Thus, in 2021 the amount of the indicator analysed is more than double that of the national market. The last aspect analysed concerns the website and social networks component which highlights the presence of companies in the

online environment. As far as companies owning a website are concerned, Figure 7 shows the situation for Romania and the European Union.

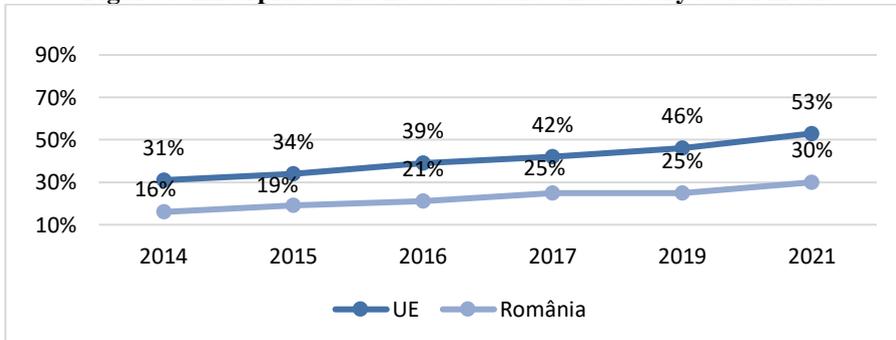
**Figure 7. Enterprises with a website**



Source: Author's elaboration after <https://ec.europa.eu/eurostat>, <http://statistici.insse.ro>.

Regarding the number of companies with a website, we note that this indicator has shown a favourable evolution. The progress recorded at national level is significant; the growth rate of the indicator for Romanian companies is higher than the EU average, but the level is lower. With regard to social media, the figure below shows the evolution of the share of the number of firms that own a website and use social media in the period 2014-2021:

**Figure 8. Enterprises that have a website and use any social media**



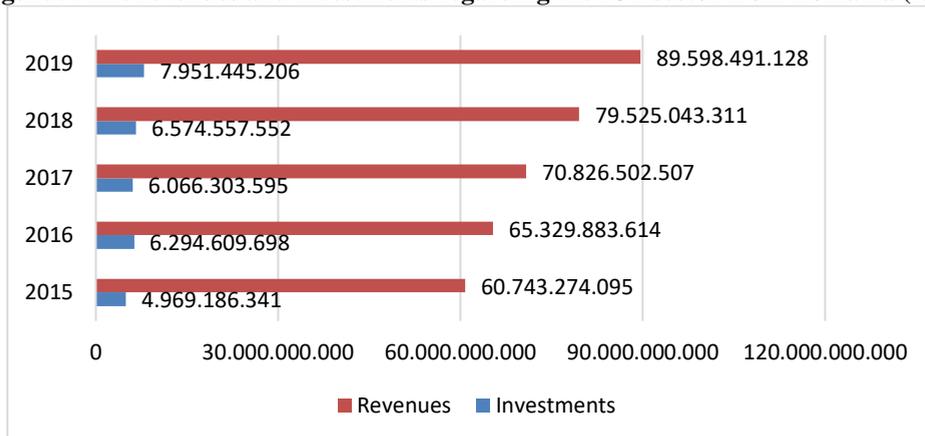
Source: Author's elaboration after <https://ec.europa.eu/eurostat>, <http://statistici.insse.ro>.

Both for firms operating on the national market and for those operating on the EU market, we observe a sustained growth rate throughout the period covered by the research. Moreover, we note that at national level the value of this indicator almost doubled in 2021 compared to 2014, which indicates the interest of companies operating on the Romanian market for the online environment.

Progress towards digitisation could also be seen in the development of the ICT sector which is making major contributions to the technological progress in the

national market. In this respect, we have analysed the evolution of the number of companies in this sector (we have included those entities with CAEN codes in classes 261, 262, 263, 264, 268, 465, 582, 61, 62, 631, 951 according to OECD, NACE Rev 2, 3 digit), the turnover obtained as well as the investments made. As regards the number of business organisations operating at national level in this field, the data available on INSSE's online tempo platform show a significant increase. Thus, in 2019 at national level there were 26,032 companies in this sector, more than 25% more than in 2015. Regarding the performance of these companies, we report the evolution of turnover and investments made in the period 2015-2019:

**Figure 9. The revenues and investments regarding the ICT sector from Romania (lei)**



Source: Author's elaboration after <http://statistici.insse.ro/>.

The highlighted data indicate a strong performance for ICT companies, with a favourable evolution for both indicators during the period under review. Thus, the turnover increased in 2019 by about 13% compared to the previous year and by about 48% compared to 2015 (the first year included in the analysis). Regarding the investments made by the companies in this sector, we note that these increased in 2019 by 20% compared to the previous year and by 60% compared to 2015. This suggests a high interest in the development of activities carried out on the domestic market which will have positive effects on the national economy.

## 5. Conclusions

According to the highlighted information, we find that the contribution of information technologies in the long-term performance and development of business organizations is a major one, representing a basic element in the strategies of successful companies. Technological progress in this area is due to the contribution of the ICT sector in the development of software, hardware, IT platforms and other digital solutions that are constantly being offered to individuals and business organisations. The solutions given by these digital architects represent a fundamental issue for the sustainable development of business organisations.

The progress achieved by Romania in the digitalisation sphere is limited compared to the EU situation. Although the ICT sector is developing, being one of the most dynamic sectors of the Romanian economy, the use of specific information technology tools is still limited in the activities of business organisations, compared to the EU average. We can state that this aspect is highly influenced by the lack of digital competences and also appropriate strategies on national level.

## Acknowledgment

This paper has been financially supported within the project entitled "DECIDE-Development through entrepreneurial education and innovative doctoral and postdoctoral research", project code POCU/380/6/13/125031, project co-financed from the European Social Fund through the 2014-2020 Operational Program Human Capital.

## References

---

- [1] Boston Consulting Group (BCG) (2019). *The most innovative companies. The rise of AI, platforms and ecosystems*, <https://www.bcg.com/publications/collections/most-innovative-companies-2019-artificial-intelligence-platforms-ecosystems>.
- [2] Bounfour, A. (2016). *Digital futures, digital transformation from lean production to acceluction*, Springer Publishing.
- [3] Charan, R., Willigan, G. (2021). *Rethinking competitive advantage. New rules for the digital age*, Currency/Random House Publishing, New York.
- [4] Coates, K., Holroyd, K. (2015). *The global digital economy. A comparative policy analysis*, Cambria Press, New York.
- [5] European Commision (EC) (2016). *Fostering SMEs' growth through digital transformation*, <https://ec.europa.eu/docsroom/documents/19646>.
- [6] European Investment Bank (EIB) (2020). *Who is prepared for the new digital age? Evidence from the EIB Investment Survey*, <https://www.eib.org/en/publications/who-is-prepared-for-the-new-digital-age>.
- [7] Jordan, T. (2020). *The digital economy*, Polity Press, Cambridge.
- [8] Laudon, K., Laudon, J. (2020). *Management information systems. Manging the digital firm*, Pearson.
- [9] OECD (2011). *OECD Guide to Measuring the Information Society 2011*, OECD Publishing.
- [10] OECD (2004). *The Economic Impact of ICT. Measurement, Evidence and Implications*, OECD Publishing.
- [11] Tapscott, D. (2015). *The digital economy. Rethinking promise and peril in the age of networked intelligence*, McGraw-Hill.
- [12] Turban, E., Volonino, L., Wood, G. (2013). *Information technology for management: advancing sustainable, profitable business growth*, John Wiley & Sons, Inc., New Jersey.
- [13] Turban, E., McLean, E., Wetherbe, J. (2004). *Information technology for management: transforming organizations in the digital economy* (4<sup>th</sup> edition), John Wiley & Sons, Inc.

- [14] Sharma, S., (2005). *Socio-economic impacts and influences of e-commerce in a digital economy* in *Digital economy: impacts, influences and challenges*, Editor Kehal, H. & Singh, V., Idea Group Publishing.
- [15] Vagadia, B. (2020). *Digital disruption implications and opportunities for economies, society, policy makers and business leaders*, Springer Publishing.
- [16] Westerman, G., Bonnet, D., McAfee, A. (2014). *Leading digital: turning technology into business transformation*, Harvard Business Review Press, Boston.
- [17] <https://ec.europa.eu/eurostat>.
- [18] <http://statistici.insse.ro>.