

Impact of Digitization and Big Data on Romanian Companies - a Qualitative Research

Horia Mihalcescu

The Bucharest University of Economic Studies
horia.mihalcescu@mk.ase.ro

Ana-Maria Dumitrache (Bajan)

The Bucharest University of Economic Studies
anamaria.bajan@yahoo.com

Gheorghe Orzan

The Bucharest University of Economic Studies
orzan.gheorghe@mk.ase.ro

Article history

Received 15 July 2022 | Accepted 12 October 2022 | Published online 15 October 2022.

Abstract

Our general investigation is about the degree of understanding of the new economy, "digital economy", in Romanian companies, with a narrow focus on understanding the needs and uses of Big Data technology. We used a structured interview with 30 owners, CEO, IT managers, and Marketing Managers from Romanian companies and applied descriptive statistics on all data collected and content analysis on the open answers. The key findings are that Romanian managers are half aware that the digital economy will dramatically reshape business models and increase the competition. However, around one-third of them don't understand the basic concept of digitalization, digital transformation, and the need for digitalization. The most important department the Romanian managers think they should digitalize is marketing, but some big businesses don't think and want digitalization. One of the main obstacles to the digitalization of Romanian companies is the lack of human resources with proven expertise in the field. In order of Industry 4.0 components, only a few implements and use CRM, ERP, or another form of integration with customers or suppliers. Big Data is poorly known and used, but where it is used, it is a strong competitive advantage. Romanian managers do not understand how public institutions are digitalized to help the private initiative. They expect the public institutions to take the initiative to start digitalization in all society, including companies. The implications of our findings are extremely different from other public studies that suggest Romanian companies are strong in digital transformation. Our study shows the need for further investigation, if not measures to increase support for the digitalization of Romanian companies to remain/become competitive. Our findings are that only a few managers/companies are aware of the new digital economy with increased competition, and the initiative of digitalization, even in the private sector, should be from public institutions.

Keywords: Digitalization, digital transformation, Big Data, Romanian companies, Public Sector.

JEL classification: M31.

1. The new business context – Digital

The new business context is the digital one. The Digital economy is the new economic environment where economic activity is based on data that is an effect of billions of Internet and Intranet connections between people, people and machines and between machines as Deloitte research describes. Also, the same research finds that the main principle of the digital economy is hyperconnectivity which means the dramatic increasing in interconnections between people, machines, organizations, based on Internet, internet of things (IoT) and mobile technologies (Milosik and Evans, n.a.).

The digital economy and the new society, the Network Society, are on the rise and changing even the conventional notions about how businesses and organizations are structured and interact and how consumers purchase services, goods, or information (Verhoef, Kooge and Walk, 2016). From Uber to Amazon, from Facebook to Alibaba, new business models have emerged and succeeded over old taxi services, groceries, and even the social and cultural events industry. New products and services arise, even new utility, new culture and organizational software and processes became the new reality (Amadoa et al., 2018).

In this new context, successful companies became more and more data-driven, more technological, and more marketing and communication organizations in the sense of market-oriented organizations. The new competitive advantage arises from technology, technology innovation, and how companies use data (De Luca et al., 2021).

2. Digitalization, Industry 4.0 and Big Data

Digitalization or digital transformation means not only the migration of data from analog to digital but the use of data in an innovative way using new technologies. We understand digitalization as how businesses and more general societies work in the new societal organization: "The Network Society" (Ciocodeică et al., 2022).

Inside the digital transformation of companies, Industry 4.0 is a concept best described as a fight for competitive advantage based on new digital technologies. New digital technologies implies new skills, new kind of leadership, new organizational design and new organizational values. Industry 4.0 companies are more connected and collaborative inside and outside their frontiers with people, other organizations and generally speaking with all stakeholders and share with all of them information, data and knowledge (Froot et al., 2022). The main Industry 4.0 components are: "System Integration, Big Data and Analytics, Cloud Computing, Simulation, Additive Manufacturing, Cyber-Physical System, Cybersecurity, Collaborative Robotics, and Augmented Reality" (Brodny and Tutak, 2022, p. 2), as can be seen in Figure 1.

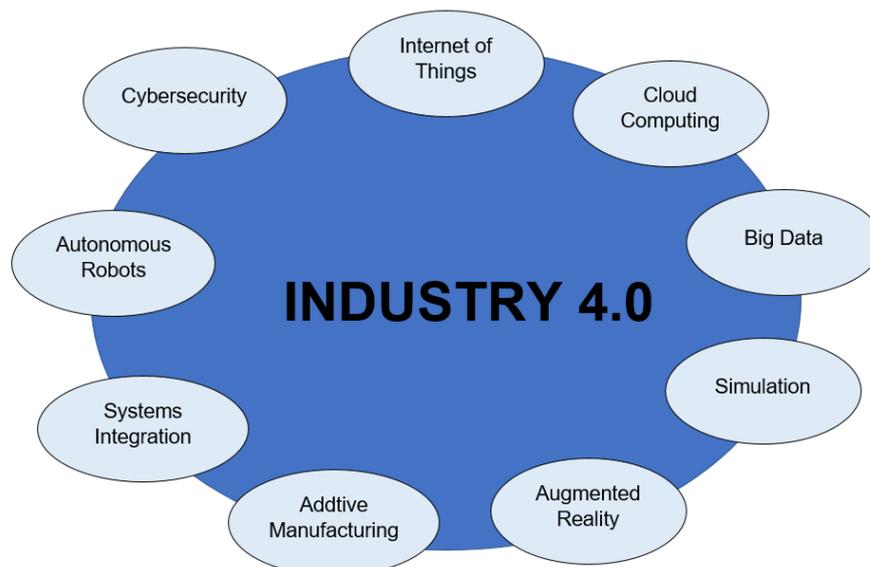


Fig 1 Industry 4.0 components, Source Analyzing the Level of Digitalization among the Enterprises of the European Union Member States and Their Impact on Economic Growth, by Brodny, and Tutak, 2022

Industry 4.0 describes the new technologies that became competitive advantages for companies in the digital economy and Network Society. Inside Industry 4.0, one special

technology is Big Data which "refers to techniques, technologies, systems, practices, methodologies, and applications related to the acquisition, storage, integration, analysis, and deployment of massive amounts of structured and unstructured data to support business decision making" (Suoniemi et al., 2020). In fact, Big Data is the one technology able to make accurate forecasts and predictions because of the amount of data. The main statistical idea behind Big Data technology is that the reality of an researched universe is better when the sample studied is greater, and Big Data means access and analyze of tremendous amount of data (Mikalef et al., 2019).

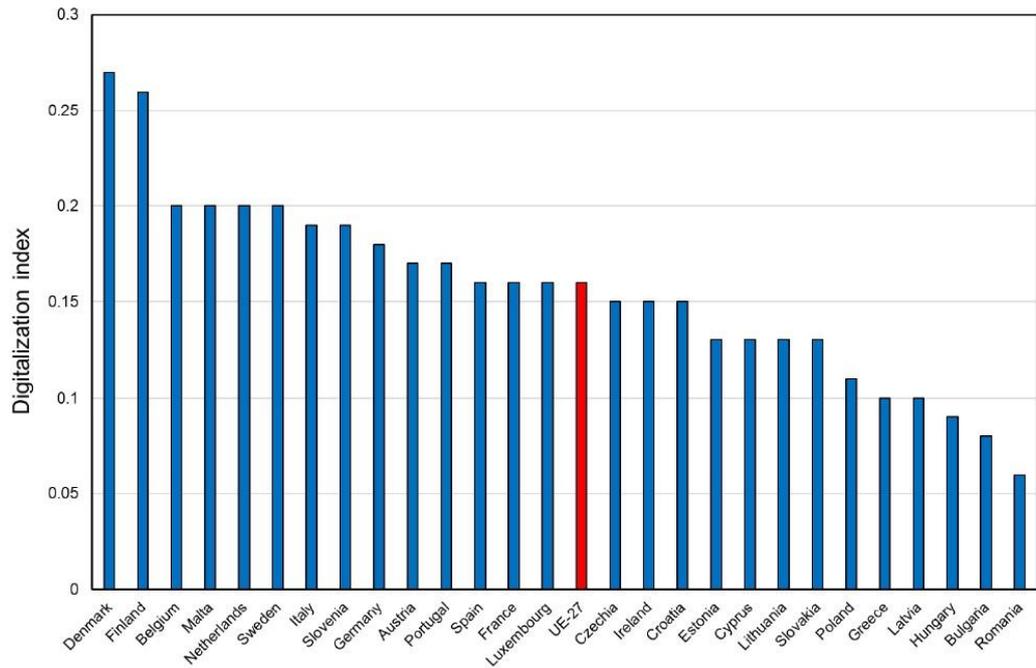
Big data is usually associated with the three Vs: volume, velocity, and variety. Later on, two additional V's are added to emphasize the importance of collecting, analyzing, and extracting meaningful knowledge: veracity and value. "Big data are described as large-volume, high-velocity, and heterogeneous data that emerge from the increasing digitization of transactions, interactions, communications, and everyday experiences" (McAfee and Brynjolfsson, 2012). The amount of data this new technology uses came from the digital shift which includes proliferation of mobile devices, Internet of Things (which means that devices, not only humans, are producing data) and social media, which has made everyone a broadcaster and thus data producer (Demchenko, n.a.).

Big Data technology has become a competitive advantage for companies. "The combination of big data technologies and greater access to consumer data through web-based channels generates customer insights not previously possible. Big data insights thus put managers in a superior position to design timely, automated, and highly personalized product and service offerings, with human expertise remaining critical but in a supporting role" (Suoniemi et al., 2020).

3. EU and Romania Digitalization levels

In order to set our research hypothesis, we have to do secondary research about digitalization and Big Data technologies in the EU, including Romania. The research of Brodny and Tutak (2022) shows that the level of uses for Industry 4.0 in Romania is the last in EU countries, despite some business and institutional successes like UiPath or Governmental Cloud project, see Figure 2.

Also, the Digital Economy and Society index, a composite index provided by EU institutions, is a visualization tool that "allows you to explore some open datasets through the interactive creation of charts and tables. The indicators have been selected to support the EU Digital Single Market policies and to monitor the digital progress of the European Economy and Society, through annual reports, a DESI index, and country factsheets" (DESI, 2021) show us the position of Romania based on four indicators: human capital (experts and level of digital literacy of general population), connectivity (speed of internet connections countrywide), integration of digital technology (companies), digital public services (implementation of digital technologies in public institutions). As we can see in Figure 3, Romania has good internet connectivity, but human capital and digital public services are poor.



The digitalization index values for the EU-27 countries.

Fig. 2 The digitalization index value for EU-27 Countries, Analyzing the Level of Digitalization among the Enterprises of the European Union Member States and Their Impact on Economic Growth, by Brodny and Tutak, 2022

	Romania		EU
	rank	score	score
DESI 2021	27	32.9	50.7

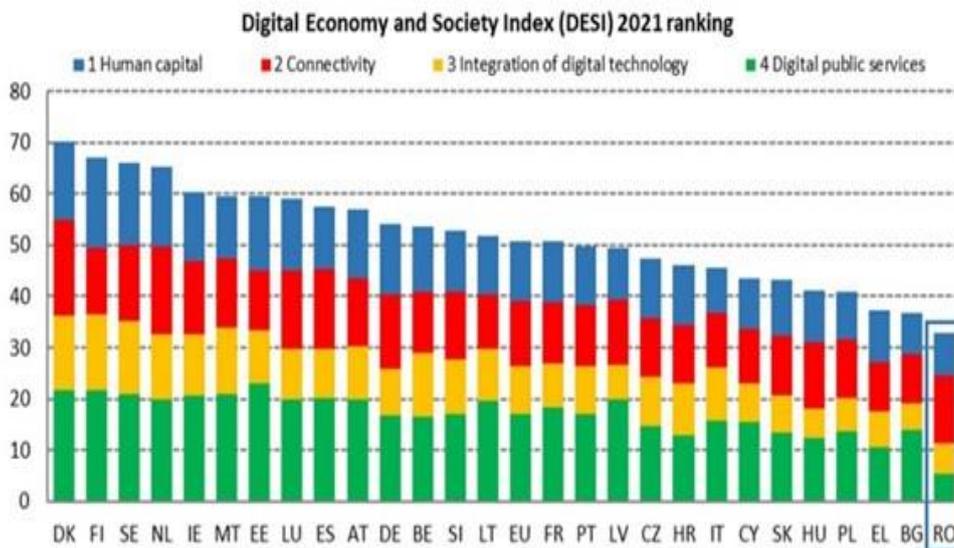


Fig. 3 Digital Economy and Society index (DESI) 2021 ranking, Source: Digital Economy and Society Index (DESI) 2021 Romania

The level of digitalization in Romania is the lowest in EU and COVID-19 Pandemic did not change too much in this respect even the expectation were that digitalization advance because of social distance policies. More than that, the EU index for digital economy and society for 2022 shows that Romania is still the last among all EU countries, see Figure 4.

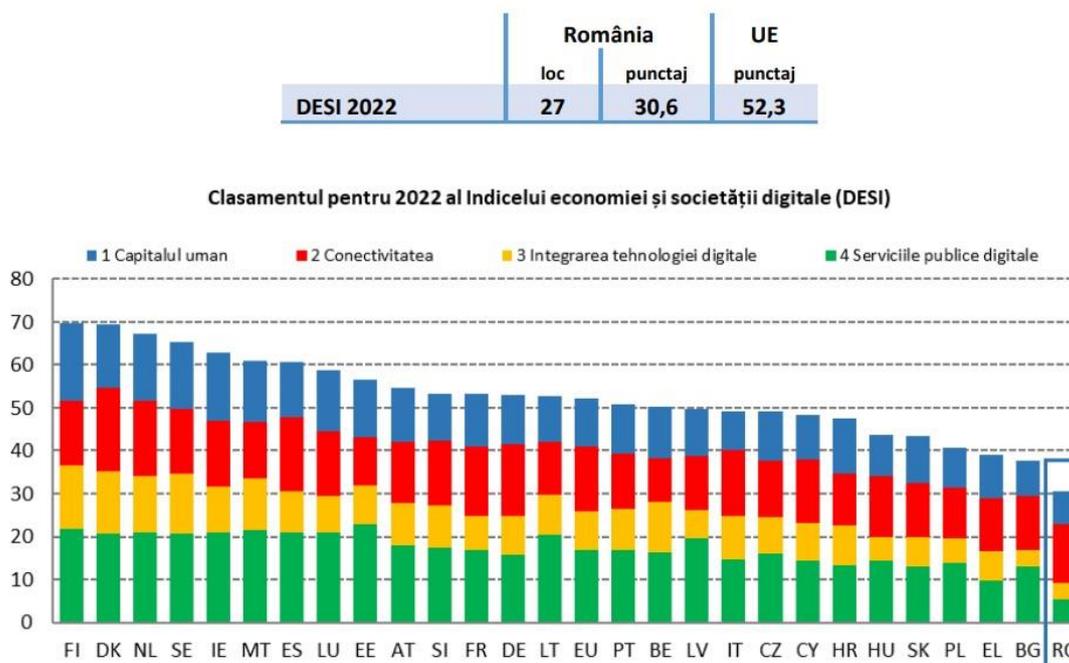


Fig. 4 Digital Economy and Society index (DESI) 2022 ranking, Source Digital Economy and Society Index (DESI) 2022 Romania

The most important digital deficit in Romania is, as we can see in EU data and it is show in Figure 3 and 4, digital public services. This include integration and access to public datasets, in other words democratization of access to public data.

More than a policy or political and institutional will, digitalization means a deeper understanding and new regulations for data and information access.

4. Methodology

We applied a questionnaire at the management level of 30 big Romanian companies that already have implemented Industry 4.0 tools.

We define four levels of digitalization for companies:

Level I – the company does not have internet, e-mail, website, or do not use e-banking.

Level II – the company uses e-mail and e-banking and has a website.

Level III – the company uses digital marketing tools (social networks), and has implemented digital communication mechanisms with customers, and e-commerce.

Level IV – the company is a data-driven company (we have Big Data, CRM, ERP etc.).

We use descriptive statistics to process our data.

Even if there is a small number (30) in the sample, we consider that, because Big Data implementation is not common in the Romanian business environment, the results are accurate and give a real indication about all companies with Big Data implementation in Romania.

5. Research findings and conclusions

Most companies are in the digitalization process (most of them at levels III & IV from our research model). The digitalization started for getting info to run the companies based on data that show a high level of understanding of the digital economy. Marketing is the key department. Many digital transformation initiatives in most companies started from the marketing department.

The future needs for digitalization are coming from the finance department and general management as well, to align & synchronize all the departments in line with the market requirements. More and more Romanian companies understand and apply the concept of a market-oriented company. Most companies are fully aware of how important Big Data management is for the business, but they require help & support. Big Data seems too complicated for companies and should be better explained and understood to become a source of competitive advantage for Romanian companies.

The Romanian state is playing an important role as well, but even itself needs help & support for a digital transformation process to integrate all the processes and interactions between the companies and between society and public institutions. A better public data integration and access will boost Big Data implementation in private sector. One of the interesting things we discover is that digitalization *per se* is not the “silver bullet” for development of companies. Digitalization generate more efficiency and efficacy few years after implementation or integration of digital technology in some conditions. We find that one of constant condition is the belief in and strong support of company leadership for new technological approach.

References

- Amadoa, A., Cortez, P., Rita, P., Moro, S., 2018. ‘Research trends on Big Data in Marketing: A text mining and topic modeling based literature analysis’, in *European Research on Management and Business Economics* 24, pp. 1–7.
- Brodny, J., Tutak, M., 2022. ‘Analyzing the Level of Digitalization among the Enterprises of the European Union Member States and Their Impact on Economic Growth’, in *Journal of Open Innovation: Technology, Market, and Complexity*, 8, 70, pp. 1-29.
- Ciocodeică, D. C., Chivu, R.G., Popa, I.C., Mihălcescu, H., Orzan, G., Dumitrache, A.M., 2022. ‘The degree of adoption of business intelligence in Romanian companies -the case of sentiment analysis as a marketing analytical tool’, in *Sustainability*, 14, x., <https://doi.org/10.3390/xxxxx>.
- De Luca, L. M., Herhausen, D., Troilo, G., Rossi, A., 2021. ‘How and when do big data investments pay off? The role of marketing affordances and service innovation’, in *Journal of the Academy of Marketing Science* 49, pp. 790–810.
- Digital Economy and Society Index (DESI) 2021. Romania*, Available at: <https://digital-strategy.ec.europa.eu/en/policies/countries-digitisation>, accessed 20iunie 2022.
- Froot, K., Kang, N., Ozik, G., Sadka, R., 2022. ‘Predicting Performance Using Consumer Big Data’, in *Journal of Portfolio Management*, April.
- McAfee, A., and Brynjolfsson, E., 2012. ‘Big Data: The Management Revolution’, *Harvard Business Review*.
- Mikalef, P., Boura, M., Lekakos, G., Krogstie, J., 2019. ‘Big data analytics and firm performance: Findings from a mixed-method approach’, in *Journal of Business Research* 98, pp. 261–276.
- Milosik, A. and Evans, N., n.a.. ‘Impact of Big Data and Machine Learning on Digital Transformation’ in *Marketing: A Literature Review*, Digital Object Identifier 10.1109/ACCESS.2020.2998754.

- Suoniemi, S., Meyer-Waarden, L., Munzel, A., Zablah, A., Straub, D., 2020. *Big Data and Firm Performance: The Roles of Market-Directed Capabilities and Business Strategy*, Elsevier.
- Verhoef, P. C., Kooge, E., and Walk, N. , 2016 *Creating Value with Big Data Analytics, Making smarter marketing decisions*, Routledge.
- Yuri Demchenko (facilitator, reporter), n.a.. *Defining the Big Data Architecture Framework (BDAF) Outcome of the Brainstorming Session at the University of Amsterdam*, Available at: http://bigdatawg.nist.gov/_uploadfiles/M0055_v1_7606723276.pdf.