

## ENTERPRISE'S DIGITAL TRANSFORMATION – DIGITAL TECHNOLOGIES INCORPORATED BY EUROPEAN UNION'S BUSINESSES

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**Abstract:** *Business models are in a continuing change due to the technology and digitalisation. Digital transformation of each sector of the economy is inevitable. These conversions are achieved through the implementation of the digital technologies as robotics, virtual and augmentative reality, artificial intelligence, internet of things, internet of bodies, Big Data analysis, cloud computing, blockchain technology, quantum data and edge computing. This research underlines that integrating digital technologies is essential for the improvement of the provided services and products as well as the expansion of the sales market resulting into profit increase and economic development. The productivity and the performance of the European companies from all the economic sectors will rise through new business opportunities. The analysis of the statistical data of the European Union's Digital Economy and Society Index presents the progress that each member state is achieving toward the development of economy through digital technologies. Statistics point out that big companies use more often digital technology in the planification of resources or marketing analysis compared to small and medium enterprises. Analysing the literature and statistics the conclusion underlines that digital technologies integrated in each economic sector determines the raise of the competitive performance and durable development. Production models implemented can be adapted and applied through data processing and analysis concerning the production and the supply and distribution chain. Artificial intelligence assimilated by the enterprises boosts the degree of innovation and creativity. Equal access for funding for all enterprises assures investment in human capital and new technologies.*

**Keywords:** *digital economy, digital skills, Digital Economy and Society Index*

**Jel Codes:** J24, O3, O4

### Introduction

The main objective of this paper was to discover the opportunities of the digital technologies integrated in each economic sector. The hypothesis is that it determines the raise of the competitive performance and durable development. Secondly, for this paper, it was of interest to see how digital economy concept is associated with a new industrial revolution that influences the economic, political, cultural and social sphere of the human life. (see fig. no 1) The hypothesis is that in the last years enterprises throughout the world made significant investments toward digital development, especially in the field of medicine, pharmaceutical, research and development, electronic, agriculture, transportation, so on. Business models are in a continuing change due to the technology and digitalisation. Digital transformation of each sector of the economy is inevitable. (Rittera and Lund Pedersen, 2020)

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The productivity and the performance of the European companies from all the economic sectors will rise through new business opportunities. The efficiency of the technologies is influenced by two elements of capability, the management of transformation and the digital one. (Westerman et al., 2013).

It is imperative that the technology accomplishment is used for the people and for the protection of the environment, this calls for action plans from the authorities and businesses for long life learning programs and habitat conservation. (see fig. no 1)

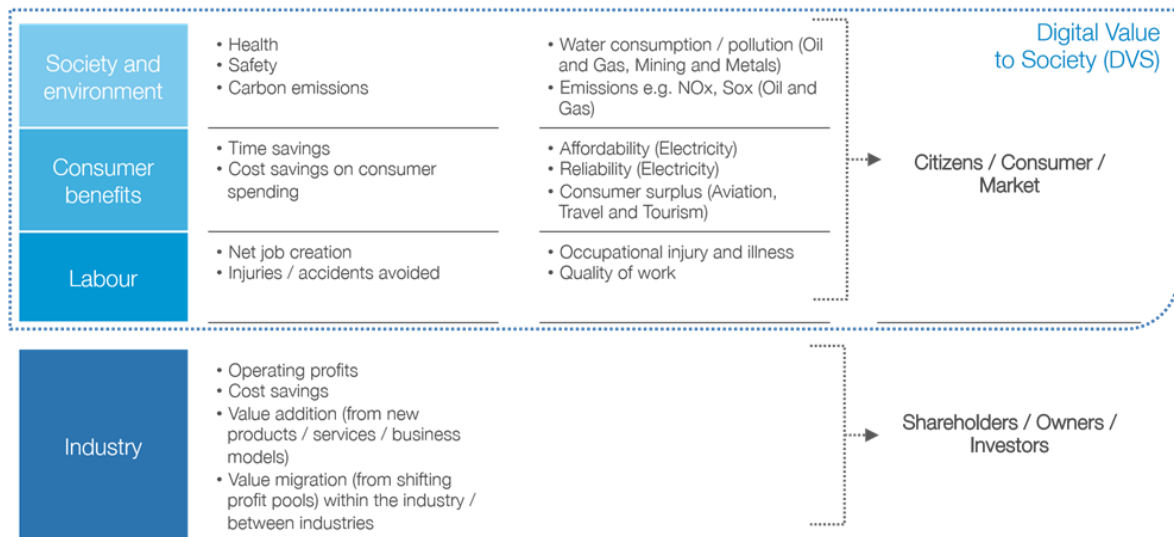


Figure 1. *Digital Value to Society*

Source: World Economic Forum, *Unlocking Digital Value to Society*, 2017, pp. 6, reports.weforum.org/digital-transformation/wp-content/blogs.dir/94/mp/files/pages/files/dti-unlocking-digital-value-to-society-white-paper.pdf, last accessed 9<sup>th</sup> November 2020

## Literature review

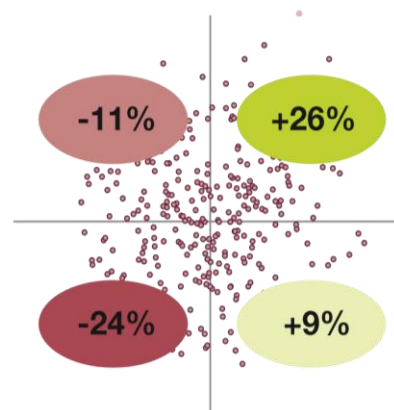
### Benefits of the digital technologies' assimilation

The MIT Center for Digital Business published a study (see fig. no 2) underlining that companies which implemented digital technologies achieved an average increase in profit of 26 % and market valuations of 12 % boost. (Westerman et al., 2013) These conversions are achieved through the implementation of the digital technologies as automated robotics, virtual and augmentative reality, artificial intelligence, internet of things, internet of bodies, Big Data analysis, cloud computing, blockchain technology, quantum data and edge computing.

*Companies with stronger transformation management intensity are more profitable*

Basket of indicators:

- EBIT Margin
- Net Profit Margin



**Figure 2. Profitability of the enterprises that adopt digital technologies**

Source: Westerman, G., et al., 2013, *The Digital Advantage: How digital leaders outperform their peers in every industry*, the MIT Center for Digital Business, pp. 7, [http://ide.mit.edu/sites/default/files/The\\_Digital\\_Advantage\\_\\_How\\_Digital\\_Leaders\\_Outperform\\_their\\_Peers\\_in\\_Every\\_Industry.pdf](http://ide.mit.edu/sites/default/files/The_Digital_Advantage__How_Digital_Leaders_Outperform_their_Peers_in_Every_Industry.pdf), last accessed 9<sup>th</sup> November 2020

Internet of things and big data analysis are the technologies, alongside 3D printing, used to improve the circular economy's environment impact. Durable economic growth, prosperity of the community and the citizens and environment protection are the goals of circular economy, achieved by the use of the 4Rs: reusing, recovering, reducing and recycling. (Bressanelli et al., 2018)

European Commission's report enumerates that the implementation of the digital technologies will create one million jobs in the coming years and that manufacturing industries could save 90 billion euros by integrating automated machinery in the production and acquiring high-quality industrial data. (European Union, 2020 d)

New business opportunities, sustainable and innovative enterprises that conduct toward economic growth can be attained by means of applicable policies and wise investments. Along these lines, European Union's funding for research and innovation of the digital technologies stepped up 70 % in the 2016-2019 period by 1.5 billion euros. (European Commission, 2020 c)

European Commission (EC) determined that an investment of 4 to 6 billion in the digital services, data spaces, cloud infrastructure could transform Europe into a leader in data. The EC forecasts a 2.8 times growth for the data economy for the year 2025, a value of 829 billion euro, compared to the 2018 value of 301 billion euro. It also estimates a two time raise of the numbers of data professionals, from 5.7 million in 2018 to 10.9 million in 2025, and a 1.2 times increase in the number of human capital with basic digital skills, from 57 % in 2018 to 65 % in 2025. (European Commission, 2020b)

### **Research methodology**

For this paper there have been utilised diversified reports, literature titles, public authorities' strategy bulletins regarding digital technology adopted by companies, its benefits, challenges and further research needs. These titles can be found in the reference section.

Analysing the literature and statistics the conclusion underlines that digital technologies integrated in each economic sector determines the raise of the competitive performance and durable development.

### **Digital Economy and Society Index data research**

Digital Economy and Society Index (DESI) 's function is to observe digital performance and keep tab on the advancement of EU's member states in digital competitiveness. Five main domains are represented by DESI:

1. Connectivity (Con),
2. Human Capital (HC),
3. Use of Internet Services (UIS),
4. Integration of Digital Technology (IDT),
5. Digital Public Services (DPS).

The index is annually calculated. Analysing the DESI index each European country establishes the field that calls for vigorous actions and pinpoint investments. <https://ec.europa.eu/digital-single-market/en/digital-economy-and-society-index-desi>

Connectivity index refers to fixed broadband take-up and coverage, mobile broadband and broadband price. Human Capital index is structured by internet user and advanced skills and

development. Population's internet use, online activities and transactions are the elements of Use of Internet Services Index. Business digitisation and e-Commerce are analysed through Integration of Digital Technology. <https://digital-agenda-data.eu/charts/desi-components#chart>.

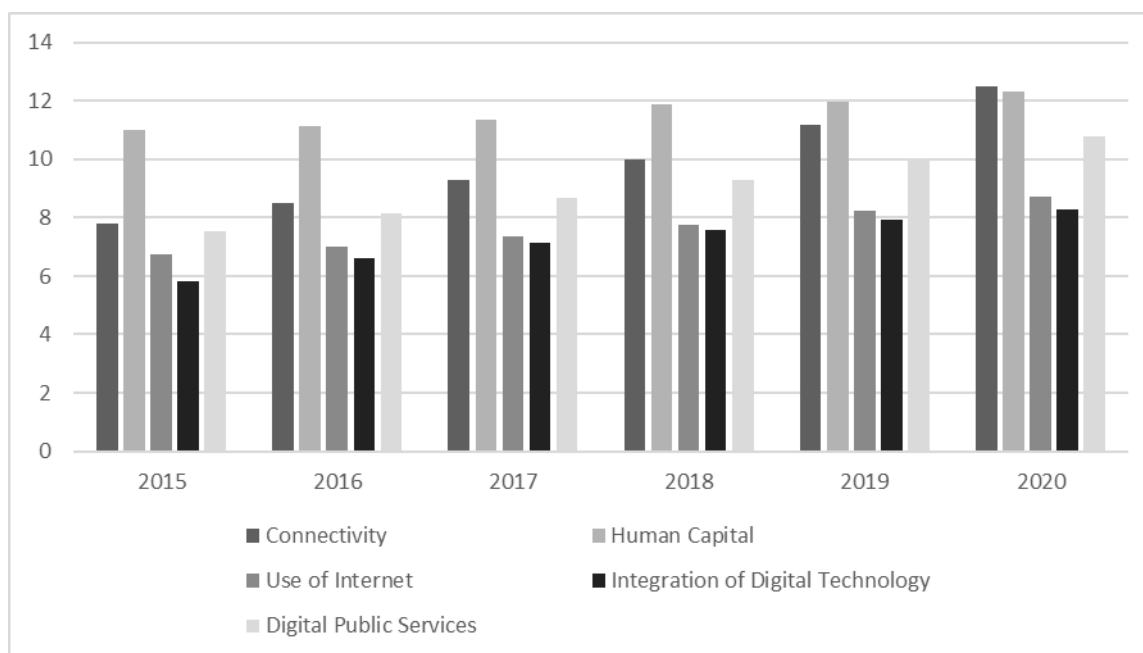


Figure 3. **European Union - Digital Economy and Society Index evolution 2015 - 2020**

Source: DESI 2015 – 2020 European Commission, data set

<https://digital-agenda-data.eu/datasets/desi/#download>, last accessed 5<sup>th</sup> November 2020

Figure no. 3 presents the progress of the DESI and the sub-dimension indexes over the last five years. Analysing the data sets provided by the European Commission at <https://digital-agenda-data.eu/datasets/desi/#download>, the following change in the index value were observed: Connectivity increased by 60%, Human Capital by 20%, Use of Internet by 65 %, Integration of Digital Technology by 49% and Digital Public Services by 55 %. For the period 2015 to 2020 scrutinised each of the sub-dimension index value increased by 50 % or more, except Human Capital development skills, only 20% boost. Why only 20% increase though the other index's value thrived 50% and more requires future exploration. HC professional education and training and skills upgrade research is not the purpose of this paper, but it will be continued through the next studies.

DESI 2020, measured being the median of the main DESI dimensions weights:

1 Connectivity | Weight: 5/10 (25.0%)

2 Human Capital | Weight: 5/10 (25.0%)

3 Use of Internet | Weight: 3/10 (15.0%)

4 Integration of Digital Technology | Weight: 4/10 (20.0%)

5 Digital Public Services | Weight: 3/10 (15.0%)

Source: *Digital Economy and Society Index, 2020*, last accessed 5<sup>th</sup> November 2020

Figure no 4 pinpoints the leading countries with digital economy development, Finland (FI), Sweden (SE), Denmark (DK), and the lacking behind member states, Bulgaria (BG), Greece (EL), Romania (RO). Digitalisation, innovation and training human capital initiatives programs are required alongside robust investments for the progression and economic growth. It is important to

audit the DESI index to insure digital transformation beneficiary for all firms and wellbeing of the citizens and for the growth of the economy.

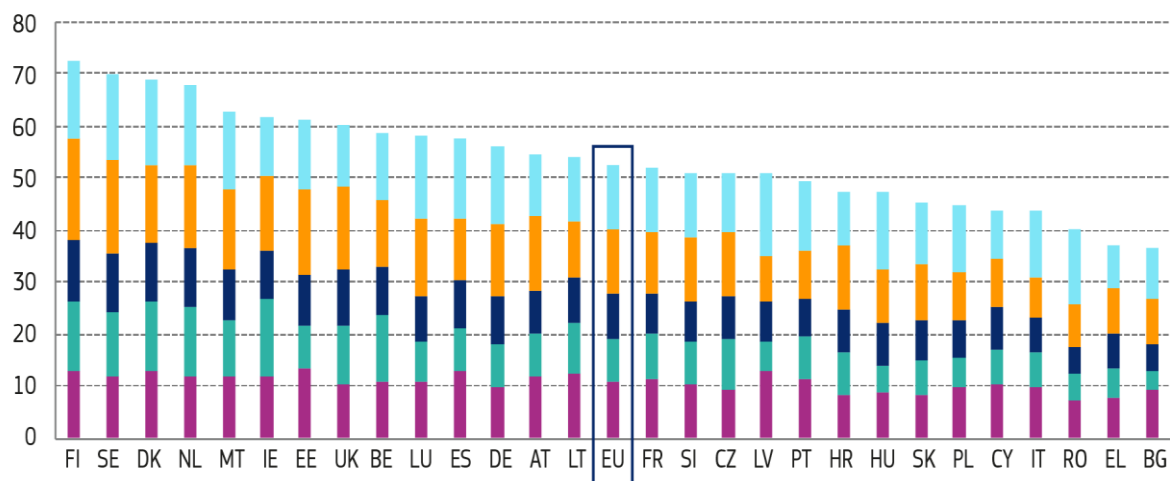


Figure 4. *European Union - Digital Economy and Society Index year 2020*

Source: *European Commission, The Digital Economy and Society Index 2020*

<https://ec.europa.eu/digital-single-market/en/digital-economy-and-society-index-desi>, last accessed 5<sup>th</sup> November 2020

For this research, an overall view is taken on the components and elements of the digital economy index for the member states of European Union.

### Human Capital digital skills

The most durable resource of each enterprise is the human capital. Basic digital skills are attained by 58% of the population of the EU. Nowadays, acquiring digital skills is the foundation for the digital society, adding that most of the jobs require abilities to use digital technologies. ICT specialists number increased by 21% over 4 years, reaching 9.1 million in 2018 among EU's member states. Even though there is an increase, big, medium and small companies (SME) reported and workforce shortage of ICT professionals, 64% of big firms and 56 % SME's.

Figure no 5 underlines the leading countries delivering the most digital skilled human capital, internet user skills and advanced skills and development, Finland (FI), Sweden (SE), Estonia (ES), and the insufficiency trained citizens of Bulgaria (BG), Romania (RO), Italy (IT).

### Integration of Digital Technology by EU's businesses

Business Digitalisation of the firms through electronic information sharing, social media, big data and cloud applications usage is represented by the figure 6. Cloud application is used by 17% of the EU's SME where big data tools are used by 12% of the enterprises. Advanced technologies for businesses are used the most by enterprises in Finland, Netherlands and Belgium and least used by Poland, Hungary and Bulgaria. Again, it is noticeable that the same countries

with each sub-dimension index value are the leaders or the ones needing the most investments in technology infrastructure and training programs.

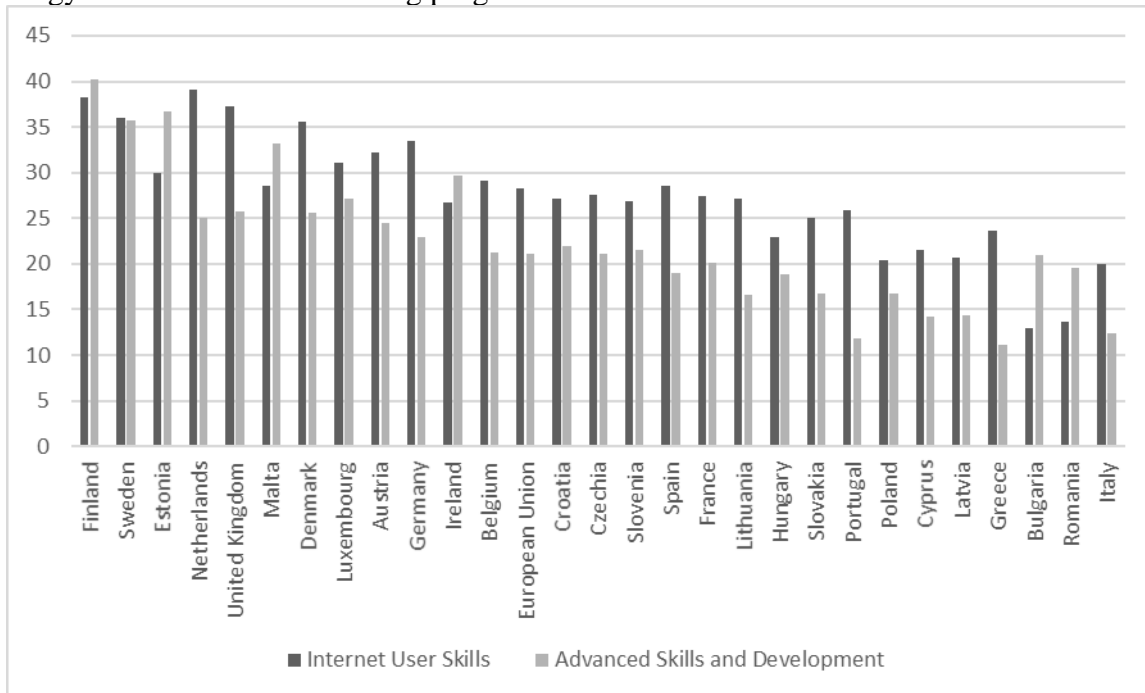


Figure 5. *DESI Human Capital Dimension year 2020*

Source: DESI Human Capital Dimension 2020 European Commission, data set <https://digital-agenda-data.eu/datasets/desi/#download>, last accessed 5<sup>th</sup> November 2020

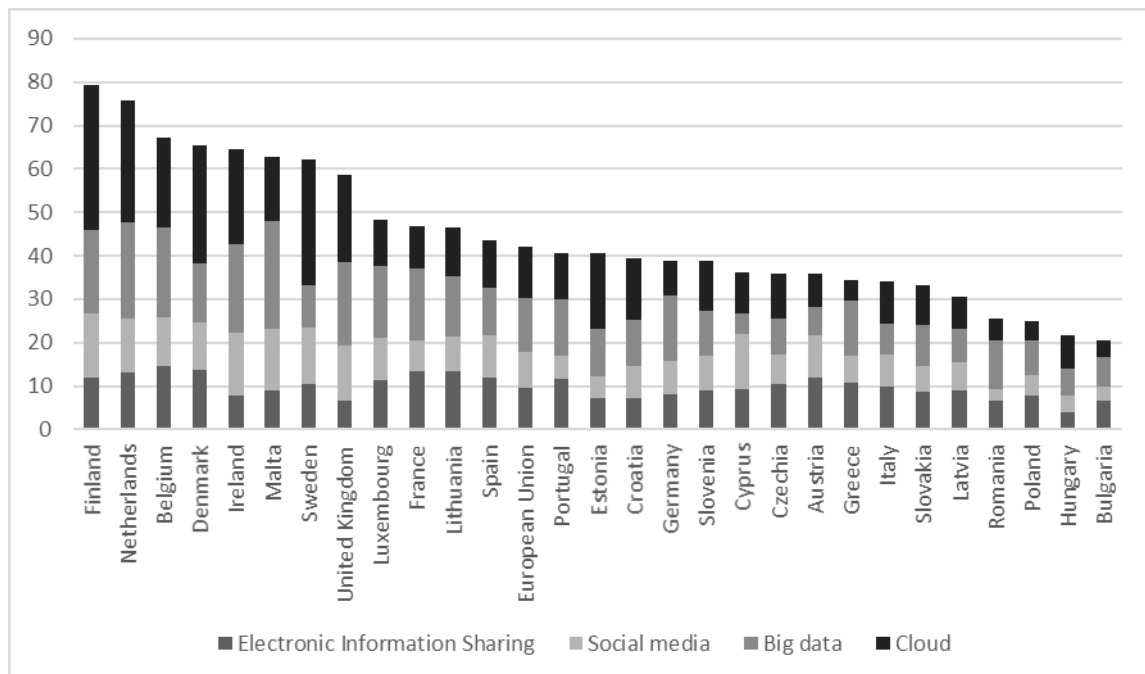


Figure 6. *Integration of Digital Technologies Dimension, sub-dimension Business Digitalisation year 2020*

Source: DESI Integration of Digital Technologies Dimension 2020 European Commission, data set

<https://digital-agenda-data.eu/datasets/desi/#download>, last accessed 5<sup>th</sup> November 2020

### Digital public services for businesses

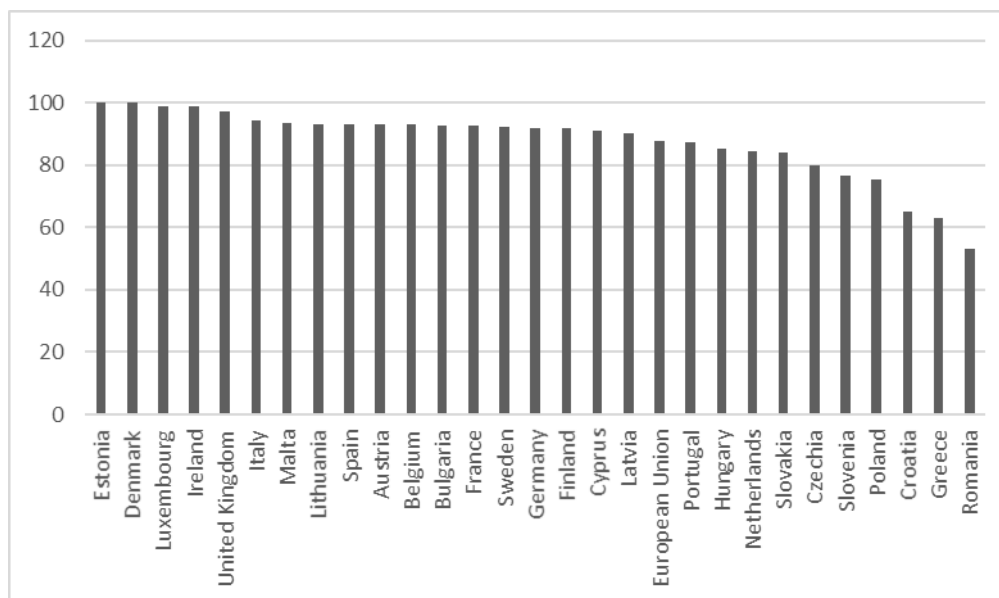


Figure 7. *Digital public services for businesses 2020*

Source: DESI Digital public services for businesses (DPSB) 2020, data set <https://digital-agenda-data.eu/datasets/desi/#download>, last accessed 5<sup>th</sup> November 2020

Online public services procedures accessible for managing start-ups or companies are revealed by DPSB index. The opportunities, challenges and expectations from the each of the governmental offices for e-government are high, as the economical and society benefits materialise for governments, companies and citizens. Estonia, Denmark and Luxemburg are the top achievers, where Croatia, Greece and Romania have an inadequacy development for today’s requirements.

### Results and discussions

This research underlines that integrating digital technologies is essential for the improvement of the provided services and products as well as the expansion of the sales market resulting into profit increase and economic development. Digital services, both public and private, are integrated more in developed and thriving economies.

The elements of the digital transformation action plan that have to be taken in consideration beside the benefit of the technology, are the financial facets, changes in the creation and innovation assessments. (Matt et al., 2015)

Artificial intelligence assimilated by the enterprises boosts the degree of innovation and creativity. (Nadkarni and Prügl, 2020) Enumerating few applications among the departments of the enterprise: operation and design of the manufacturing system, optimization techniques, power and energy systems. (World Economic Forum, 2020 a)

A key investment in human capital development is required by adopting a school and training curricula that prepares for the forthcoming years, targeting technology and engineering

fields, adjoining basic and advanced digital technology skills training investment. (World Economic Forum, 2020 b)

It is important to highlight that artificial intelligence usage cannot create jobs and prosperity for the citizens and companies without a proper proficiency of digital skills upgrade of the human capital.

The use of artificial intelligence use has to better the everyday life of people, and its main intendment has to take in consideration the European values and the dignity of the human beings. The fundamental rights of the consumer must be respected during the process of digital technology integration.

Statistics point out that big companies use more often digital technology in the planification of resources or marketing analysis compared to small and medium enterprises.

European Union's Digital Economy and Society Index evolution data research and analysis pinpoint the same member states that are advanced in adopting digital technologies and the ones that need concentrated, specific and persistent investment in infrastructure, education and training.

### **Conclusion**

Analysing the literature and statistics the conclusion I have drawn is that digital technologies integrated in each economic sector determines the raise of the competitive performance and durable development. Production models implemented can be adapted and applied through data processing and analysis concerning the production and the supply and distribution chain.

The challenges for the enterprises are given by the rapid digital technology changes and the need of upgrading the employees' skills. These changes cause companies to be innovative and flexible, to adapt the businesses' strategies for the new market requirements.

This paper concludes that equal access for funding for all enterprises assures investment in human capital and new technologies. Designing and constructing a framework for adult profession and upskilling training, focusing on the importance of lifelong learning, in order to have economic growth alongside employer and employee' prosperity.

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