THE NEW STEP IN DIGITALIZATION OF ECONOMY

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Abstract: *Digitization leads to a permanent transformation of the economy and state services. State governments and economic agents must be ready for the transformations that will take place and on the one hand create legislative frameworks to control progress, and on the other hand economic agents must be ready to develop their business in accordance with new technologies informational. The analysis of the trends in the digitization of the economy and how to calculate it is the objective of the given article. The purpose of the study is to identify the transformations taking place in the economy and society with the implementation of information technologies, and the ways to quantify the stage of this transformation.*

Keywords: *digitalization, digital intensity index, economy transformation, cyber security.*
JEL Classification: *K24, M15.*

1. Introduction

We are witnessing the digital transformation of many industries which is typical of the fourth industrial revolution. Economic transformation and digitization lead to a radical reduction in the costs of storing, processing and transmitting information, as well as accelerating the exchange of financial resources between parties. In addition, it transforms the way countries' economic systems work under the conditions of information technologies. Over the past 20 years, investments in ICT enterprises have increased the GDP of many countries by tens or even hundreds of billions of dollars.

The influence of technologies on economy and business is increasing significantly day by day. Tons of e-mails and messages of trade secret quality are sent every day. This fact influences the increasing importance of new data security technologies. Customers spend countless hours each year comparing deals, shopping for goods, reading free information portals, blogs and spending time on social media. At the same time, they transfer funds or secure their savings through new ways of storing value.

However, in many countries such changes are too fast for the legislative apparatus to prove to create an adequate legislative framework. Because traditional user-business-service trade relationships are being replaced by new platforms that connect the user directly with another user without a mediator. Blockchain has proven that this model is not only possible, but also controllable by users and not by specific national laws or unique regulations introduced by the given country, and is based on peer-to-peer transactions.

2. Literature review

F. Khan connects one Internet economy, on the one hand, with productive goods such as high-tech goods, entertainment content and related products, and on the other hand, with industries, which carefully evaluates technologies that are not directly related to the real sector of the economy. According to this researcher, the economic effect within the economy based on information technology leads to a quantitative indicator of the production of various goods and services, investment and employment in this case. Drawing attention to the problem of attributing one or another type of economic activity to the Internet or the industrial economy, F. A clarifying term is proposed - Smart economy - a sector of the economy in which the process of making a profit by economic agents undergoes radical changes, which obscures the role of individuals in commercial activities (Khan, 2002) .

According to Christine Balagué, vice-president of the French National Council “du numérique” (Bauwens, 2015), any individual with a mobile phone can now become a service

provider, create services or at least place an offer for sale in order to earn little spare money. So, the owner can grant the exclusive right for a certain limited time, intended for the use of an expensive asset (car, apartment, special gear, etc.). Objects of value have come to represent for their owner not just useful thing, but capital that can be exploited in a number of different ways for the purpose of generating aditional income.

Scientists S.S. Cohen, J.B. DeLong, J. Zysman introduced the concept of E-economy. Authors think that the term of "network economy" is too narrow to cover all the changes that are taking place in the industrial economy. In other way the concept of "Innovative Economy" is also inappropriate to describe the transformations that took place at the beginning of the 21st century. On the contrary, the term New Economy is too broad; and researchers attribute many diverse meanings to this term (Cohen et al, 2000).

Summarizing the opinions of experts who are representatives of major international research organizations, it seems possible to identify some primary trends, which in the long term will have a significant impact on economic growth indicators (Atledinova et al, 2017): cloud computing; Internet of Things; artificial intelligence; robotics; blockchain, meta-economy. These trends are the basis of the fourth industrial revolution. These directions are associated with the digital economy, which is based on the use of digital Internet technologies in the process of production of goods and services and their trade.

On the direct dependence of the growth of the economy, the wealth of the country and its inhabitants from the development of the national economy, high-tech production and services, says the Norwegian economist Erik S. Reinert (Rainert, 2017).

However, according to Roubini, even a massive education and training effort in new technologies may not be enough to include these segments of the population in the promised social progress and prosperity. This skepticism makes him suggest that other solutions could prove indispensable, such as permanent income support, a basic consolidation of social services (health, pensions, etc.) for people definitively excluded from the labor market by machines and algorithms. "A most fragile balance - between the freedom of the markets and the prosperity of the workers - must be sought and found" (Roubini, 2015).

3. The ways of digital development of the economy

A review of the world experience, especially the introduction of digital technologies in industry, made it possible to highlight the main concepts: Industry 4.0, intelligent manufacturing, digital production, the Internet in industry. A series of trends are based on these concepts, which are typical for the digital transformation of industry and enterprises:

1) the use of intelligent devices to measure production line parameters;
2) the refusal of a large number of employees and the transition to robotic technologies;
3) replacing own storage and computing capacities with distributed resources;
4) creation of a unified IT system for the automation and integration of production processes;
5) applying the entire mass of data for analysis;
6) introduction of mandatory electronic circulation of documents;
7) the introduction of digital technologies for all stages from idea to operation;
8) the application of specialized services for the procurement of materials and raw materials, and also their subsequent delivery to the client;
9) sale of manufactured products via the Internet.

An economic transformation today is primarily a digital transformation. Digital transformation can be explained as a process of changing the way of interconnection between different information technologies that lead to the change or emergence of new activities of

the economy or society (Gutium, 2022). Or it can be explained by the application of technical and telecommunication innovations.

If it is about context, then within for-profit companies, digital transformation involves changing the process of production, service, execution of works, or internal management. Within the economy at a macroeconomic level, digital development means changing the way of interaction between different government departments, and B2G (business to government) interaction. At the societal level, digitization brings with it new methods of communication and interaction between people and potential customers.

An evidence-based approach to decision-making requires quantitative data on the following aspects of digital transformation (Gutium, 2023). Quantitatively, the digitization of the economy and society can be measured by such indicators as:

a) achieving the total digitization of the key sectors of the economy;

b) increase in the number of public services accessed online by the population;

c) increasing the number of households with broadband Internet access;

d) the increase in investments in the information technology sector compared to the previous year;

Companies that are based on digital technology are now in top 100 most capitalized companies in the world. If in 2010 there were just 11 of such economical agents, by 2015 there were already 19. The average annual increase in the number of employees in high-tech TNCs was 5%, turnover is 5%, assets are 11%. There was no growth in telecommunications and other TNCs. Thus, an increase in efficiency and digitization do not create new jobs in established companies, but such jobs appear only in technology companies. The five most capitalized US companies in 2017 were technology companies (Apple, Netflix, Microsoft, Meta and Amazon). Their total capitalization exceeds USD 3 trillion, or more than 15% of US GDP, and the average capitalization is 3 times higher compared to the capitalization of other TNCs (Global Center for Digital Business, 2018).

Digital economy new opportunities that are able to make a real revolution in human life. Thanks to the development of modern information technologies, the consumer quickly receives more quality services in a very short time. For each individual business, the transition to e-commerce can act as an impetus for potential growth and expansion through an increase in clientele and some facilitation of sales and service delivery through information technology and the use of network services and cloud platforms. According to sociological research, in 2016 the number of people with free Internet access exceeded 3 billion people. In 2019, over 53% of the world's population, or 4.1 billion people, will have access to the broadband network.

4. The digital intensity index as a way of assessing the level of change in the economy

The Digital Intensity Index is a composite indicator derived from the survey on the use of ICT and companies that are working in e-commerce field. With each of the twelve included variables having a score of one point, the “Digital intensity index” distinguishes four levels of digital intensity for each enterprise: counting from zero to three points implies a very low level of digital intensity, from four to six – low, of at seven to nine – high and ten to twelve points – very high “Digital intensity index”.

This index is composed from different variables, and its variables varies between different years depending on the questions included in the specific survey. In year 2018 and 2020, the composition of the this index was similar and included the following 12 variables:

- employment of ICT specialists;
- fast broadband (30 Mbps or more);

- providing more than 20% of employees with a digital device that is able to connect to mobile internet;
- have a website;
- a website has sophisticated functionality (at least one of: description of goods or services, price lists);
- possibility for visitors to customize or design goods or services online;
- tracking or status of orders placed;
- personalized content on the website for regular/recurring visitors;
- use of 3D printing;
- purchase of medium-high cloud computing services;
- sending invoices suitable for automatic processing;
- the use of industrial or service robots;
- having e-commerce sales that represent at least 1% of total turnover;
- analyze big data internally from any data source or externally, over 50% of employed persons having access to the Internet for business purposes.

According to the data in Figure no. 1, Denmark has the highest digital intensity index in Europe. It should be noted that Denmark also has one of the highest Human Capital Indexes, being 0.948 in 2020, Finland 0.94, Sweden 0.947, Ireland 0.945, and Norway 0.961, being in 2nd place in the world. These data allow us to find that the higher the Digital Intensity Index is, the more developed the human capital will be, and in the end it will allow the stable development of the country.

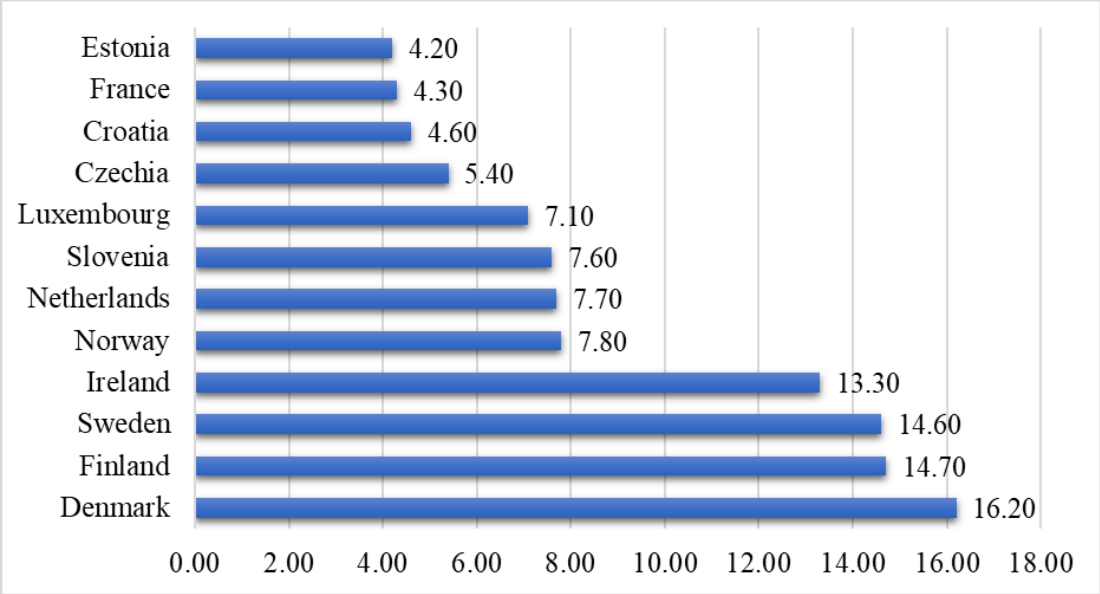

Figure no. 1. Digital Intensity Index, 2022

Source: Eurostat, 2022.

5. Conclusions

In general, we can find that the digitization of the economy as a direction of scientific research is a huge area for collecting new data and forming new theories and concepts. Among the formal characteristics that distinguish digital products from most conventional products, the distinctive properties of all information products, including those specific to digital products, can be highlighted. Among them is, first of all, the high added value. As a specific feature of digital products, which distinguishes them from other information

products, it should be mentioned the possibility of their transmission on communication channels without loss of accuracy, cloning instead of copying overwriting. The consequences of this property are the ability to encrypt signals, digital computing on a computer, 3-d printing, and many others, including those that have yet to be discovered.

Researchers warn that digital transformation is a complex, unconventional and largely unpredictable process that requires certain previous research, such as effect upon technological and managerial readiness within organizations and markets.

With each industrial revolution, new opportunities for the development of the economy, both public and private management systems, of society and the standard of living are opened. In the fourth industrial revolution the importance of education and human capital had increased because the role of education and knowledge had increased. Moreover, thanks to the new digital technologies, each individual can be part of commercial realities without an intermediary, thus becoming a small entrepreneur of the new information age.

There is a deep connection between the intensity of digitization and the development of human capital, which essentially influences the development of the economy and the standard of living.

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