DIGITAL ECONOMY AS A STRATEGY OF ECONOMIC DEVELOPMENT IN THE 21st CENTURY

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Abstract:

The development of the digital economy is a very interesting research problem. The beginnings of the digital economy date back to the 1990s, when the use of information technology was limited to manual transmission of data by means of electronic devices. Therefore, detailed research of key concepts that significantly accelerated the development of the digital economy was taken as the research objective. The methodology of the study was based on a theoretical analysis of individual concepts that positively influence the development of the digital economy. The result of this study was the determination of the role that particular factors played in the development of a knowledge-based economy. The main conclusions drawn from the study are the following: there has been an increase in the competitiveness of industry thanks to the use of the latest technological developments in the field of computer science, advanced data exchange and integration of IT systems of various organizations. One can therefore consider digitization to be one of the most revolutionary changes in the modern world, constituting a significant determinant of the development of the innovative economy and the information society. This means that it plays an important role in economic, political, social as well as in cultural life. Nowadays, it is difficult to imagine the functioning of organizations, governments or societies without access to information and communication technologies.

Keywords: digital economy, digitalisation, digital threats.

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1. Introduction

Digitization is considered to be one of the most revolutionary changes in the contemporary world. Moreover, it is an important determinant of the development of the innovative economy and the information society. This means that it plays an important role in economic, political, social and cultural life. Nowadays, it is difficult to imagine the functioning of organizations, governments or societies without access to information and communication technologies.

Digital transformation successively reaches all spheres of life. It is extremely important not only because of its role in economic development, but it also positively affects the functioning of societies. Digitalization considered as a continuous process of convergence of the real and virtual world is now a key driver of innovation and change in most sectors of economic and non-economic activity. Due to the use of innovative digital technologies, for many organizations new ways were created to improve their efficiency and financial results.

2. The origins and the concept of digitalization

The beginnings of digitization date back to the 1950s. At that time, digital telecommunications only started to develop, and then it meant the transmission of a sequence of the digits 0 and 1, and not of analog signals, as had been before. The breakthrough was the connection of computers with analog telephone lines, which gave rise to the ARPANET network, later called the Internet. Another important event for the development of digitization, which took place in the 1960s, was the development of the data transmission concept, *i.e.* data transfer between devices used for their processing or registration, discontinuous in the form of bits, converted into an electronic signal. Another milestone in the digitization process was the development of the X.25 network in the early 1970s. This network was intended for digital data transfer with analogue lines. Then, thanks to the enormous progress of computer science, a period of intensive development of digital

telecommunications and networking techniques began (Sartori 2016, p. 431).

Digitization is a term that is currently very often used in relation to changes that take place in the economy due to the use of modern computer technologies. It is interesting to note that the appearance of this phenomenon dates back to the 1950s, however ‘digitization’ came into common use somewhat later. The concept of digitalization was created along with the development of computer technologies in the 1950s, which meant the process of converting an analog resource to a digital one (Paradowski, 2010, p. 186 - 199).

The word ‘digitization’ was first used by R. Wachal in 1971. In his essay published at the time, the author used this concept to identify the phenomenon of increasing use of digital technologies in various areas of life. He referred this term mainly to society, stressing the role of the newest technologies in the development of civilization (Brennen, Kreiss, 2014). In the PWN Lexicon, one can find the following definition of the term: ‘digitization is a set of activities aimed at replacing devices in technical systems based on analog technology with digital circuits’ (*Leksykon PWN*, 2004, p. 230). When defining this term, W. Pisarek pays particular attention to the subject matter of this action, stating that digitization is the transformation of data recording from the analog to digital form for the purpose of their further storage, processing and transmission (Pisarek, 2006, p. 32). It can therefore be assumed that the concept analysed is used in various contexts and defined quite arbitrarily, depending on the scientific discipline represented by a given author.

The ongoing globalization process has compelled the need for computerization and digitization in many countries. Skilful acquisition, collection and use of information by means of information and communication technologies is now a key factor contributing to economic growth. What is more, there are studies according to which information and communication technologies in recent years have contributed to an increase in productivity in the European Union by almost 50% (Bartoszewska, Czarnecki, 2010, p. 97). A rapid increase in the role of information and services provided electronically, the use of information and

communication technologies in the economy, public administration, and in the everyday life of citizens have led to the dynamic development of digitization.

3. The development of the digital economy

The emergence and dynamic development of modern information technologies and communication have caused many changes in both society and the economy. Quite often these were changes regarding important issues related to the management of organizations and having a significant impact on the way in which business processes were implemented. The use of information technologies can affect the technical and organizational spheres, communication with clients or employees, as well as many other areas of the functioning of enterprises. This means that digitization has consequences for both individual users and entire institutions.

As was mentioned earlier, the beginnings of the digital economy date back to the 1990s., The use of information technology was limited then to transferring administrative or business data manually using electronic means. At that time, information exchange between systems took place only with the help of man, but now advanced system integration allows automatic data exchange. Currently, we can talk about the bloom of the fourth industrial revolution. The main message of this revolution is to increase the competitiveness of industry through the use of the latest technological developments in the field of computer science, advanced data exchange and integration of IT systems of various organizations.

Along with the advent and spread of the digital economy, some significant changes occurred in the area of business operations. However, it is worth mentioning one of the most expressive features of the digital economy. Namely, more customer care. The confirmation of this thesis may be the fact that thanks to the application of modern technologies and organization of company structures according to new business models, a significantly higher work efficiency is achieved, the availability of services for customers is improved, and the flexibility of business entities is

increased. All this means that they have a greater ability to produce innovative products and services that will be better adapted to the individual needs of the recipients. Additionally, due to the access to a variety of mobile devices and applications, communication between particular stakeholder groups and places where orders placed are processed have been significantly improved.

The development of the digital economy presented above would not have been possible if it had not been for important concepts, products or services that facilitate the implementation of innovative changes. The following are a few key factors that have accelerated the development of the digital economy to a large extent.

The concept described as the Internet of Things has been developing dynamically since 2010, when the so-called third wave of the Internet emerged. The Internet of Things as a technology that allowed automatic communication between active elements of technical systems was defined by K. Ashton in 1999 in the Procter & Gamble (P&G) presentation entitled 'The Internet of Things'. The author proposed using data transmission over the Internet using RFID to control the supply chain at P&G. Since then, the growing importance of this phenomenon has been observed, although for the first years of its operation it was rather a micro trend. It was only at the beginning of 2013 when the Internet of Things changed into a leading trend (Waltzman, Shen, 2015, p. 20). The Internet of Things is a network of physical objects (things) that thanks to built-in sensors and access to the Internet can communicate with both man and with each other (Chen, Yao, Tian, 2015, p. 106).

Another factor positively affecting the development of the digital economy is the ability to process data in the cloud. It is worth explaining what this action is. The cloud computing model is an innovative approach to the IT infrastructure, in which technology and software are made available to entities as a service. This means that smart solutions take the power of computing not from their own IT infrastructure, but from external resources available over the Internet. The traditional model, based on possessing own IT infrastructure, is characterized by high costs related to the purchase of fixed assets. Meanwhile, using the cloud

computing model it is enough to declare the number of users using this solution, the method of use and the amount of data processed. Based on this information, a monthly subscription for the service provided is established (Walterbusch, Martens, Teuteberg, 2015, p. 613).

Nowadays, Internet users are producing huge amounts of data every day. The way they are collected, managed and controlled is referred to as ‘big data’. It is a concept that is difficult to define explicitly. M. Cox and D. Ellsworth are considered to be the first to define this term in 1997. In their opinion ‘big data’ means very large data resources to be analysed and out of this huge amount more valuable information can be extracted (Cox, Ellsworth, 1997, p. 124). It is worth quoting the definition proposed by M. O'Brian, who thinks that it will be easiest to explain what big data is when the basic characteristics of this phenomenon are described. According to this author, big data is a term describing such data sets that are distinguished by a large variety and volume, variability, complexity, streaming of information, and the fact that their management should use the tools, methods and technology characterized by the highest degree of innovation (O'Brian, 2017, p. 40).

Another factor contributing to the development of the digital economy is the popularization of social media. Social networking sites such as Facebook or Twitter have been the strongest players on the online scene for a couple of years. They attract hundreds of millions of Internet users who devote an increasing amount of their time to the media. Thus, they arouse more and more interest of companies and marketing specialists, or strategists, who perceive the enormous potential of being in the virtual world. Social media is a tool that gives companies completely new opportunities to establish relationships with clients. It is worth emphasizing the fact that the effective use of this new medium is possible only when entrepreneurs completely change their previous way of thinking. Communities on the Internet cannot be treated as another communication channel, instead you must think about how a given product or service helps build relationships with others.

Digitization has now reached all spheres of human life. Its impact on the social functioning of people is significant, but

it cannot be denied that it affects economic life. The popularization of innovative digital technologies has caused significant changes in the ways companies compete, in consumer behaviour and presenting their expectations, and also contributed to the creation of completely new business models. All this led to the recognition that every individual who wants to develop cannot be limited to the real world only, he needs to, first of all, focus on the virtual environment.

4. Digital threats

The development of digitization creates many facilitations and gives various benefits to the functioning of enterprises and improves communication between individual social groups. However, this dynamic development affects the issue of ensuring data security and the users themselves. Implementation of modern technologies has many positive aspects, but at the same time increases the number of cyber-attacks. The report developed by PwC on the security of information stored in enterprises clearly indicates that the scale of the problem has increased significantly over time. In Poland, the number of detected cyber-attacks in 2015 was 46% higher if compared with 2014 (https://www.pwc.pl/pl/pdf/raport-pwc-gsiss-cyberzagrozenia-2016.pdf). It should be emphasized that this problem does not only concern the business sphere. It is faced both by individual users and government administrations as well.

When analysing digital threats, we should divide them into two main groups. The first group is composed of the kind of dangers that can have financial consequences and mainly affects the sphere of business, although it is increasingly affecting individual users. This group includes all kinds of cybercrime including using malware to conduct financial attacks, extortion robbing, blocking the use of certain services, remote data destruction, *i.e.,* sabotage actions, phishing of confidential data using social engineering. The second group, in turn, includes threats affecting the social sphere such as, for instance, addiction to the virtual world, cyberbullying experience, facilitation of

belonging to various types of organizations, *e.g.*, sects or virtual subcultures.

Cybercrime is currently one of the most widely recognized concepts used to describe modern forms of computer crime. In 2001, this term was incorporated into the Council of Europe Convention on Cybercrime, which is considered one of the most important international initiatives devoted to the fight against computer crime (http://conventions.coe). The term ‘computer crime’ is very aptly and in a detailed way defined by K. J. Jakubski. In the author's opinion, a computer crime is a criminological phenomenon, which consists of all unlawful behaviours concerning the functioning of electronic data processing, directly impacting the information being processed, its medium and circulation in the computer and in the entire computer connection system, as well as computer equipment and the right to use a software (Jakubski, 1997,. P. 31).

Digital threats resulting from insufficient vigilance of users can often result in financial losses or even the collapse of the enterprise. Craftiness and the cunning of hackers means that the number of attacks is growing, and not all entrepreneurs have already developed an effective way to protect their IT data underlying the functioning of the organization. Moreover, law enforcement agencies do not always have the tools to capture digital criminals. Therefore, we need to stress how dangerous is sharing personal data on the network, the lack of securing the computer system using licensed programs, and above all, the lack of prudence in the implementation of various types of operations on the Internet.

In addition to the digital threats related to the sphere of business, which may lead to financial losses, it is necessary to distinguish the dangers that the virtual world brings to society. One of the main problems of many social groups of different ages is addiction to the Internet. The network creates such a large range of possibilities for spending free time, that for many people functioning without access to the virtual entertainment is something unimaginable. An example may be the so-called ‘computer players’. Very often, addiction to playing at its initial stage remains

unnoticed even to the players themselves. This process is progressive. There is no doubt that Internet addiction is a huge threat to society.

Another important digital threat is violence understood in a broad sense and implemented through electronic tools. This is a phenomenon that accompanies the development of information and communication technologies. It is usually referred to as cyberbullying, but this term contains much more types of inappropriate and aggressive behaviour. According to I. Uflik-Jaworska, the problem of terminology of violence in cyberspace is very complex and controversial. It is assumed that within this term also covers such concepts as (Uflik-Jaworska, 2009, p. 198-199): electronic aggression, virtual aggression, virtual violence, cyberwar, cyberbullying, and cybermobbing. For the purpose of this study, it is assumed that cyberbullying should be understood as taking actions intentionally that are aimed at harassing, intimidating and humiliating other network users. Such activities usually last for a certain period of time and are carried out by means of electronic tools and their aim is to harm other network users.

5. Conclusion

The dynamic civilizational and technological progress of the last two decades has brought about significant changes in the world. It has affected the way of living and functioning of people in society. One can now talk about the creation of the phenomenon, defined as the information society, whose existence is based on the accessibility, creation and transmission of information. As a result, societies expand their knowledge and develop their skills along with changes taking place in the area of information and communication technologies. The implementation of such a process is possible due to a proper information transmission through an extensive internet network. There is no doubt that the Internet is currently the source of information that is used most frequently. Moreover, it has become a place where various services are implemented quickly and efficiently.

Summing up the above considerations, it must be admitted that the development of information and

communication technologies does not give rise only to benefits and facilitations in the functioning of individuals, but it also causes significant digital threats. Individual users, enterprises and state administration bodies can fall victim to cybercriminals. It is very important at this stage to make the society aware of what dangers may result from the misuse of electronic media.

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