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Theoretical and Methodological Approaches to Development of the Concept of Digital Economy

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Abstract

The article substantiates the theoretical and methodological approaches to the development of the concept of the digital economy. The definition of the term "digitalization" has presented in both broad and narrow meaning. The evolution of the concept of the human mind has shown from the involvement of the concept of no sphere till the creation of the concept of the digital economy in current times. The approaches of forming the digital economy have been well-grounded, i.e. technological approach, process approach, platform approach and branch approach. Each of the mentioned approaches has determined and described. The digitalization as a process penetrating the casual life of people has discussed. Digitalization as a goal of development and a tool of providing sustainable development has determined.

Keywords: *Approaches to Forming Digital Economy, Digitalization, No-Sphere, Sustainable Development.*

I. INTRODUCTION

The process of development of the economy has recently determined by the process of the digital transformation of all spheres of life of people. The digitalization has become the logical consequence of working out the concept of noo-sphere that has firstly determined in science at the beginning of the last century. It was then when it became clear that the human's thought and human's mind will inevitably become the significant factors which will determine the development in the future. However, it demanded more than century finds its logical consequence in forming the concept of the digital economy, and to admit the crucial role of the digital technologies in the overall development and the people's casual life. Nowadays approaches are being substantiated in order to construct the digital economy as it has seen as the aim of development on the one hand and a useful tool of avoiding the crises of the current century on the other.

II. LITERATURE REVIEW

Problems of forming a human-oriented economy have been in the field of view of theorists, politicians and public persons within a century. Starting from the beginning of the last century when the concept of no-sphere was firstly well-grounded by V. Vernadsky [11] the researchers have been

trying to work out the concept of development which had to become a general vision of the future model of the economy. For example, the term "innovation" which became the first term in working out the concept of "information technology has firstly used by Y. Schumpeter, in his famous work "Business cycles" [2].

The model of R. Solowprovides, the patterns of economic growth, depending on the impact not only of factors of labour and capital but also on technological changes. [8] In the 1990s, the gap between the developing and the developed countries deepened significantly. This fact led to the development of endogenous theories of economic growth which included knowledge and labour factors as the main determinants of the widely developed in those times human capital category. At the beginning of the 90-s of the previous century, the concept of sustainable development had considered being the leading one in the circumstances when the anthropological pressure of humanity on the planet became threatening. All the concepts of development have been considered in the frames of sustainable development since that time on.

The concept of "digital economy" has become a logical coil in the process of producing human oriented concepts by scientists all over the world. The American scientist Negroponte, N. (1995) used the word "digitalization" in his research in 1995 has determined the mainstream of future development. He was the first to study various sides of the overall process of digitalization. [4] Today, the word "digitalization" is one of the most used words in the online content in 2019 [9] and the interest to it continuous growing.

In Ukraine, the researchers are determining the digitalization issues in different branches and sectors of the Ukrainian economy. For instance, in the research of Ostapchuk A., Alekseieva K., Artiukh T., Zorgach A., Zaburanna L. (2019) the digitalization of the agrarian sector is studied in the frames of the human development.[5] The forecast of the workplaces trends in the industrial sector of the Ukrainian economy has conducted in the research of Kozhemiakina S., Cherkasov A., Reznik N., Zhuravka O., Mazurov S. (2018).[3]

Although the value of the studying already done the general theoretical and methodological approaches to the development of the concept of the digital economy have not paid enough attention. That is why the topic of the current research has considered being relevant and actual in order to formulate the general theoretical vision of the digitalization as a process. It was decided to perform the concept in the frames of sustainable development has shown the evolution of the concept as a human-oriented one.

The most important tasks of the article are substantiation of the theoretical and methodological approaches to development of the concept of digital economy, defining the term “digitalization” in both broad and narrow meaning, showing the evolution of the concept of the crucial role of human mind from the involvement of the concept of Noosphere till the creation of the concept of digital economy in current times, determining digitalization as a goal of development and a tool of providing the sustainable development.

III. METHODOLOGY

To reach the stated goals of the research and to fulfil the formulated tasks, several widely used scientific methods and techniques have implemented. The method of analysis and synthesis has used to substantiate the theoretical and methodological approaches to the development of the concept of the digital economy. The method of induction and deduction was applied to gather information on the theoretical background of the human-oriented concepts of development and to show the digital concept as a consequence of the concepts worked out before. The method of comparison has used to compare different approaches to constructing the digital economy in current conditions. Using the method of constructing schemes has made it

possible to present the visual scheme of the research showing the evolution of the concept of the human mind in development. The method of logical conclusions has implemented to show the process of digitalization both as a goal of development and a tool of providing sustainable development.

IV. RESULTS

The mainstream of the development of the economy in the measures of the current century is its global digitalization. It has evident that the process of digitalization has become the basis for the new coil of technological development, the factor of forming the world leaders in development. Simultaneously it is the way for both developed and developing countries to improve their economic and social state. In this connection, many countries have started implementing the strategy of stimulating the development of digital technologies in order to obtain more positive results and to lessen the negative results.

The term digital economy is comparatively new in science. It has firstly used by an American computer scientist N. Negroponte (N. Negroponte) from the Massachusetts University of Technology in 1995. However, it did not become widely spread after that. Other terms have used including "Information economy", "electronic economy", "knowledge economy". Only in the year 2016, the concept of "digital economy" was internationally recognized after the release of the World Bank's "Digital Dividends" report [13]. Today the term "digitalization" is one of the most used in the world web and the one that the majority of the scientists, politicians and social leaders consciously or not touch with their attention.

There are two different definitions of the term "digitalization". In its narrow meaning, it can be determined as a variety of commercial activities for the production and sale of electronic goods and services, i.e. electronic commerce, electronic banking, electronic money, online services, information sites, Internet media and creation of entertainment and business software. All these digital activities in the digital world have provided by the production of appropriate equipment and other supporting activities.

In the full meaning digitalization of economy means the digital transformation of the whole society, the transformation of the mentality of people. The whole process of digitalization of the world economy can be compared to the process of electrification of the economy that occurred at the beginning of the XXth century in all countries of the world. It was then when electricity penetrated in households, industry, agrarian sector and trade have caused significant changes in the way economy holding and life of people.

The new economic environment that can be seen as the digital environment leads to changes in the psychology of people and the changes in their life habits. The new generation born on the edge of the centuries can be seen as totally different personalities because the virtual world is as real for them as the world itself. In approximately half a century, there will be a different society formed. However, even now, it is not easy to forecast how the changes are going to occur. It should be mentioned that digitalization in current conditions should be considered both as a new coil of development and as an answer to the challenges of the world economy caused in particular by extremely high anthropological pressure on nature within the last hundred years. Nowadays, having entered the new millennium, humanity has found itself in a situation like never before. Futurologists and philosophers, economists, politicians and geographers since the middle of the last century called to pay attention to the threat of several crises hanging over our planet, i.e. such crises as population growth, limited traditional energy sources (oil, gas and coal), limited freshwater and mineral resources, pollution of soil, water and air with substances, many of which had never existed before the XXth century (for example, pesticides and radioactive waste from nuclear plants).

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Simultaneously there are threatening political trends observed which are frequently associated with “globalization”. The main challenge of globalization is subordinating of the interests of underdeveloped countries to those who managed to get ahead. For instance, in the concept of the “golden billion," the system of relations between the developed countries and the developing ones are analyzed. The main conclusion is that the economic advantage of the developed countries enables them to exercise their influence on developing countries which in their turn possesses the role of the raw material appendage and cheap labour carriers for ensuring the prosperity of the "golden billion" of people living in the developed countries. [7]

In such conditions digitalization of the global world can become a factor of overcoming the gap between the developed and underdeveloped countries and reaching the new qualitative level of human development. It should be said that such point of view is not new at all. In the beginning of the last century Ukrainian scientist V.Vernadsky was the first to promote teachings on the transition of the biosphere into the Noosphere. The terms “biosphere” and “noosphere” do not belong to V.Vernadsky: the term “biosphere” appeared back in the XIXth century in the works of the German geologist E. Suess [11], and the term “noosphere” was coined by the French scientist and philosopher E. Leroy. However it was V.Vernadsky who assessing the role of the human mind and scientific thought as a planetary phenomenon came to the following conclusions:

1. The course of scientific creativity is the force by which a man changes the biosphere in which he lives.

2. This manifestation of a change in the biosphere is an inevitable phenomenon that accompanies the growth of scientific thought.

3. This change in the biosphere occurs independently of human will, spontaneously, as a natural process.

4. Since the living environment is organized it is a natural process of transition of the biosphere to a new phase, to a new state - to the Noosphere.TheNoosphere is a state of the biosphere in which the mind emerges as a new, unprecedented on the planet power. [10]

In the second half of the XXth century, the information society as a social, economic and cultural system became the object of attention of researchers all over the world. It was the time when the information has first considered as the leading resource of development, and the information technologies started playing a crucial role in economic and social development.

Approximately in that period, there was a shift from "human for the economy" to "economy for human". In the concept of the information society, such components as technological, economic, professional, spatial and cultural have distinguished. The technological component was related to the radical technological innovations in the production, storage and transmission of information due to the increasing speed of computers, reducing the cost of their production and, consequently, their dissemination in almost all spheres of human life. The economic component has conditioned by the progress of the "knowledge economy" or the information sector of the economy, which included education, media, production of electronic equipment, information services, research and development. The professional component of the information society was closely linked to the economic one as it emphasized a rapidly growing share of people employed in the "knowledge economy". The spatial component has connected to the emergence of information networks that were significantly changing the perception of human interaction in space and time. The cultural component lied in the changes in people's daily lives and their value orientations as a result of the rapid spread of information technology. Informational economy formed the foundation of post-industrial society in that period. In contrast, the fundamental

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difference between the information economy and all previous types of the economy became the fact that the most important productive resource there was not any more physical good, but information and knowledge. Information as a productive resource caused relative inexhaustibility (in comparison with any material resources) sources of development of the country in conditions of the information economy. As the main qualitative characteristics of information economy were determined the predominance in the GDP of the countries with information economy of products and services created in intangible branches and spheres of national economy; a significant excess of the number of people employed in the intangible sectors of economy; investments in human capital, outstripped the investment in physical capital; the socio-economic development of the post-industrial country was not any more determined only by the GDP growth rate but by many diversified indicators of quality of life of people.[1]

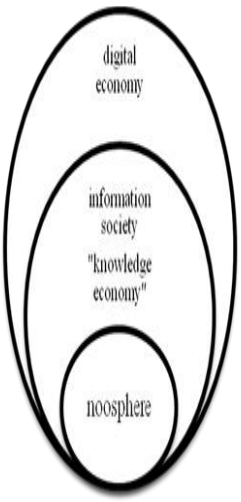

Figure 1.Structural-logic scheme of evolution of the human-oriented concepts

*Source: made up by the authors.

Within the last five years, the number of publications on the topic of "digital economy" has grown significantly, and the term "digital economy" has become among the most used in the world. The flow of materials touching different aspects of the phenomena has, however, been not correctly structured and analyzed. We can observe a variety of perspectives and opinions among scientists and politicians. There have been some attempts done to structure the available information on digital economy and they have led to forming of two directions: the actual data on the phenomenon itself ("digital economy" or empirical information) and scientific (popular science) studies on the phenomenon ("digital economics"). Of course, digital economics has directly based on the digital economy, but the development of the latter depends on developments in digital economics. Such a boom in research and discussing the essence of the digital economy can be considered as real evidence of substantial revolutionary changes in the social and economic studies of the development of economic systems. The digital economy is probably the new model of the economic system developed from other concepts (starting from the no-sphere concept, the concept of the information society, knowledge economy) and influenced by the fast development of digital technologies all over the world.

There are approaches to forming the digital economy determined by the scientists who deal with this issue in their research. [6] These are technological approach, process approach, platform approach and branch approach.

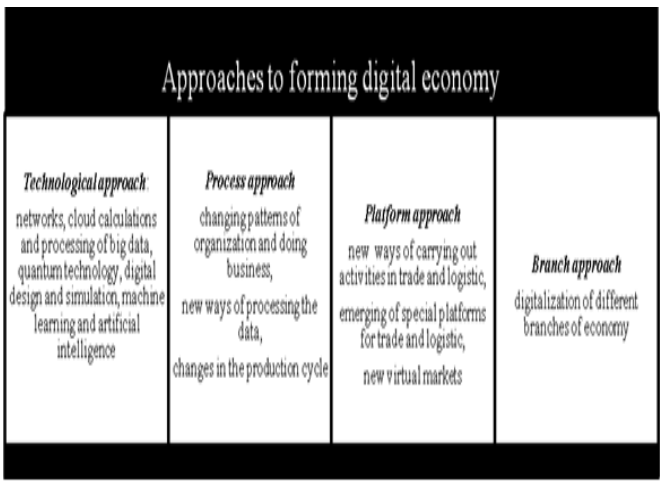

Figure 2.The essence of approaches to forming the digital economy

*Source: made up based on [6].

The technological approach implies the development of new technologies. It includes networks, cloud calculations and processing of big data, quantum technology, digital design and simulation, machine learning and artificial intelligence (recognition of speech and images, texts translation, music generation), robotics, and additive techniques. The process approach to the formation of a digital economy implies changing patterns of organization and doing business. Digital transformation enthusiasts claim that now the main factor in production is not connected to some physical means, but to the data and the ability to process it. The platform approach is being mainly worked out in the sphere of trade and logistic. Its essence is in carrying out service in the coordination of different activities of the market agents. There are such famous all over the world platforms as Uklon, Uber and Amazon, different local services which function only in their countries or represent some companies. The activities of such platforms are based on the exchange of data and stimulate the formation of new virtual markets. The branch approach to the digital economy can be determined as a new stage of technological automatization. Specialists have analyzed the current production cycle, i.e. development of some product from the idea of its production to its sales and service. It has been concluded that all existing stages can be replaced by new technological complexes, such as digital R&D centre, digital factory, digital warehouse and digital transport, e-commerce and digital services. The digitalization processes do not touch only industry but the sphere of services, public administration, science and education, medicine.

It has been already mentioned that digitalization as a process touches all spheres of life of people changing themselves, their mentality and living habits. It has evidence that digital technologies actively penetrate the casual life of people. Digitalization of certain types of activities allows implementing system projects, such as “smart home” (solutions to create intelligent security services and optimize the use of resources by households) and the “smart city” (livable city or smart city – technical and technological complexes, smart decisions on the development of urban space and the management of urban infrastructure, including the transport system, energy, water supply networks, collection and processing system waste, other public services). There are predictions of the researchers that stipulate that about 67 % of people of the world will live in urban areas. We have already got into conditions when many megacities of the world are overpopulated, and municipalities do not always cope with utilization garbage. Digital technologies provide a new opportunity for implementing the concept of the “smart city” to make inhabitants satisfied with the city services and the municipal authorities cope with the garbage problems. From this point of view, we can also raise the issue of providing sustainable development through implementing digitalization of the economy, i.e. providing the needs of people today without compromising the ability of future generations to meet their own needs. [12] Thus digitalization is not only the aim of development to meet some economic goals and raise the quality of life of people but a tool of providing sustainable development. Providing of digitalization can substantially lessen the anthropological pressure on the planet.

V. DISCUSSION

The current reality is being formed and developed in totally different conditions which have never been observed before. The changes which occur can be compared to the changes in human lives and the economy in the times when the electricity was invented and started its penetrating into all spheres and the overall changes were altering simultaneously economy and mentality of people in an irreversible way. Today we have become witnesses of the process of digitalization of economy in global measures. The digital technologies are being implemented everywhere, changing all the spheres of the economy and

providing new standards of life. The new generation of young people born within last decade is not able to imagine the world without its virtual component whereas the adults are in the efforts to adapt to the changes as fast as it is possible.

It should be said that the concept of digitalization can be considered as the developed concept of the Noosphere offered by V.Vernadsky at the beginning of the last century. It was his primary conclusion that the human mind and scientific thought will inevitably become the final stage of the transition of the biosphere, a new coil in the human's development. The concept was being researched and developed by scientists all around the world, and the economy that was being formed has seen as "information economy", "knowledge economy". However the concept of digital economy has become the new way of understanding the changes that occur by the scientists all over the world.

There are different approaches to constructing the digital economy. The most common of them which should be mentioned are the technological approach, process approach, platform approach and branch approach. All of them differ in choosing the way the digital economy should be constructed and measured, but all of them are similar in admitting the crucial role of digital technologies in the process of development.

It would be conceptually wrong to neglect the fact that the digital economy can also be seen as a tool of driving the humanity to the sustainable development in order not to compromise the future generations to meet their needs. Providing digital technologies, it becomes possible to lessen the people's ruining effect on the planet.

VI. CONCLUSIONS

So that digitalization of the economy is the mainstream of development in current conditions. It touches all countries of the world becoming at the same time, the factor of forming the leaders. The word “digitalization” is comparatively new and can be seen as a logical consequence of development by scientists of the concept of Noosphere firstly suggested by V.Vernadsky at the beginning of the last century. In the opinion of the scientist, the transformation of the biosphere in the process of its development should lead to the forming of society with the primer role of the human mind in it. The scientists of the XXth century worked out different concepts of development with a substantial role of the human mind in it. There were the concepts of "information economy", "knowledge economy", Nowadays the concept of "digital economy" is the one most widely used.

There are four main approaches to building the digital economy. These are technological approach, process approach, platform approach and branch approach. They determine the ways and imply the factors which can influence the process of digital transformation. However, all of them have in common the critical role of implementing the digital technologies into all spheres of life of people. The digital environment changes both the economy and the mentality of people; the virtual world becomes a part of reality.

The process of digitalization can also be seen as a tool for providing sustainable development. Thanks to digitalization, it becomes possible to lessen the human's negative influence on our land and to provide the needs of the nowadays without compromising the needs of future generations.

Practical implications. The results of the studying can be used as a source of information concerning theoretical and methodological development of the concept of the digital economy in current conditions.

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