

Issues of Development of Human Capital in the Conditions of Digitalization of Economy

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Abstract — The development of digital economy led to qualitative changes in the management of human capital. These changes in the last decade are in the focus of theoretical and practical research, which led to the formation of a new socio-economic paradigm. The subject of the study is human capital in a digitalized economy. The purpose of the work is the consideration of key problems for the development of human capital in the context of the digitalization of the economy. As a result of the research, the following tasks were solved: the essence of the digitalization of the economy was considered and disclosed. The main development problems are identified and social risks of human capital development are formulated in the context of the digitalization of the economy. Human capital is presented as the most important tool to increase the welfare and competitiveness of an individual and society as a whole, since today the country's welfare is growing primarily in terms of intellectual potential. Instead of quantitative characteristics, qualitative ones come to the fore, which allows increasing labor productivity and increasing the return on expended resources. As a result, the concept of human capital becomes a key to achieving the main goal – to create a knowledge economy, an information society, and increase competitiveness in the context of globalization. Despite all the visible advantages, digital transformation can exacerbate the existing inequality, in particular between people with high and low qualifications, large and small firms, as well as urban and rural regions. To mitigate the negative effects, the key factor contributing to the rational distribution of the potential benefits of transformation within the economy and society is a competent state policy. One of the ways to maintain the quality of human capital at a competitive level is a system of additional professional education, built into the logic of transformation of human society on the principles of humanism.

Keywords — *digital economy, human capital, information and communication technologies, risks, technological changes.*

I. INTRODUCTION

The emergence of the digital economy is a natural reaction to large-scale technological changes taking place in the modern world. This was several decades ago when the world entered the

digital age. The digital revolution has begun. Information and communication technologies have been developing rapidly since the beginning of the 20th century. The traditional way of life has changed, causing the formation of new industries and professions. Speaking about the process of “digitalization” (in the English version – digitization, and also sometimes digitalization) of the economy and society, first of all, it is necessary to introduce certainty into the terminology. In the broadest sense, the process of “digitalization” is usually understood as the socio-economic transformation initiated by the massive introduction and assimilation of digital technologies, i.e. technologies for the creation, processing, exchange and transmission of information.

A somewhat more complicated situation is with a clear definition of which technologies should or should not be classified as “digital” (digital technology, hereinafter – DT), as well as with what is specifically understood by the synonymous term “digital solutions”.

An active theoretical discussion on these topics is still ongoing in the research environment: as an illustrative example, we can refer to the recent online survey “Digital Economy – Towards a Long-Term Strategy”, conducted from January 12 to January 25, 2017.

An analytical center under the Government of the Russian Federation, the participants of which were offered a choice of seven alternative definitions of the basic term “digital economy” (OECD, World Bank, the governments of Great Britain, Australia, etc.). In addition, these discrepancies are compounded by a rather wide interpretation by experts and analysts of what stage of techno-economic development humanity is currently at and what technologies (or technology groups) will have a decisive influence on economic growth in the near future. Thus, the universal term “Third Industrial Revolution” (TIR) has gained great popularity, the main ideologists of which are American researchers Jeremy Rifkin and Raymond Kurzweil.

Proponents of the TIR concept, in particular, believe that the First Industrial Revolution was based on the use of coal, the Second – hydrocarbon resources, and only the unfolding Third implies the gradual introduction of a whole range of new technological solutions (including renewable / clean energy sources, composite and nanomaterials, biomedical innovations, 3D printing technologies, mass electrification of transport, etc.), which, in turn, rely heavily on the use and further perfection Digital / information technology.

A number of researchers also use a hybrid version of the "third technological ICT platform." At the same time, adherents of the alternative concept of the "Fourth Industrial Revolution" or "Industry 4.0" consider many of the TIR elements and solutions that Rifkin, Kurzweil and their followers consider as their most important components.

Digital technologies are rapidly changing the usual forms and methods of economic life around the world.

The business of not only individual companies is changing – industries, regions and entire states are changing. Digitalization is beginning to go far beyond the changes in technology itself and even in business – they become a macroeconomic and political factor.

Not only engineers, scientists and entrepreneurs, but also politicians, philosophers and public figures are trying to make sense of the changes.

Some see it as an instrument of fundamental changes in public life, while others, on the contrary and hope that digitalization will become an alternative to painful reforms. In the course of the current techno-economic wave, of which the digitalization process is a part, Russia found itself in the echelon of the pursuing countries.

If there is any plus in this position, then it is that one can take into account the experience of competitors at the forefront.

The technologies that can have the greatest impact on the economy are: artificial intelligence technologies, big data analytics, cloud computing, the Internet of things, robotics, autonomous vehicles, customized products and 3D printing, social networks and other types of digital Internet platforms.

However, in the connection with digitalization, there are risks aimed at human capital. Human capital is becoming the main asset of the state.

Not a person in general, but a person with professional competencies in the field of new technologies, able to research, able to introduce new, able to perfect the old.

This may not be one person, but a group of people who can combine and activate the competencies of individuals into a single collective intellect.

Therefore, it is necessary to form a new innovative environment focused on collective activity, to immerse a person from the school bench into it.

This should be done by all levels of the education system, all economic entities, all regions, that is, a "smart society" should be created that will use modern information and digital

technologies both to reduce manual labor and increase the share of intellectual activity, and to form a humanistic, human-oriented environment [6].

II. LITERATURE REVIEW

The processes associated with the accumulation and use of human capital, as well as with the measurement and evaluation of the effectiveness of investments in human capital, are actively studied in social, humanitarian and economic spheres. Moreover, the assessment of its economic significance for more than 60 years has remained unchanged and has not undergone significant transformation in the works of both foreign and Russian scientists [2, 5, 7–9, 14, 16–18 et al.]

The researches show that the success of organizations will depend only on intelligent employees who own information and communication technologies (ICT) and can create innovations. L.A. Rivera-Batiz, Romer P.M. proved that human capital is the main prerequisite for innovative activity, which contributes to the adaptation of technological achievements of other countries (and/or provides technological borrowing) [10, 11].

As it is shown by I. Eaton, S. Kortum, technological externalities are associated with the location of economic and research activity [3]. Moreover, F. Sbergami [15] believes that the diffusion of knowledge and technological externalities plays an important role in long-term economic growth, which is reflected in all the main models of endogenous growth. S. Jin, C. Cho made an attempt to empirically verify the assumption on panel data that the development potential of ICT affects the socio-economic development of countries, including national education [1].

The result obtained was statistically significant. Scientists involved in empirical studies of the diffusion of knowledge and human capital use the duration of fundamental education as the main criterion for its formation.

For example, P. Klenow and A. Rodriguez-Clare estimated human capital taking into account the average number of years of study, an analysis of the impact of education on earnings showed differences in earnings per employee in the form of the following components: physical capital, human capital and total productivity factors [4].

III. METHODOLOGY

Studying human capital, first of all, it is necessary to determine the terminology, the essence of the category of "human capital". Throughout its entire existence, the term "human capital" has constantly changed. Therefore, the existence of many different approaches to its study is quite natural.

The authors agree with the opinion of Nureyev R.M., who, having analyzed more than 200 years of the history of the development of human capital concludes that in this concept two approaches can be distinguished: human capital as a reserve and human capital as a stream of income [12].

According to the first approach, human capital is a specific form of capital, the bearer of which is man himself. Human capital is a combination of health, abilities, knowledge, skills,

abilities, competencies, the manifestation of which determines its labor productivity and the amount of income received in the form of wages.

According to the second approach to human capital, investments in human capital are considered not just expenses, but investments, which are characterized by return in the form of a stream of income throughout a person's life.

In the scientific literature and practice, within the framework of these approaches, there are many different interpretations of the category of "human capital"; various attempts have been made to develop a comprehensive concept.

In the opinion of the authors of this article, the most comprehensive is the definition proposed by S.A. Kurgansky. He managed to combine the above two approaches to the study of human capital. In his opinion, human capital is «a stock of knowledge, skills and other qualities that is formed as a result of investments and accumulated by individuals, which, when used appropriately, generate new value and a stream of incomes» [13].

IV. DISCUSSION

The analysis of the impact of digitalization of the economy on socio-economic development leads to the understanding of the need for society to address the following tasks.

First, the preservation of employment while increasing labor productivity. This is not only a redistribution of workers in other industries, but also a new understanding of the very essence of the work performed and the corresponding training of specialists for the real sector of the economy (for example, instead of turning parts, a modern worker should be able to program to work on numerically controlled machines).

Secondly, it is the improvement of the quality of life of society while increasing labor productivity. If the possibilities of digital economy do not contribute to the improvement of the living standards of the population, as well as the formation of the middle class, the further growth of disparity in society will be the most important obstacle to building a digital economy.

Thirdly, the inevitability of a return to fundamental education in both secondary and higher education is the only possible way to prepare society for life in the new conditions, since the very nature of employment is changing, the economy with high labor productivity is becoming more complicated, and intellectual labor is becoming more.

Fourth, it is necessary to develop a mechanism for setting the price of an information product. Traditional market mechanisms in the era of digitalization of the economy no longer work. It is impossible to ignore the property of information that is easy to copy and spread quickly, as well as the fact that, when implementing an intellectual product, it remains with both the seller and the buyer.

One of the main contradictions: the creation of an intellectual product "information-intensive", provided by the scientific potential of society, has zero costs when copying.

Fifth, it is further improvement of legislation, the implementation of institutional reforms in the country, as well as appropriate training.

In order to solve this problem, in 2017 the following programs were developed and are being implemented: the Digital Economy of the Russian Federation program and the Strategy for the Development of the Information Society in the Russian Federation for 2017–2030.

Sixth, a detailed analysis of the situation on the labor market in connection with the introduction of digital technologies and the release of part of the working population, as well as the possible extension of the retirement age.

At the same time, digital technologies will continue to change existing jobs and create new ones. Artificial intelligence will gradually begin to supplant routine intellectual work. These processes will deepen, changing not only the content of labor functions, but also the very organization of labor.

At the present stage of the digital economy, it is impossible to unambiguously assess the consequences of this process due to its enormous complexity and versatility, but as the productive forces develop and a new quality of production relations develops, we will be able to better understand what knowledge and skills will be in demand in the new economy.

However, now it is clearly possible to predict the release of low-skilled labor, since it is precisely such jobs that will be primarily automated and replaced by robots. The problem of structural unemployment as a result of the transition to the number will become relevant for both developed and developing countries.

It should be noted that, along with the release of low-skilled personnel, in the near future, serious changes in our country will also affect people with a higher education diploma and experience in various sectors of the economy.

This is due to the fact that, on the one hand, higher education in our country has acquired the character of a massive and universal; on the other hand, an increase in structural unemployment will be the result of an increase in the mismatch between the new skills presented by the digital economy and those provided by the education system at all levels.

In this regard, in the near future, radical socio-economic changes in the structure of the middle class are possible in the direction of reducing its size and increasing social instability. Technological changes are already leading to the obsolescence of a number of professions, such as: librarian, stenographer, operator, banking operator, etc. Another important factor that should affect the quality of human capital is the speed of the digital transformation of human society.

It is quite large and the digitalization process will accelerate exponentially, which in the near future will entail a shortage of personnel in new professions or a change in competencies within existing qualifications.

The transfer to digital technologies of a part of production processes will require employees to acquire new skills as the

content of their labor functions changes, and the lack of a sufficient number of workers with the right skills on the labor market will give enterprises a greater incentive to cooperate with universities that provide the possibility of additional professional education.

Thus, the formation of a new quality of human capital, corresponding to the emerging realities of a digital society, and maintaining it at a competitive level throughout the working period of a person's life, is possible only under the condition of a lifelong education system.

Higher school is faced with the most important task: not only to determine the list of new professions on the basis of foresight technology, but to identify the vector for the development of new professional competencies and create the conditions for maintaining competitive skills and knowledge of a person throughout his life, especially a working period.

On the one hand, some researchers argue that the future lies with professions in the field of computer data and information technology. Therefore, education should be directed towards the formation of professional competencies in the field of science, technology, engineering and mathematics (STEM competencies). On the other hand, the point of view is fully justified that the digital future requires a new quality of human capital based on creativity, the ability to make innovative decisions, the so-called creative person.

The formation of professional skills adequate to digital economy will certainly require more attention to the formation and development of STEM competencies.

The increasing number of opportunities to get a new job and ways to maintain an existing job will depend on the ability of workers to understand new technologies and be able to interact with them.

However, this does not mean at all that most workers will need diplomas with higher education in engineering or computer science.

However, this means that workers will need to acquire the basic foundation of digital literacy through the use of continuing education opportunities.

In this regard, it is necessary not to waste time on retraining personnel, training specialists of a new quality with STEM competencies that are in demand on the labor market, primarily in order to maintain social stability in the country.

In general, an important and difficult task now is to increase the level of adaptation of workers of all age groups to the new skills that the digital economy is demanding. The quality of skills will constantly change as the digitalization process moves to a new level of development.

In this regard, one of the ways to maintain the quality of human capital at a competitive level is precisely the system of additional professional education, built into the logic of transformation of human society on the principles of humanism.

V. RESULTS

In modern conditions, the country's leadership notes that the formation and development of human capital is the most important task in the complex of strategic tasks of effective state management of the Russian economy. Note that the concepts of "human resources", "human capital" and "human potential" used in the scientific literature have both a number of similar properties and differences.

Human capital is usually understood as the economic assessment of the accumulated knowledge, skills and abilities that a person possesses and which play an important role in increasing labor productivity and contribute to the development of new technological innovations.

It is formed through state and entrepreneurial investments, as well as self-development of the individual. The most important factor affecting the development of human capital is the level of education, network literacy and the general culture of the population.

In digital economy, various network institutional structures are being formed, including government institutions at the global, federal, regional and local levels, as well as various self-organizing network communities of the population.

Internet technologies not only quickly penetrate into politics, business, government, but also transform the nature of interpersonal relations in society (virtual online networks are formed, relations of information partnership are established, users are grouped according to certain information interests), in electronic networks the rules of the "game" are being transformed, the principles of doing business, the relationships between the main subjects of legal relations, the coordination of activities of business entities are changing evaluating To, management of companies and public administration.

The leading place in the structure of management and regulation institutions of the globalizing information and innovation economy is held by the electronic network management, regulation and control institutions, the most important of which is the electronic state (e-government).

The formation of a system of "electronic government" and the provision of electronic public services is today a priority task both in Russia and in most developed countries of the world. R. Hicks identifies three main areas of development of e-government: e-administration (e-administration); electronic interaction with citizens, providing them with electronic state services (e-citizens, e-services); development of the information society (e-society).

The development of human capital is significantly affected by the standard of living of the population. The quality of life is one of the most important indicators characterizing the level of development of the country.

The quality of human life is the most important qualitative and quantitative characteristic of the human capital of a population and includes a set of indicators that determine a person's ability to work and live in favorable conditions, the ability of enterprises to increase labor productivity and profits, and, as a result, the ability of regions and the entire state to increase GDP, etc.

The development of the human capital of the population is the task of an individual, family and state, since in the long run this will lead to the improvement of all micro and macroeconomic indicators.

In the practice of international comparisons, the “Human Development Index” is calculated annually, which includes the quantitative parameters of human capital.

In Russia, there are a number of barriers that impede the development and efficient use of human capital.

To overcome them, it is necessary to carry out a reform of the population’s incomes, which is connected with raising wages at least to the level of a living wage for all segments of the population; it is advisable to consider introducing a progressive taxation scale in Russia; it is necessary to significantly increase investments in such areas as education, healthcare, in the development of innovative sites, in network educational projects; it is necessary to create and maintain existing voluntary organizations of citizens who can interact to solve society’s problems, to concentrate, express and communicate social problems, social interests to authorities, including through social networks.

The most important direction of improving the system of formation and use of human capital is to increase the efficiency and coordination of formal and informal institutions for regulating the education sector and the highly skilled labor market.

To do this, it is necessary to reduce administrative barriers, review and change control and oversight mechanisms, make network interaction more flexible and free, which should lead to lower transaction costs and create a balance of public, private and public interests, taking into account possible changes in the social contract scheme between society and business and power in the transition to a digital economy.

The integral element of the human capital of society is social capital, which includes bridging capital, which is an institution of trust between diverse members of society; bonding capital arising as a phenomenon of trust in homogeneous groups of society.

In digital economy, a new type of social capital is emerging, which can be called social network capital (social network capital), which arises in the process of interactively distributed network interaction of participants in global, national, corporate and social networks.

The newest form of manifestation of social capital (human capital) is social networks.

The regulation and institutionalization of relations between citizens, business and government in social networks is the most important function of the modern state.

With the coordinated and constructive work of individual citizens, civil organizations, government agencies, commercial enterprises, with their equal influence on the formation and development of human capital, Russia can significantly increase its performance in this area.

Enterprises, the state, ordinary people who have the ability to influence and contribute to the development of human capital need to understand that a highly educated person who is the bearer of human capital plays a leading role in the modern economy and society.

The implementation of the goals of sustainable, dynamic innovative development of the country in the digital age depends on the standard of living of the population, innovative characteristics of specialists, their professional information and network competencies.

In the framework of Russian Digital Economy program, adopted by the Russian government in July 2017, it is planned to form a neural network education system that will train personnel with network competencies and will rely on neurocognitive mechanisms for acquiring new knowledge, using neurocomputer interfaces, virtual and augmented elements reality, hybrid intelligence.

Currently, the products and services of the neural network education market are developing in such segments as distance learning, lifelong learning, massive open online courses, blended learning, innovative models of continuing education, and by 2035 the full use of integrated systems of natural and artificial intelligence will take place.

It is assumed that in Russia the number of specialists with higher education in the field of information and telecommunication technologies will increase by 120 thousand people annually from 2024. Universities, technical schools and colleges each year will graduate another 800 thousand specialists in the field of IT. In particular, due to this, the share of the population with digital skills will grow to 40 %.

VI. CONCLUSION

Thus, in digital economy, a country's competitiveness is determined, first of all, by accumulated and developed human capital, which has diverse network and digital competencies at various levels: at the global, state, (electronic government), corporate (private companies), and individually social (social networks).

The main drivers of socio-economic development are highly educated people, quality and favorable living conditions.

Today, the Russian economic system, which is in the process of transition to a digital hyper-competitive economy, requires highly qualified specialists who are carriers of human capital, which has developed information and network properties and competencies that are adequate to the requirements of the modern digital economy.

Nowadays, it does not make sense to talk about the information society without free access to information, and this is a major socio-political problem.

Only constant, purposeful work to improve the efficiency of use of human capital will allow acquiring an additional strategic resource for development and modernization. It includes optimization of: business processes, information flows, functional responsibilities, areas of responsibility, reporting forms, etc.

However, in order to achieve good results, we need an intelligible development strategy and serious efforts to radically change the general approaches to modernizing the economy and, first of all, the reform of vocational education – the training of human capital in the broad sense of the word.

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