

Iterations of Digital Transformation of Human Capital in the Development of Economic Growth Drivers



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Abstract This article is devoted to research of potential, new discussed problems of iterations of digital transformations and their influence on human capital. The research is aimed at systematization and justification of key iterations of digital transformations of human capital in the development of economic growth drivers. Results: (1) The terminological apparatus of the concept “human capital” is revealed. (2) The main trend iterations of digital transformations, their properties and degree of influence on the transformation of human capital are considered. (3) The author’s concept of the four-level model of interrelation of building an effective model of adaptation of human capital in conditions of transformation of the nature of work is presented. (4) The neoclassical paradigm describing iterations of digital transformations of human capital, consisting of structural and logical processes influencing the growth of economy, is proposed.

Keywords Human capital · Digital economy · Institutionalization · Human development · Neoclassical paradigm

JEL Codes O15 · O17 · O33

1 Introduction

At the basis of dilemmas of all the volatility of historical iterations of human capital, models of divergence and convergence of the expanded possibilities of its realization,

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lies a struggle of interests between the introduction of new technological solutions, innovations and the wide involvement of human capital in the formation of the added value of the final product or service. The results of studies by Gomina and Mestieri [4] showed that today, on average, the deviations between countries in terms of the level of technological development reaches 42 years, which demonstrates the problem of significant differences in coherence, interaction and transformation of human capital at the interstate, global level.

2 Reference Information and Methodology

The modern point of bifurcation of world iterations of digital transformations of human capital, on the one hand, represents: fundamental and applied scientific discoveries, a level of interaction of SMART technologies and digital platforms, robotization and automation of production and service cycles, clustering of separate directions of non-typical employment including development of gig economy, a level of health and education of the person. On the other hand, it faces asymmetries of social security, insufficient flexibility of adaptive-institutional support, development of institutional isomorphism, significant differences in intercountry productivity, limited realization of labour rights, and an unbalanced system of effective management and business management. All these iterations of digital transformations of human capital caused the establishment of the foundation of scientific research and search for the connection of the congruent socio-economic environment and cognitive dissonance of social reactions, in the conditions of the development of growth of the world economy.

Theoretical and methodological basis of research is formed by the positions of economic theory, regularities of development of digital economy, international research in the field of development of human capital, scientific works of foreign scientists-economists on development of economic growth drivers.

Methodological tools used in the paper: systematic and complex approach to research iterations of digital transformations of human capital in dialectical unity with the development of growth drivers of the world economy. In the work the general scientific and special methods are used, which have allowed to define components, processes and interaction of historical dilemmas of iterations of human capital transformations and to allocate a model of multilevel effective adaptation of the human capital in the conditions of transformation of character of work are used. In particular, the methods of retrospective analysis, the system approach and the institutional-evolutionary method were used to study the formation and development of iterations of human capital transformations. In defining features and problem-solving issues the researchers used content analysis; in studying the consequences of digital transformation, robotization and automation they applied economic analysis; in the study of the state of inequality, level of education and health of human capital economic-statistical (graphic) method was used. Preparation of proposals and recommendations was carried out through system-structural method and methods of

social imitation in terms of subjective process of assessment of social deviations and society's response to them in the conditions of socio-cultural reality of the digital economy transformations.

3 Discussion and Results

The process of transformation and implementation of technological innovations has historically been accompanied by resistance and rigid dissonance of public reactions. Keynes [10] drew attention to the consequences of technology in the form of mass unemployment. In 1930, Keynes [11] said that in 100 years' time, thanks to new technologies, there would be an era of leisure and abundance. He believed that everyone would have to do something to enjoy life, but that three hours a day would suffice.

According to a sociological survey conducted in 2017 by the Center for Public Initiatives "Special Eurobarometer 460" [15], about 75% of European citizens indicate a positive perception of the introduction of new digital economy technologies as a kind of good that improves their future. The first consequent historical dilemma of the iteration of confrontation between the "man" and the "machine" lies in the search for an answer to the question: What new technological changes does human capital expect and what will they lead to on the way to forming new heights of capitalization of funds and increasing the assessment of the value of the company as one of the drivers of economic growth?

At the beginning of the twentieth century, the business model of companies' development was set within the limits of certain boundaries of their interests, and it was usually within the territories of cities and districts. Coase [3], in his scientific paper "The Nature of Companies", noted the specifics of increasing the size and scope of companies, where the basis for the expansion of production processes was provided by the factor of comparability of investments (costs) of own forces in comparison to the analogue of costs in the open market. The scale of activity of modern companies under the influence of digital transformation, globalization, international trade agreements on free trade, new information technology initiatives and other introductions of human progress have significantly changed the possibilities of business processes of companies—now they conduct operations where and when it is more profitable. Thus, the transformation of the degree of vertical integration of companies allowed more and more functions to be outsourced and freelanced. There is a second iteration of human capital transformation in the background of competitive struggle—new forms and models of doing business (including those blurred within different countries) in contrast to classical forms of functioning, new forms and models of business which are less dependent on human capital.

The founder of economic theory, Smith [14] believed that the acquisition of abilities, upbringing, training or apprenticeship, always require real costs, which are fixed capital, that is allegedly realized in the person. These abilities, being part of the state of such a person, also become part of the wealth of society as a whole.

Thus, we consider the following author's definition as comprehensively balanced, in the narrow sense: Human capital is a reasonable set of knowledge and skills, health and survivability, education and culture, which are accumulated over the course of human life and allow the individual to develop their potential as useful properties and results of development in society.

The current state of education and health of the world population has increased along with technological advances and scientific discoveries. The human assets index has changed considerably over the past forty years, reflecting significant improvements in achievements such as life expectancy at birth, including reductions in extreme forms of deprivation. The derivation of increases in global life expectancy rose to 65 years [16].

Therefore, there is a historical dilemma between the perception of iteration of the process of creating an additional product (value) at an early age by a person and his ability to develop as a full person with secondary vocational education or higher education to further develop the potential and increase the value of human capital.

Relevance of research of human capital, which possesses complex properties of an emergent system in the conditions of implementation of the concept "Industry 4.0", as well as the transformation of growth drivers of the economy, is of particular interest when considering iterations of the properties of their orderliness and self-organization, explaining the development of complex from the simple and the emergence of order out of chaos.

Today the information environment of human life is saturated with compression and acceleration of "time" and above all in the field of creation, movement and use of information. According to the report of the Director of the BRICS Antimonopoly Center voiced at the VI BRICS Competition Conference [2], in 2019 Russia ranked eighth in the world by Internet users (109.5 million users). In 2019, according to the International Telecommunication Union [8], more than 3.9 billion people, or 51.2% of the world's population, already accessed the Internet. The growth dynamics for 2019 as compared to 2015 shows a significant increase by more than 700 million new users. When researching the dynamics of changes in information flows of Internet users, the following things attract scientists' attention: analytical model of complex-system assessment, demand for hosting, reliability of web sites, popularity of sites and digital platforms in the world presented by the Russian company TAdviser [13].

The dynamics of information flows today transform the reflexion of the human being by changing their perception, consciousness and behaviour. Scientists of the world constantly discuss the problem of Internet addiction, problems of psychological reaction and manageability of a person. In 1969, the American psychologist Kübler-Ross [9] proposed a model of the human emotional state, and in 1996 the model of Weiss's adaptation process appeared [18, 19] as we see it, the search for ways and approaches to manageability and adaptability of a person in the modern society sphere is stable.

The World Development Report 2019, prepared by World Bank staff [17], notes the complexity of adapting a new generation of workers to the jobs, as they, above all, require specific social protection programs at the state level. Globally, only 2 out

of 10 people in developing countries receive social assistance and only 4 out of 10 work under health insurance guarantees.

One of the protection trends is the establishment of a social protection floor sufficient for the society to enable a person to receive assistance regardless of employment status. In this case, the effectiveness of the social protection system can be improved by extending its overall coverage in order to include, first of all, those members of society who need it most, and by increasing the role of state participation in socially significant projects, for example, through proactive budgeting.

To develop maximum benefit to society in an era of discovery and technology development, a new socially oriented convention is required, in which the fundamental element is to increase investment in human capital and to work in a phased, systematic way to create social protection. Against the backdrop of the growing need to create a soft “airbag” in new jobs, the transformation of the components of human capital requires greater authority on budgetary rules of administration and compliance with modern challenges of an insufficient tax base, large-scale shadow schemes in the economy and inefficient control over budget spending.

Let us consider some distinctive features of a modern stage of digitization and a condition of a technological paradigm objectively influencing formation of digital economy with increase of certain degree of synergy effects in the field of the human capital:

(1) First of all, digital platforms, trading platforms are new business management models (platform models) characterized by blurring the boundaries of the company, successfully competing with outdated models of local production. The positive point is the process of activating digital platforms, which allows to increase the growth of efficiency indicators in the world with much less investment in material or human resources. The negative point is the virtual orientation and location of business model production assets, which affects three categories: confidentiality, competition and taxation. Influence on the human capital by changing the demand for work skills increases the value of cognitive skills of the highest order. It also changes the perception of investing in human capital with three components: cognitive development, social behavioral skills and a set of skills that predetermine adaptive capacity. Governments that are in the transition to a technological shift that is changing the nature of work are seeking to invest in human capital as the only right solution to a mass of uncertain factors in the future environment. Table 1 presents data on the main processes of interaction of all elements in the transformation of the nature of work.

There are different levels of impact on adaptation measures of key elements of human capital in this model. This statement is based on the theory of social simulation in terms of the subjective process of assessment of social deviations and reactions of society, as well as taking into account the properties and characteristics of the methodology of the index of human capital.

(2) Secondly, changing demand for low-skilled (simple) labour of a worker—new technologies displace and change (reduce) the need for those skills that can be replaced by advances in technological evolution: automation and robotization.

Table 1 Level relationship of the main construction parameters of an effective model for adapting human capital to the changing nature of work

| Transformation level | Order of levels | Adaptation measures | Up-to-date human capital index track |
|--|-----------------|--|---|
| 1.Goal | | People in demand, competitive markets, new socially oriented contract Hlt ↑ Ed ↑ S ↑ Hlt ↑ Ed ↑ S ↑ Hlt ↑ Ed ↑ S ↑ | Health (Hlt) Education (Ed) Survivability (S) |
| 2.Social integration | | Efficient service procedure, fair taxation, inclusive business model management Hlt Ed S Hlt Ed S Hlt Ed S | |
| 3.Politics | | Investments in human capital Importance of social protection Transparent model of revenue mobilization Hlt ↑ Ed ↑ S ↑ Hlt ↑ Ed ↑ S ↑ Hlt ↑ Ed ↑ S ↑ | |
| 4.Consequences of the introduction of new technologies | | Changes of skills Establishment of fair social guarantees New business management models, platforms Hlt ↑ Ed ↑ S ↑ Hlt ↑ Ed ↑ S ↑ Hlt ↑ Ed ↑ S ↑ | |

An increase in demand for cognitive social behavioral skills and the tendency to reduction of demand on low skilled workers on labour markets are considered to be positive changes. However, the situation with increased competition between man and machine, where flexibility and speed of adaptability to changes will be decisive factors in time, is considered negative. Therefore, the spillover of human capital (labour migration) from one labour location to another according to a number of criteria will increase, which will lead to different forms of related negative side effects associated with skewness (oversaturation, urbanization, conglomeration) in ensuring social security of people. Influence on the human capital is expressed in the following way: skills for complex problem solving, teamwork, and development of logical thinking will change the requirements for development, primarily intellectual values in a person, rather than physical capabilities.

A wide range of forecasts suggests that it is difficult to assess the impact of technology on employment. Most estimates are based on automated probability calculations by machine learning experts at Oxford University’s Blavatnik School of Government [12]. Specialists in 2018 were asked to evaluate a sample of 70 occupations in the online database of O*NET occupations used by the U.S. Department of Labour, from the point of view of whether or not they were fully automated.

(3) Thirdly, robotization [7] as a process of transformation of automated processes into a more complicated, complex algorithm of operations per unit of time will significantly change the attitude to productivity and cost of production. Based on the scientific discoveries of American scientist Ashby [1], it can be noted that the introduction of robotic processes of machine learning in the economies of countries has already started. According to the International Federation of Robotics [6], Figs. 1 and 2 provide information on the dynamics, volume and trends of the robotics market in the world. The dynamics of the presented information testifies to the rapid growth and huge potential of this area, which should create new conditions and opportunities for human development.

The positive aspect lies in the fact that optimization of factors and means of production, intensive way of increase of production capacity and active support of development of robotization will lead to improvement of quality of performed works, productivity, exclusion of the human factor and change of structure of the workers occupied in industrial (dangerous and harmful) branches of digital economy. The negative aspect consists in the absence of a new socially oriented contract, a soft

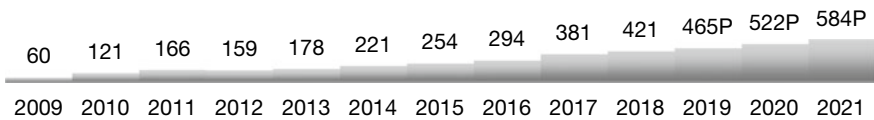


Fig. 1 The dynamics of installed industrial robots in the world for 2009–2018 and forecast for 2019–2021, thousand units

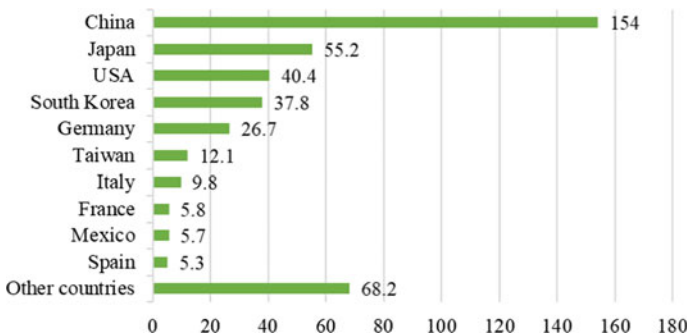


Fig. 2 Top 10 countries in the world for the implementation (installation) of industrial robots in 2018, thousand units

“airbag” in new workplaces during the transformation of human capital components will lead to mass unemployment.

(4) Fourthly, the existence of low-productive labour, in the informal sector of companies whose access to new technologies is limited. According to ILO [5], over the last decades unreported employment has remained high (over 60%), even with the improved requirements of the regulatory environment for the introduction of business.

The impact on the human capital is expressed in changing demand for labour skills, increasing the value of institutional regulation, transparency and accessibility in resource redistribution.

(5) Fifthly, modern technology and, in particular, social networks, affect the perception of growing inequalities. In an effort to improve the quality of life, people take an active part in the economic growth of the state. Thanks to social networks and other digital means of information exchange, a person can compare various and often fundamentally different lifestyles and opportunities of people (from different states, social classes, etc.). Where aspirations are combined with opportunities, there is an enabling environment for sustained economic growth that benefits all segments of the population. But where there is inequality of opportunity or a mismatch between jobs and skills, frustration can lead to migration or fragmentation of society.

4 Conclusion

Human capital from a methodological perspective is viewed as a systemic, multi-level phenomenon, accumulating a set of knowledge and skills, the level of health and state of survivability, the quality of education and the position of culture throughout human life, allowing a person to develop his or her potential as useful properties and results of development in society. Thus, the formed author’s review of positions of iterations of digital transformations of human capital in dynamics of development of growth drivers of economy, and also the four-level model of interrelation of the basic parameters of adaptation of human capital in the conditions of transformation formed by the author’s team allow to form author’s neoclassical paradigm of the description of iterations of digital transformations of human capital consisting of structural and logical processes. The author’s scheme (Fig. 3) of neoclassical paradigm of iterations of digital transformations of “human capital” and interaction of processes causing efficiency of human saving as a complex process which is formed under the influence of technological, digital, political, educational, physiological, social-economic, cultural and social-ethical factors of quality of his or her life is formed.

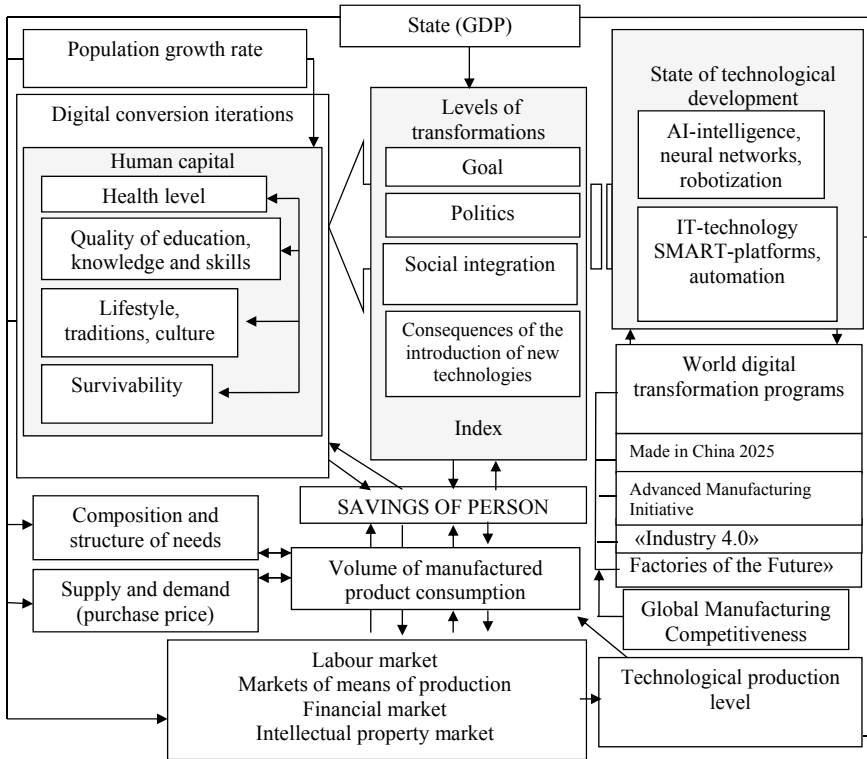


Fig. 3 Neoclassical paradigm of iterations of digital transformations of human capital

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