

# Human Capital in Sustainable Development of the Information Economy: Euphoria and Reality

Elena V. Krasova <sup>a</sup>

*Department of Economics and Management, Vladivostok State University of Economics and Service, 41, Gogol street, Vladivostok, Russian Federation*

**Keywords:** Human Capital, Information Economy, Sustainable Development, Information and Communication Technologies, Technological Euphoria, Criticism of Post-Industrialism, Labor Productivity.

**Abstract:** The article is devoted to understanding the role of human capital in the context of sustainable information economy development. The subject is very relevant and widely discussed in the world scientific literature. There are some main approaches to human capital's role defining: they are based on technological euphoria, alarmism and study of real trends in economic development. A significant difference in the approaches does not allow scientists and practitioners to find a general view on human capital's future and suggests completely different consequences and responses. The purpose of the research is a critical reflection on the human capital's role in the modern steadily developing information economy in the context of multiple approaches and opinions. The author identifies the prerequisites and factors of the human capital theory development, determines real trends in the information economy development and concludes that the euphoric and alarmist approaches to human capital are unusable.

## 1 INTRODUCTION

Modern science inextricably links the economic growth with technological development. A human being with his intellectual potential, knowledge, skills and competencies is a source of technology development. Many scientists and specialists, inspired by sustainable information and communication technologies (ICT) development and giant leaps in the IT companies' capitalization, truly believe in great perspective in transforming reality. They regard a rapid growth in labor productivity in all fields because of the interactive technologies expansion, total digitalization and robotization. Based on works of economists and sociologists of the second half of the twentieth century – Daniel Bell, Alvin Toffler, John Galbraith, Peter Drucker and others, these scientists talk about fundamental changes in socio-economic relations, lifestyle, work, rest, i.e. in all spheres of social life and consciousness. In the centre of these changes, there is a human. These changes are justified by them in the context of our civilization's movement to the Sixth technological cycle, the 4.0 Industrial revolution.

Technological euphoria accordingly changes the attitude towards people and human capital. Some experts view human capital as a leading factor in scientific and technological progress, the main driver of economic development (Hu, 2021; Novikov, 2009; Koren et al, 2020). «The foothold of a new economic structure based on ICT is intellectual activity, pushing into the background the instrumental and machine production of material goods» (Abdikeev, 2014). «Labor is becoming more and more intelligent, innovative and creative», manufacturing turns into brainfacturing (Shirinkina, 2019). Science and education as intellectual structures «will dominate industrial production, agriculture, construction, etc.» (Rakitov, 2018). Moreover, some scientists predict that an era without work, an era of wealth and enjoying life is coming soon. The era is expected to give each person the opportunity to reveal his best creative abilities (Hines, 2019; Campbell, 2019).

The other specialists on the contrary have an alarmist opinion. The main problem for them is reduction of jobs as a result of digitalization, robotization and the Artificial Intelligence (AI) intrusion. Mass structural unemployment, people'

<sup>a</sup> <https://orcid.org/0000-0001-7847-0385>

inability to work in a «digitalized economy», inefficiency of the existing education system, mutation of personal characteristics for many people are the main economic and social disasters that the developed and developing countries may face in the near future (Domini et al, 2020; Brynjolfsson and McAfee, 2014; Pitaikina and Vlazneva, 2018). «The question about a conflict of interests between human capital and AI remains unresolved. As well as the risk of forthcoming society in which there is no place for human capital seems very high» (Gorodnova et al, 2019).

The third group of scientists investigates the processes of ICT development and the role of human capital without euphoria and alarmism. They speak cautiously about changes and make their arguments on data analysis, not on assumed opportunities or threats. They are critical of the most established concepts and popular theories, which seem to be beyond any doubt. About 70 years have passed since the beginning of the information revolution, and our days can be called a good moment in order to draw correct, adequate conclusions about the actual dynamics of the techno-economics and the human capital's role in it.

## 2 RESEARCH METHODOLOGY

The purpose of the research is a critical reflection on the human capital's role in the modern steadily developing information economy in the context of multiple approaches and opinions. The research objectives that reveal the purpose are identifying the prerequisites and factors for the human capital theory development, determining the real trends in the information economy development, substantiating the author's opinion about the human capital's role.

The methodological basis of the research includes the theses of classical economic theory, the human capital theory, the information economy concept, and a number of related theories. The research is methodologically based on general methods of scientific analysis, including systematization, generalization, abstraction, analogy, analysis and synthesis. The article uses the concepts system by modern science in the context of such categories as human capital, sustainable development, ICT, information economy, digital economy, production, post-industrialism and others.

## 3 THE RESEARCH RESULTS

The active development of the human capital theory as an independent research program fell on the Fifth technological cycle period. In developed countries, there was a scientific and technological breakthrough, called later the information revolution. A high volatility of consumption, income and employment under the capitalism was also observed. The ICT progress has significantly changed both production technologies and the consuming structure in modern society, lifestyle, and views on economic growth sources. The main signs of the information revolution are automation of production processes, new products and services emergence, new fields of economic activity. A number of USA economy researchers believe that the most of productivity dynamics in the United States in the twentieth century was caused just by ICT as key technologies that formed a basic innovations cluster in developed countries.

The development and commercialization of inventions in the ICT field, made in the 1950s-1960s, took a long time for education and training of both the ICT developers and the ICT users. The training period coincided with a pause in rates of productivity growth in the 1970-1980s. However, the results of the training were clearly seen in the second half of the 1990s, when the ICT efficiency had increased sharply, and the period of computerization and Internet expansion around the world had begun (Greenwood and Yorukoglu, 1997). Western scientists had reasons for expanding the fields of knowledge, justifying the mechanism of human capital's inclusion into socio-economic development models.

The ICT has significantly changed the nature and structure of industrial and social relations, so «a post-industrial society» had been become widely talked about. The post-industrial society (economy) is usually understood as an economy with dominant high-tech sector with high labor productivity and a relatively high share of the service sector. Forming and establishing the post-industrial era is a controversial and debatable question. Nevertheless, the restructuring of the Western countries' economies, and then the Eastern European countries' economies, towards service branches, was definitely equated to post-industrialism onset. This fact fastened human capital with information technology development.

As a base for explaining such connection, the hypothesis about wide use of workers' knowledge, skills and competencies in value creation process through the innovative ideas application to the

production process is considered. The popular American futurist Alvin Toffler wrote that such traditional factors as land, labor, and capital were giving way to another key factor – knowledge. Knowledge is a factor in the global powershift. The knowledge database is being revolutionized, and advances in different fields of knowledge, far from the politics, are in fact inextricably linked to today's geopolitical explosions (Toffler, 1990). American sociologist Lewis Mumford even challenged the materialist dialectic, when said that throughout human history humanity had had more essential needs than just getting food. The needs had been based on human brain capabilities and associated with human self-identification. The domination of manufacturing over all other human activities is nothing more than a distorted view on history and on ourselves (Mumford, 1967).

John Galbraith outlined his vision of a new industrial society as a key idea of transition in the production sphere from the power of money to the power of knowledge (Galbraith, 2004). Peter Drucker picks out the increase in productivity of intellectuals who produce knowledge, ideas, information as a key factor in socio-economic development (Selections, 2004). Spanish sociologist Manuel Castells writes that information transforms the production process, makes to improve technologies, knowledge and management on the base of the technologies, knowledge and management. This circle increases the productivity and efficiency of the economy (Castells, 2009). Many modern economists talk about the information society as a kind of the most acceptable version of the post-industrial society for today. In the society, most of the workers are engaged in production, storage, processing and sale of information, especially its highest form – knowledge.

Thus, knowledge and professional competencies are reviewed as a productive resource, capital in economy that creates, distributes and uses knowledge to ensure its growth and competitiveness. «Knowledge enriches all industries, all sectors and all participants in economic processes», takes the form of «scientific and various high-tech products, innovations, highly qualified services, education and competencies» (Abdikeev, 2014). At the level of international organizations, we can hear that information and knowledge are the centre of sustainable economic growth and development, and the ability to produce and effectively use information is becoming a vital skill for many people. In economic science such concepts as «information economy», «innovative economy», «knowledge economy», «intellectual economy», «neo-industrial

economy», «cognitive economy», «creative economy», etc. have become widespread. In the context of these ideas, the only way to move towards the knowledge economy is human capital as a complex of this knowledge and competencies.

Another aspect of relationship between information economy and human capital is the development of consumer values and consumer culture because of mass production and increase of goods assortment in the twentieth century. A human with his knowledge and competencies is not only a subject of industrial relations, but also an active consumer. According to the needs raising principle, the more educated a person is (the more knowledge and skills he has), the more his needs raise and become more complex, and the more active he demands goods and services. In practice, it is already difficult to distinguish between a producing person and a consuming person: the satisfaction of some needs determines the emergence of others. G. Ford wrote, «Labor is more a buyer than a seller», (Ford, 1926). Lifestyle, wealth level, environment and much more are formed not by social group, not origin, not age, not living place, but level of education, social and professional environment.

We can say that the external, material content of life depends mainly on the internal content, which is reflected by the level of human capital's development. We began to see it clearly in the informatization period. American political scientist, famous researcher of post-industrialism Zbigniew Brzezinski wrote, «The changes brought about by communications and computers greatly contribute to the connectedness of a society whose members are in continuous and close auditory-visual contacts, constantly interacting, participating in intense social trials». Brzezinski supposed that the post-industrialism was a society, which culturally, psychologically, socially and economically had been formed under the technique and electronics affect (Brzezinski, 2007). Such view made to strengthen the correlation between the human capital theory and the knowledge economy concept.

The third important aspect of the human capital theory development is the socio-psychological one. The possibility of almost complete satisfaction of primary needs opens up the potential for secondary needs implementation. Development of some or many human capital components furthers the growth of self-respect, love and favor of others, self-realization, i.e. everything that meets the «enjoying life» concept. The psychological nature of the human capital theory popularity has to be discovered later, throughout the 21st century. However, already today an exciting idea

about human mind's priority over machines, about human as a main subject of economic relations and economic development, gives the human capital theory a true charm. At the same time, the strict scientific analysis of the «capital» holders' living realities is moved over to the background.

#### 4 THE RESULTS DISCUSSION

It is paradoxically, the variety of concepts and views that characterize the new quality of socio-economic relations did not make to clarify and define the human capital's role in the modern economy at all. The emphasis on information and knowledge, the desire to highlight the intellectual, non-material component of economic development led to a bias in the study of resource structure, to unreasonable underestimation of the industrial base of society. On the background, the number of utopian and alarmist publications devoted to humanity's future has significantly increased in the world scientific literature. They do not take into account the real trends and problems as a rule. Therefore, after a long period of «information», «technological» euphoria today is the right moment to criticize the post-industrial ideas.

Contrary to post-industrialism concept conclusions, the importance of industrial production does not fall at all. According to the World Bank data, the share of industrial production in the total world GDP in 1995 was about 32%, in 2015 – 25%, in 2020 – 30%. Average annual growth rates of world industrial production for 1998-2017 were just slightly lower than the world GDP ones: 2.96% versus 3.49% resp. (World Bank, 2020). Russian scientists' calculations for 2000-2019 show that number of industrial workers in the world has increased by 35% and share of industrial workers in the total number of workers has increased from 21.2% to 22.85% (Pavlov, 2020). There is the highest concentration of working technologies as well as effective organizational systems in industrial production, since the approbation and commercialization of innovations take place mostly in industry. We can see it in the fact that the share of industrial production in GDP in many countries exceeds the share of industry in the total number of employed (FSSS, 2020; Tsareva et al, 2017).

We challenge the conclusion of the intellectual economy (or knowledge economy) followers about due reduction of material production and material assets because of ICT development and digitalization. In the heart of Toffler-Drucker society there is an intellectual who does not dig holes or sew shoes.

However, even the most intelligent person lives in a house and wears clothes. This means that someone is building the house, and someone is sewing the clothes. The intangible component cannot exist without a material basis, regardless of technology development level. Moreover, the more refined the technology is, the stronger material base should be. Just imagine that ultra-modern expensive software cannot function if you turn off the computer's power.

Let's turn to statistical analysis. The digital technologies have been used in business models of different companies already more than 50 years. Data for 50 the most innovatively developed countries of the world do not show any significant correlation between innovative development level and industrialization level of the countries (Figure 1).

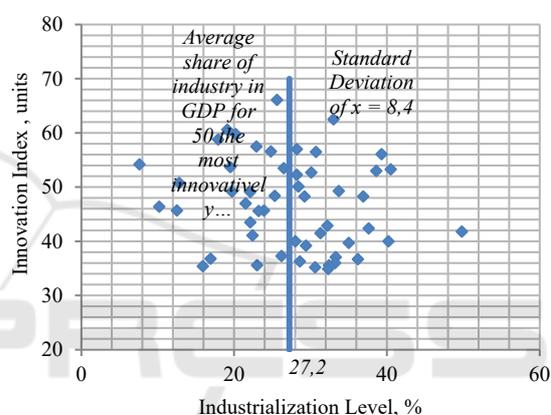


Figure 1: Innovation Indices and Industrialization Levels for 50 the most innovatively developed countries in the world, 2020. Sources: UNDP; World Bank, 2020.

Also we can see a weak correlation between human development index and industrialization level for 50 countries with the highest human development index (Figure 2).

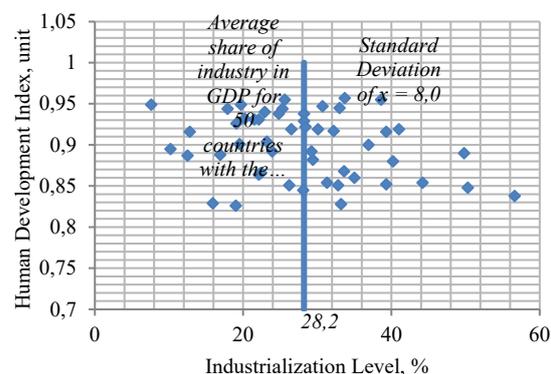


Figure 2: Human Development Indices and Industrialization Levels for 50 countries with the highest human development indices, 2020. Sources: UNDP; World Bank, 2020.

Data presented above let make a conclusion that development of innovation and human capital does not necessarily lead to reduction in material production. High indicators of innovations and human capital development can be achieved both in industrial economy and in non-industrial one. Industrialization level is a stand-alone indicator, which depends first on the resource base and production specialization of the country. Besides that, while speaking about the reduction in industry share in some developed countries (for example, the United States), we should take into account the relocation of industry outside the country borders, in particular, to Asian countries, as well as the measures to protect intellectual property, which significantly inflate the value of intangible assets in the USA economy.

Concepts «postindustrialism» and «knowledge economy» are some of the most deeply established and at the same time some of the most controversial. We must notice knowledge is the base of any economy: human invented the cart, the steam engine, and the internal combustion engine with knowledge of the nature laws. The difference is that by the end of the twentieth century in some high-tech industries, knowledge has become not a unique, but flow product. It is created and used simultaneously and constantly in the production process. Information and knowledge circulation leads to their rapid obsolescence and need to obtain new ones in order to maintain and/or increase the labor productivity. So, intellectual should learn all his life and it automatically leads to human capital spheres development, first of all education and vocational training. Does it mean a new stage of civilization development called the knowledge economy? Or is it just a change of technological landscape on the background of the same historical form of the society organization?

Today we do not consider informatization as a source of threats or unclear perspectives that go beyond the scientific vision. The sustainable ICT development does not mean forcing economic growth yet. Knowledge and competencies creation does not guarantee their effective application. Practice proves it. «Now we are not seeing neither a sharp acceleration in labor productivity (very likely, the situation is exactly the opposite), nor radical breakdown of usual people lifestyle. The subject of discussion is not so much real as expected situation. No one can be sure whether it will come or not» (Kapeliushnikov, 2017).

Let us study labor productivity (GDP per person employed) in the world in dynamics for 1960-2018. We can see the diverse dynamics: the highest rates of

productivity growth (1.9%) were recorded in 1960-1973, then 1.6% – in 1974-1991, 1.8% – in 1992-2007, and 0.8% – in 2008-2018 (Figure 3).

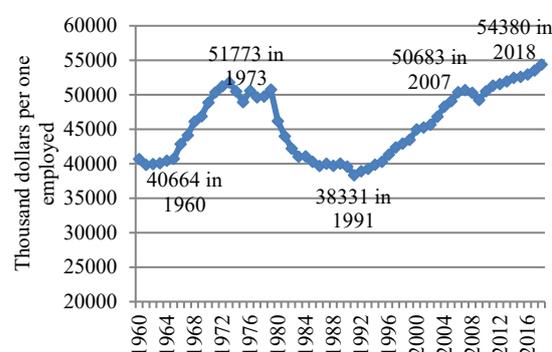


Figure 3: Labor productivity dynamics in the world economy, for 1960-2018. Source: Labor, 2020.

The reasons for the global slowdown in labor productivity are discussed in scientific literature. The most reasonable is the version about a significant reassessment of ICT in non-manufacturing, intermediary and consumer sectors – trade, marketing, finance, entertainment, social networks, etc. The capitalization of IT companies is growing, mainly due to the sale of services, which helps to attract and serve customers. Mobile phones and other gadgets surround modern people to save their personal time and energy. At the same time, in people consciousness there is a frequent substitution of knowledge effectiveness signs with consumer informatization signs. The last is a special market segment where consumers demand goods that simplifies communicating and searching information.

Largely the ICT are «useless for solving humanitarian, social, and environmental problems. They contribute to the technological progress just a little» (Buzgalin, 2018). Today the consumer component of human capital is the main source of profit creation for large transnational corporations. As for Russia, according to some scientists, there is a «trend to return to an extensive growth model, when labor productivity contribution to the added value decreases» (Smorodinskaya et al, 2019; Andreev et al, 2020). As a result, there is no need to train highly qualified personnel, since «the existing economic model is based on the reduction of labor to the simplest forms and operations (underdeveloped human capital)» (Grechko, 2016; Trofimenkova, 2018).

## 5 CONCLUSIONS

We can answer those who adhere to euphoric view the following. «Humanity has met the XXI century with highly developed, but skewed production forces, which unable to create a material basis for overcoming poverty for billions people» (Buzgalin, 2018). It could hardly talk about a society without labor, about a free creative people's activity in the condition of global poverty problem, expansion of territories with anthropogenic environmental disasters, and significant differentiation of countries by the economic development and human capital level. Rather, we can talk about an increase in dependence on computers, software and various kinds of information services, about the uneven distribution of labor intensity between professions, about the convergence of work and personal time, about high intellectual and psycho-emotional overloads while working with huge mass of information. The work content is changing rapidly, however, the behavioral mechanisms, the organization of human activity remain the same.

Alarmists expecting a massive expansion of technological unemployment should take into account the declining labor productivity growth rates and their generally limited impact on the dynamics of labor demand in the medium term. There is no «robotization of human», no «inclusion of robots in our everyday reality», no «artificial substitutes for human capital in everyday life», no «crossing of info-, nano-, bio-, cognitive technologies all over the humanity» as some authors write (Gorodnova et al, 2019). There is neither substitution of workers for robots on conveyors, nor substitution of accountants and secretaries for information systems, as some write (Shirinkina, 2019). Technological euphoria seriously affects the ability to think critically. This is especially clearly presented in the Russian scientific literature.

Leading scientists note that unlimited development of human needs is the main factor of the sustainable employment growth in the long term. «As long as some people needs are still unsatisfied, there will be no shortage of jobs. Total substitution of people for machines can be imagined only in a situation of complete saturation, i.e. in a world where there is no problem of limited resources» (Kapeliushnikov, 2017).

## REFERENCES

- Abdikeev, N.M. (2014). Knowledge-based economy and innovative development. *Finance: Theory and Practice*, 5 (83): 16-26.
- Andreev, V.A., Varkulevich, T.V. and Sultanova, E.V. (2020). Does Russia overcome the processes of capital flight economy? *International Journal of Management*, 11(5): 160-169.
- Brzezinski, Z. (2007). *The Choice: Global Domination or Global Leadership*. The publisher: International relationships. Moscow, 288.
- Brynjolfsson, E. and McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. New York: WW Norton & Company.
- Buzgalin, A.V. (2018). The late capitalism and its limits: the dialectics of productive forces and production relations (to the 200th anniversary of the birth of Karl Marx). *Political Economy Issues*, 2: 10-38.
- Campbell, J. (2019). Questions with regard to work. *Ideas and Innovations*, 7(1): 27-33.
- Castells, M. (2009). The Information Age: Economy, Society, and Culture. *The Rise of the Network Society*, 1: 656.
- Domini, G., Grazi, M., Moschella, D. and Treibich, T. (2020). Threats and opportunities in the digital era: Automation spikes and employment dynamics. *Research Policy*, 104137.
- FSSS – Federal State Statistics Service. International comparisons. URL: <https://rosstat.gov.ru/incomparisons>.
- Ford, H. (1926). *Today and Tomorrow*. The publisher: Doubleday, Page & Company. Garden City, New York City.
- Galbraith, J.K. (2004). *The New Industrial State* (1967). The publishing house AST. Moscow, 608.
- Gorodnova, N.V., Skipin, D.L. and Rozhentsov, I.S. (2019). Application of Smart technologies: assessment of the impact on human capital development. *Creative Economy*, 13(10): 1837-1858.
- Grechko, M.V. (2016). Human capital as part of the neo-industrial model for development of domestic economy: significance, inconsistency, discontents. *Financial Analytics: Science and Experience*, 33: 16-36.
- Greenwood, J. and Yorukoglu, M. (1997). 1974. *Carnegie-Rochester Conference Series on Public Policy*, Elsevier, 46 (1): 49-95.
- Hines, A. (2019). Getting ready for a post-work future. *Forsajt*, 13(1): 19-30.
- Hu, G.-G. (2021). Is knowledge spillover from human capital investment a catalyst for technological innovation? The curious case of fourth industrial revolution in BRICS economies. *Technological Forecasting and Social Change*, 162: 120327.
- Kapeliushnikov, R.I. (2017). Is technological change a devourer of jobs? *Voprosy Ekonomiki*, 11: 111-140.
- Koren, A., Bondarenko, T. and Pustovarov, A. (2020). Human wellbeing as the main factor of economic growth. *Universidad Y Sociedad*, 12(5): 172-177.
- Labor productivity. *Information and Analytical Portal by Business Analyst Alexey Kolokolov*. URL: <https://alexkolokolov.com/laborproductivity>.

- Mumford, L. (1967). *The Myth of the Machine. Technics and Human Development*. The publisher: Harcourt Brace Jovanovich. San Diego, 1: 352.
- Novikov, A.M. (2009). Transactions in a company of knowledge. *Vestnik of Moscow State Agroengineering University named after V.P. Goryachkin*, 5(36): 9-13.
- Pavlov, M.Y. (2020). Noonomy, postindustrial economy and industry 4.0: comparison and contrast. *Economic Revival of Russia*, 2(64): 152-162.
- Pitaikina, I.A. and Vlazneva, S.A. (2018). New quality of human capital formation under digital economy conditions. *Economic and Law Issues*, 121: 39-44.
- Rakitov, A.I. (2018). Higher education and artificial intelligence: euphoria and alarmism. *Higher Education in Russia*, 27(6): 41-49.
- Selections from the management works of Peter F. Drucker* (2004). The publisher: The Williams Publishing. Moscow. 432 p.
- Shirinkina, E.V. (2019). Human capital and the labour market in the digital development of the Russian economy. *Russian Journal of Labor Economics*, 6(1): 103-112.
- Smorodinskaya, N., Katukov, D. and Malygin, V. (2019). Shumpeterian growth theory in the context of the innovation-led transition of economies. *Journal of Institutional Studies*, 11(2): 60-78.
- The World Bank. Open data. 2020. URL: <https://blogs.worldbank.org/opendata/>.
- Toffler, A. (1990). *Powershift: knowledge, wealth and violence at the edge of the 21st century*, The publisher: The Bantam Books. New York. 585 p.
- Trofimenkova, E.V. (2018). Main factors and reserves of labor productivity growth in agricultural enterprises of the Smolensk region. In *International Scientific-Practical Conference «Agrarian Science in the 21st Century: Problems and Prospects»* Proceedings. The publ. Saratov State Agrarian University, pages. 624-628.
- Tsareva, N., Vlasenko and A., Kololokova L. (2017). Actual questions of human resources management. *Turkish Online Journal of Design Art and Communication*, 7: 1208-1218.
- UNDP – United Nations Development Programme. Human Development Reports. URL: <http://hdr.undp.org/>.