

Human capital as socio-economic phenomenon of the innovation society: prerequisites of formation, essence and structure

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Abstract. Prerequisites of formation of human capital as socio-economic phenomenon in the innovation society are analyzed in this article on the basis of complex methodology that integrates methods of social philosophy, economics, sociology and socio-philosophical anthropology. The authors came to the conclusion that these prerequisites are the following: technologization of achievements in the field of basic sciences and lending innovation-technological, economic-commercial, administrative, innovation-personal functions to sciences. The basic provisions of the theory of human capital are investigated, and its essence and structure is justified in the paper. The authors show that this is cognitariat or social groups ensuring the formation and constant development of the scientific-industrial-technological segment of the innovation economics on the basis of implementation of innovation that is the subject of human capital. Possibilities and perspectives of utilization of human capital for solving tasks of improving productivity and profitability of production in the digital economics are also justified.

1 Introduction

On the edge of the 21st century in the framework of modern technogenic civilization, a new type of society has begun forming, with technology and knowledge as its fundamental resources. These resources are embodied in social institutions and represented by people. On this reason, as the American sociologist Daniel Bell believed, it can be called “a knowledge society” [1]. Gradually, a concept of “the innovative society” was established» in social sciences instead of the concept of “knowledge society,” since innovations were recognized as the drivers of its development, and innovation potential of human capital, the carriers of which are the subjects of high-tech production that is formed in the situation of the fourth industrial revolution, is becoming its source. *The purpose, the object and the subject* of this research are identification of prerequisites for the formation of human capital and determining its essence and structure as a key resource for the development of productive forces of the innovation society in the situation of the fourth industrial revolution.

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2 Problem Statement

The problems analyzed in this article are the following: 1) prerequisites of formation of human capital; 2) basic provisions of the theory of human capital; 3) research of the essence and structure of human capital; 4) implementation of human capital in the situation of digital economics. The authors consider human capital as a socio-economic phenomenon integrating creative capabilities of the subjective side of productive forces of social production that is being formed in the conditions of the 6th technological order. This order is based on the convergent SNBIC and NBIC technologies [socio-, nano-, bio-, info-, cogito- convergence], which are the results of the intellectual, innovative-constructive and creative-transformative activity of innovators – the creators of the new socio-technological reality of the 21st century. By the Academician V. S. Stepin, the creative potential of innovators is formed on the basis of post-nonclassical type of scientific rationality determining integrity of subjective and objective in formation of fundamental knowledge, technologization of which created the fourth industrial revolution. The key role of the intellectual-creative potential of these specialists at the level of the organization and functioning of the innovation economics allows considering them as human capital of the organization and equal partners of the owners of the fixed assets of industrial enterprises.

3 Research Questions

The analysis of the object and the subject of the research are the research questions in this article. The *object* of the research is human capital, a basic carrier of which is cognitariat – social groups providing for formation on the basis of implementation of post-nonclassical type of scientific rationality, scientific-technological segment of the technosphere of the innovation production. The *subject* of this research is the essence of human capital and its specifics in the conditions of the innovation-oriented economics of the postindustrial society.

4 Purpose of the Study

The purpose of the study is to determine, on the basis of the complex methodology, the essence of human capital, its structure and specifics in the digital economics.

5 Research Methods

The complex methodology of research of the essence of human capital and its structure integrates methods of social philosophy, economics, sociology, and socio-philosophical anthropology, that allows studying human capital on the basis of the analysis of dialectical interconnection of the objective and subjective sides of social systems at all levels of the organization of socium and in all spheres of its implementation.

6 Findings

6.1. Socio-economic conditions and prerequisites of formation of the theory of human capital

At the postindustrial stage of technogenic civilization development, the implementation of socio-oriented convergent technologies abbreviated as SNBIC and NBIC in all spheres of

social production including economics, politics, culture, education and organization and management leads to formation of a number of prerequisites for the final understanding of the priority role of human capital as a determining factor and a driving force of development of the innovation society.

Following *prerequisites* are the most important:

1) Science is obtaining such forms of implementation that it has not had before:

a) innovative-technological; b) economic and commercial; c) organizational and managerial; d) innovative-personal. These prerequisites determine the key role of human capital as a strategic factor of the innovation development of the society;

2) in the production and technological sphere of the postindustrial society, “*the knowledge society*” creates special professional groups of workers of the intellectual labor – *cognitariat* (Latin: *cognito* – knowledge), which provide, on the basis of introduction of innovations, the formation and continuous improvement of *the scientific, production and technological segment of innovative economy* that is a basic background of the innovation society.

3) economic, organizational and managerial, and cultural and educational functions of human capital as a factor providing high profitability and competitiveness of organizations, capable successfully create and effectively use human capital, are becoming more and more evident and important.

In the works on economics, sociology, social philosophy, theory and practice of management, the totality of these socio-economic factors provided for considering *cognitariat* as the determining segment of labor resources of the innovation economy. In the scientific discourse on social production system (first of all, on its economic sphere), *the problem of human capital* emerged as one of the central problems of “the knowledge economy” of the innovation society.

6.2. Basic provisions of the theory of the human capital and those who created it

The category of “Human Capital” was at first used as an economic term in 1980s in the works of the American economist, Nobel Prize laureates Theodor Schultz [2] and his disciple and follower Gary Becker (1930 – 2014) [3]. T. Schultz received his Nobel Prize in 1979 for the pioneering research of the economic development aimed at the issues of the developing countries. His disciple and follower G.S. Becker became a Nobel Prize laureate in 1992 for the transfer of sphere of the macroeconomic analyses to a number of aspects of human behavior and interrelations. This is T. Schultz, who became the author of the term “human capital” as a self-rising value, which he designed on the analogy with the economic term “capital” (German *Capital* from Latin *capitalis* – the major). In the economic science, the term “capital” means wealth that is used with the purpose to increase it. In other words, capital is a wealth that brings income (profit). Through the prism of the cost valuation, T. Schultz has also assessed a personality as a subject that occupies a certain place in the structure of economic relations and implements certain economic, production, and technological functions determined by its status.

Relying of the data of genetics, T. Schultz argued that every person is born with a certain genetic program, a set of genes that encode his/ her natural abilities, predisposition to a certain type of activity, psychosomatic features of his/ her character, defining the characteristics of behavior. Actualization of these capabilities and their development takes place in the process of *socialization*. Education and upbringing allows a person to acquire knowledge, using which he/ she adapts to specific social environments, and also becomes able to design and create new forms of social reality. Moreover, the development of human abilities and his/ her personal orientation to certain types of socially meaningful activities,

is, as a rule, since childhood purposefully instilled by a family, school and other social institutions. A set of social and psychological qualities of a personality, as well as his/ her professional knowledge and know-how, T. Schultz determined as *human capital*. According to T. Schultz, the important feature of human capital as a socio-economic phenomenon is its dynamics. It can increase as a result of social investments in culture, education, improving living conditions of people, that is made with the purpose to develop their natural abilities, which are in demand on some stages of historical development of the society. On the other hand, the development of human capital can be blocked if some kinds of production-technological and social innovations are not demanded in the society. Knowledge and experience accumulated in the process of development of the society are mastered through social practice, and integrating with natural qualities of the socialized individuals, form their *intellectual potential* that provide them with a possibility for independent creative activity. It allows concluding that in the conditions of the innovative society – "the knowledge society" – a priority role in the economic sphere should belong to social groups and individuals, possessing human capital. And the added value should be created on the basis of high productivity of intellectual and high-tech work of specialists, provided with innovative potential of their human capital [4]. T. Schultz in his arguments followed K. Marx, using his methodology, which K. Marx developed to explain the self-growth of cash and commodity capital in the process of social production because of the added value obtained as a result of the exploitation of wage labor [5].

The ideas of famous American economist of the last century Stanley Fischer (born 1943), who considered human capital as a form of national wealth and saw its origins in the natural abilities of a person, played an important role in the development of human capital theory. S. Fisher stated that any stock of goods, which has the ability to accumulate and generate income, being used for some time as a tool in various kinds of social activities, can be considered as the capital [6]. Defining the essence of human capital in accordance with the initial ideas of S. Fisher concept, we can highlight the following features:

1) human capital is the property of a worker and cannot be alienated from its carrier, as it is under the legal protection of the state;

2) human capital has the ability to accumulate and to be reproduced in increasingly complex forms and types of activities; this feature of human capital provides for: a) *creative growth* of a worker; б) *increase of labor productivity* of both the individual worker, and the organization as a whole; c) *additional growth of the products*; d) *the augmentation of the national wealth*;

3) a society, represented by the state and other social institutions (family, educational and other cultural institutions), should form the conditions for *the accumulation of human capital*;

4) human capital at all levels of its functioning: a) at the level of a system (the system of the socium or the region) b) at the level of organization or corporation; c) at individual and personal level, should be formed in the advanced mode – "in reserve";

5) the *value orientations and national ideology* prevailing in the society, forming together the leading strategy of development of both the individual, and the society as a whole, have the key importance for the formation and accumulation of positive, creative human capital. It is possible to determine its *functional purpose* on the basis of generalization of the selected features of human capital as a socio-economic phenomenon. The human capital should provide for: 1) an increase of professionalism and creative orientation of workers; 2) a growth of labor productivity and production; 3) an increase of workers' incomes and improvement of their quality of life; 4) an augmentation of the national wealth;

6) improving the competitiveness of the national economy in the situation of growing contradictions in the global economy.

Relevance of solving these fundamentally new economic problems contributed to the fact that the basic provisions of the theory of human capital were originally developed within the economic science that studied the specifics of the innovation economy, formed on the basis of fundamental scientific achievements of the fourth industrial revolution. As the key questions of the emerging theory of human capital, the following issues were investigated: 1) *social structure* of economic sphere of the innovation economy; 2) *qualification characteristics* of individual social groups of this structure; 3) *functional obligations* of specialists belonging to these social groups.

Since the second half of the last century, the development of the theory of human capital was actualized by the modernization processes in developing countries of the world community. Demolition of the colonial system after the Second World War and gaining relative political and economic autonomy by a number of countries in Asia, Africa and Latin America, conditioned necessity to form high-tech national economies in these countries as a background of their sovereignty and economic sustainability. The solution of these tasks, however, was connected with substantial difficulties. Training labor resources necessary for the creation of *the scientific production-technological sphere* of national economies happened to be the weakest point. Comparison of the economic indicators of the economic activity in the developed countries with the same indicators in the developing countries allowed the researchers of economics (T. Schultz, S. Kuznets, S. Fisher and others) to conclude that "the catching up modernization", the purpose of which is a formation of the scientific and production sphere of national economies of the developing countries, depends not only on the organizational and managerial activities of the state and technological resources. To the significant extent, the failure to modernize in the developing countries depends on the undeveloped human capital and the goal-oriented labor motivation, the foundations of which are historically laid in the mentality of nations. These data allowed T. Schultz to explain the role and significance of human capital as *the key elements of labor resources* in the formation of mechanisms and driving forces of the innovation economy. T. Schultz came to the conclusion that human capital, as well as other its forms, such as physical (technology) and financial, has the characteristics of performance, and the ability to be accumulated and reproduced. Moreover, in the process of development of the technogenic civilization, not only the importance and role of human capital in the system of social production, but also its share in the total social product increases.

Substantial contribution to the formation of human capital theory was made by the American sociologist and economist Simon Kuznets (1901 – 1985) [7]. S. Kuznets is known, first of all, by his research of national income, which was based on the macroeconomic statistics. In 1971, he was awarded a Nobel Prize in economics for the empirical justification of treatment of the economic growth in the conditions of the new economic era, which was named by S. Kuznets himself as the era of the economic growth of the new type. Studying utilization of the experience of the advanced countries in the process of economic modernization of the countries freed from the colonial dependence, which have not had their own experience of the industrial development, S. Kuznets came to the conclusion about necessity of preliminary accumulation of *the starting human capital* in these countries. Moreover, the process of modernization of developing countries, in his opinion, should be systematic, and a comprehensive modernization of the society, carried out on the basis of institutional reforms should be the major condition for the accumulation of human capital. These reforms should ensure market-oriented economic transformation, modernization of the production and technological spheres on the basis of high technologies, and the formation of civil society. According to S. Kuznets, institutional reforms in the modernizing society and accumulation of the starting human capital should act as two sides of the integral modernization process of the developing innovative society

of the 21st century. But the priority role in this process he assigned to human capital of those social groups that were the subjects of modernization processes, and focused in their activities on the democratization of society and sustainable development of national economies on the basis of high technologies.

A significant role in the development of the theory of human capital belongs to the economist and researcher Gary Becker, a student and follower T. Schultz, who studied the indirect impact of macroeconomic processes on the behavior and interaction of people outside the immediate market environment, but in the meantime developing under its influence. G. Becker came to the conclusion that the starting capabilities of human capital of a particular society are conditioned by the socio-cultural situation of its formation, and determined by education, upbringing, lifestyle of social entities, and then are concretized and deepened in the process of their direct professional work in the field of economic relations. In 1992, G.S. Becker received the Nobel Prize in Economics for "extending the scope of macroeconomic analysis to a number of aspects of human behavior and interaction, including non-market behavior" [8]. G.S. Becker delivered a great importance to the formation of human capital in the conditions of industrial organizations. In his works, he characterized a worker as "a combination of one unit of simple labor and a known amount of human capital embodied in it". He considered a salary of the worker as a combination of the market price of his/ her simple work, and the income from the investments invested in the person. On this basis, he believed that the profitability of a particular production organization and its competitiveness depend on investments in human capital of these organizations. And human capital of organizations should "be formed through investments in people, including training, training at work, health care costs, migration and search for information about prices and income" [9]. According to G.S. Becker, the dialectical relationship between total human capital of the organization and human capital of its employees is *a variable value*. Its constant growth is a condition of economic stability and market competitiveness of the organization.

Not less important role in the development of the theory of human capital of innovative companies also belongs to the works of the American sociologist and futurologist Alvin Toffler (born in 1928). In his fundamental works, such as "Shock of the future", "Collision with the future" (1972), "Report on Ecospasm" (1975), "Third wave" (1980), "Metamorphosis of power" (1990), E. Toffler revealed, in different aspects, the essence of the society of the future, and designed a strategy for its development. Based on this research, E. Toffler came to the conclusion that the specifics of the society of the future, "superindustrial society", will be largely determined by its social structure. In his opinion, "the electronic infrastructure of tomorrow's supersymbolic knowledge societies" was laid from the middle of the 20th century, when a new type of workers appeared, whose capabilities were determined by the innovation oriented creative potential. "He is an innovator, who combines imagination and knowledge with an action." These capabilities of innovators, because of the uniqueness of the functional responsibilities of workers in the high-tech production, make them the key figures of the innovative production. E. Toffler writes: "In tomorrow's world, these are not masses of workers that will force the company's production to remain idle or otherwise harm it. "Computer virus", which is included in the program, a slight distortion of the information in the database, leak information to a competitor – these are only the most obvious of the whole range of new methods of sabotage available to the angry individual, irresponsible or offended by the law" [10, pp. 263-264]. Then E. Toffler elaborates: "Today we are experiencing a new shift of power in the workplace. The great irony of history is that there is a new type of an autonomous worker, who does not really own the means of production... they are stored in the head of the worker, and there the society will find the only major source of future prosperity and power" [10].

The American economist Edward Denison has also made some contribution to the development of theory of human capital. Studying the economic growth in the USA for the period of 1929-1982, he found out that the growth of education became the determining factor of the stable increase of productivity in the sphere of industrial production. He considered education as the important component of human capital [11].

In addition to these authors, the problems of human capital were developed not only in the works of economists but also of sociologists, historians, and social management theorists. Among them, we can name the following: P. Bourdieu [12], D. Duffy [13], J. Kendrick [14], J. Coleman [15], R. Lucas [16] K.R. McConnell and S.A. Brue [17], Th. Mincer [18], L. Turou [19]. The analysis of works devoted to the studies of human capital as a factor of innovative economy, is given in the book of O. Nordhaug "Human capital in organizations» [20].

In Russian social sciences, the interest to the problems of human capital actualized in the situation of formation of the innovative economy in the country that emphasized demands to the quality of professional training of specialists to be based on the high level of intellectual development and creative orientation of activity, necessary for high-tech production in the innovative economy. The collective monograph of A. I. Dobrynin, S. A. Diatlov, E. D. Tsyrenov "Human capital in the transitory economics: formation, evaluation and effectiveness of utilization", St. Petersburg, 1999, became the fundamental contribution to the research of the theory of human capital. In addition to that, we have to mention the works of the following Russian authors: N.M. Dorofeeva [21], I.V. Ilinskii [22], A. Korchagin [23], R.I. Kapelushnikov [24], A.F. Lyskov [25], V.A. Medvedev [26], I.V. Soboleva [27], A.A. Chachaturian [28], I.V. Tsapenko and D.D. Mironova [29], O.G. Shcheglova [30] and others.

Further development of the theory of human capital leads to the "intervention" of the economic concept of "capital" into the social disciplines adjacent to the economic science, such as social philosophy, sociology, social psychology, theory and practice of management, in which the issues of the human capital were raised. Through the joint efforts of these disciplines, the concepts of cultural, intellectual and social capital, adjacent to the concept of "human capital, were developed.

6.3. Human capital as a synthesis of elements of cultural, intellectual and social forms of the capital

In 1977, G. Stigler and G. Becker [31] proposed to use the concept of "*customer capital*" to fix the presence of permanent and stable consumer preferences in the space of market relations. Methodological justification of the meaning of the purposeful formation of "the consumer relations", fixed in the category of "consumer capital", significantly accelerated the promotion of innovative products to consumer markets. The positive result of capitalization of the consumer relations, interpreted through the prism of their social and personal meanings, allowed indentifying and actualizing economic aspect in such spiritual spheres of socium as culture, education, emotional and psychological part of human relations, which were becoming powerful factor of human capital formation in the innovation oriented economy. Such concepts were elaborated in sociology as "cultural capital", "intellectual capital", social and symbolic forms of capital, in which social and philosophical, sociological and economic aspect of the key sides of the spiritual sphere of socium were integrated. In the innovative economics, they were included in the system of the market relations. The term "cultural capital" is the most constructive in this system of categories. It was introduced by Pierre Bourdieu to characterize socio-cultural factor of the innovative economics. In his work "Sketch of the theory of practical action" (1972) [12], Pierre Bourdieu interpreted cultural capital as one of the forms of the capitalized social

relations, which is linked in the society with other forms of capital, and first of all, with its economic and social forms. The specifics of each form of capital are defined by the sphere of its formation and the executed functions. In the article "Forms of capital" P. Bourdieu writes the following: "Capital, depending on the area in which it operates, and by the price of more or less serious transformations, which are prerequisites for its effective action in this area, can act in three main forms: as *economic capital*, that is directly converted into money and institutionalized in the form of the property rights; *cultural capital*, that in specific circumstances can be converted into *economic capital* and can be institutionalized in a form of the educational qualifications; *social capital*, created by some social obligations (connections), that in some circumstances can be converted into economic capital and can be institutionalized, for example, in a form of the aristocratic title" [32].

In the innovative society, in which knowledge has a priority, the cultural capital starts gaining the first-rank significance. According to P. Bourdieu, those advantages, which children of the wealthy parents can gain, studying the basics of culture initially in their families, and later, because of the qualitative education, in the society, are the core of the cultural potential. To the basics of culture P. Bourdieu referred such skills as oral and written speech, value orientations and aesthetic values, ability to interact with people and aspiration to self-affirmation. *This knowledge lays the foundations for a high level of socialization of actors and acts as their cultural capital, providing starting opportunities for future success in professional activities.* P. Bourdieu pointed out three states of cultural capital, which are conditions for the formation of basic foundations of human capital: 1) *incorporated state* - in the form of long-term dispositions of mind and body as an integral part of an individual; 2) *objective state* - in the form of goods and means that can be transferred or inherited; 3) *institutionalized state*, when availability of diplomas and academic qualifications allows to compare the opportunities of their owners with other actors, and convert these opportunities into economic and symbolic capital [32].

All these three states of cultural capital are interrelated and they are finally embodied in the symbolic capital of a social entity, which captures his reputation, authority, the ability to be "their" in a certain cultural and social group, express estimates, and impose opinion. As L.A. Beliaeva writes, "In specific circumstances cultural capital is converted into the economic capital, if it is institutionalized in the form of the educational qualifications, and manifests itself as human capital" [33, p. 336]. The ideas of P. Bourdieu about role of cultural capital as a background of the professional potential of managers implementing managerial functions in the innovation economics are important for the formation of training programs in the elite educational establishments of the West, graduates of which quickly move up the ranks in administrative structures. The term "social capital" correlates with the category "cultural capital". P. Bourdieu believed that they are mutually conditioned, since social capital "represents resources based on family relations and relations in a group membership, having a common cultural base" [32]. Based of this analysis, we can make a conclusion that human capital is a personified form of the achievements and opportunities of culture mastered by the actors, which defines the background of professional culture of specialists of the innovative economy and, first of all, specialists of the administrative and managerial structures" [34].

Based on the definition of human capital as a form of cultural capital, which is formed on the basis of educational qualifications of specialists, who integrate general scientific and professional knowledge in their potential, we can draw a conclusion about the possibility of capitalization of scientific knowledge, considering them as an instrument of innovation. Consequently, the core of cultural capital in the innovative society is its intellectual form, which is a link between the forms of cultural and human capital.

The category "intellectual capital" in the global economic literature is used to denote intangible assets of the industrial sphere of innovation economy. *Intellectual capital* is

knowledge, information channels and information, organizational and managerial capabilities of the organization (knowledge, organization and management structure), that means a totality of all knowledge and know-how, which possess employees of the organization and which is converted in the added value in the process of its functioning, forming competitiveness of the organization. Specifics of intellectual capital is in the fact that it does not have a tangible form, and becomes a productive force only in the process of direct work of its carriers.

The American economist, researcher and writer Thomas Stewart is one of the founders of the theory of intellectual capital [35]. He defines this socio-economic phenomenon of the innovation economy as a complex structured system that includes three components: 1) *the human form of intellectual capital*, that is a part of intellectual capital, which characterizes the intellectual aspect of the labor force of the organization; it is knowledge, practical skills (qualification), creative and mental abilities of specialists, their moral values, that is all those spiritual values that determine the culture of work of the organization and that are guiding marks for its employees; 2) *the organizational form of intellectual capital*, that is its part, which characterizes opportunities of functioning of the organization; it is knowledge of technological, organizational, and managerial procedures providing functioning of the enterprise (technical provisions and software, patents, technical, organizational and managerial documentation); the intellectual organizational capital is a property of the organization, and its separate components can be the object of purchase and sale of the organization; 3) *consumer (client) form of intellectual capital of the organization*, that is formed by its administration on the basis of links and relations with clients and consumers of production of the organization; this form of capital is a tool for the optimization of relations concerning acquisition and use of production by the clients.

Further development of the theory of human capital was carried out by James Coleman [36] (1927 – 1995) – the American economist and sociologist, professor at the University of Chicago. According to him, "human capital is created by the internal transformation of the individuals themselves, caused by their skills and abilities". Since the formation and change of these skills occurs mainly in the framework of joint collective activities, the study of these processes should be carried out in the context of social environment. To characterize the impact of social environment on the actors in the process of their joint activities, J. Coleman used the term "social capital". He writes: "the function defined by the concept of social capital is the value of aspects of the social structure for actors as resources that they can use to achieve their goals" [15]. Respectively, social capital is the socio-cultural opportunities that are formed in the process of joint activities of employees of the organization. For example, the potential of mutual trust and cooperation, which is purposefully formed in interpersonal relations in the process of joint collective activity and significantly improves its quality, can be considered the element of social capital. James Coleman believed that social capital is created through the formation of structural links between the actors in the process of their joint activities, through which this joint activity is optimized. Structural links provide the collective nature of the activity and facilitate formation of trusting relationship between team members in addressing such issues as exchange of information, exchange of activity and its results. He emphasizes: "Social capital manifests itself in the skills and knowledge acquired by an individual. This capital is not tangible enough, because it exists only in the relationships of individuals. In the same way as physical and human capital, social capital facilitates productive activities. For example, a group within which there is total reliability and absolute confidence, is able to commit much more as compared to a group not possessing these qualities" [15].

In his study, John Coleman reveals the dialectical relationship between social capital, which he treats as a condition for the formation of cultural capital at the organizational level of the socium, and human capital, in which social and cultural forms of capital are

integrated. This relationship is vital for successful functioning of innovation processes in all spheres of social production, but, first and foremost, in the sphere of economic relations. Thus, the basis of organizational and managerial activities aimed at ensuring a high level of productivity and profitability of production of a particular organization should determine the following algorithm:

Social capital → *Cultural capital* → *Human capital*

Human capital, carriers of which are individuals, integrates this algorithm [34].

Based on the analysis of relationship of social, cultural, intellectual and human forms of capital, which are formed in the high-tech production of modern innovative economy, we can determine the *essence of human capital and its structure*.

6.4. The essence and structure of human capital

The following approaches should be used in determining the essence of human capital as a key resource of the innovative society: 1) economic; 2) socio-philosophical; 3) methodology of the socio-philosophical anthropology; 4) sociological methodology.

In the framework of the economic approach, the essence of human capital, as formulated above, is defined as a value system of ability and opportunity of people to work, due to which the process of social reproduction takes place and consumer products necessary for maintenance of human activity are created. In this sense, human capital is *a complex instrument of the socialized individuals*, which integrates the following: 1) cultural and professional knowledge, mastered by them, considered in aggregate as the intelligence of specialists, which is shown in their ability to put and solve organizational and administrative, economic and production and technological problems; 2) health and quality of life of workers, determining the quality of their physical activity, embodied in the labor potential; 3) the ability of each individual worker, and all together, to voluntarily join efforts in their activities and build optimal forms of remuneration for work; this remuneration must be adequate to the labor force of the workers and the quality of the product produced by them.

It is possible to simplify this definition noting that *human capital in the innovative society is a set of physical and mental abilities of specialists that determine their capability to participate in labor activity in order to ensure its profitability and high competitiveness through the development and implementation of innovations*.

This definition is adequate to the definition of human capital that was proposed by one of the leading Russian specialists, who elaborates the theory of human capital, the Director of the Center of the Regional Economic Research Prof. Yu.A. Korchagin. Studying human capital in the framework of the economic approach, he identified the following components of the process of its formation: health, knowledge and abilities, capitalization of which is performed in the following sequence: 1) streaming the cumulative stock of human abilities in phases of life; 2) the expediency of using the reserve of abilities, which leads to the increase in productivity; 3) the increase in labor productivity naturally leads to an increase in workers' earnings; 4) increase in income motivates the workers to make additional investments in their human capital – cumulatively accumulate it.

In accordance with these stages and the conditions for the formation of human capital and the prerequisites that arise in these conditions, the substantive side of human capital is built, which allows determining the essence of human capital from the standpoint of the economic approach as a category of system research of *the information society*. Y.A. Korchagin writes: "Human capital is formed as a result of investment and accumulated by an individual reserve of health, knowledge, skills, abilities, motivation, which is advantageously used in the process of labor, promoting the growth of productivity and earnings" [38].

However, this definition does not reflect the key criterion of human capital, which should be associated not only with profitability and quality of products produced by a worker in the process of this work, but also with an understanding of *the highest sense of the human activity*. The question arises whether the ability and the possibility to receive and make a profit is always an essential sign of the value of human activity for people and a prerequisite for the evolutionary development of human being and society? The definition of the essence of human capital within the economic approach does not fully reveal the social and humanitarian significance of human capital, and does not fully assess its role in solving problems of strategic development of modern technogenic civilization. Technogenic civilization has achieved significant results in the field of science and technology, but in its conditions there are still no answers to the fateful questions for humanity, which Immanuel Kant put yet in the 18th century in his attempt to determine the essence of a man and to reveal his capabilities in cognitive, creative and transformative activities. I. Kant believed that only answering three questions: "What can I know? What should I do? What can I hope for?" a person can judge his/ her capabilities, which, being actualized in his/ her creative activity and its results, allow to adequately assess not only a person's usefulness for the society, but also to see him/ her as a free and creative person. "In essence, these three questions relate to what a human being is", Kant wrote [39]. Kant himself, answering these questions, came to the conclusion that a man is a free human being, creative in his/ her activities. And although his cognitive abilities are limited, based, however, on his historical social experience and culture, he is able to find a sense of life and to build a reasonable and just society [40].

Thus, the development of methodological substantiation of the essence of human capital as a socio-economic phenomenon of the innovative society requires a comprehensive approach, taking into account the socio-philosophical, and philosophy and anthropological methodology, and justifying from the standpoint of dialectical and materialistic approach, the unity of natural, spiritual and social principles in a man. Genetically conditioned natural, essential force of people, reflecting, to a large extent, natural climatic, socio-historical and economic conditions for the formation of specific ethnic communities that have their own mentality, refers to the natural origin in a man. The core of mentality of each ethnic group is historically formed values, which explain the essence and meaning of being. The qualities of the profession-labor-activity are connected with realization of the essential forces of a personality in a labor activity. Spirituality, as considered the founder of philosophical anthropology Max Sheller, is a "special kind of intellectual thinking, that is able to provide existential independence and freedom from all what is associated with the pressure from the outside: nature, society and conditions of its own existence" [41]. The natural and spiritual origins of a man is integrated in the process of his/ her social practice, forming the social foundation of his/ her personality, the core of which is his/ her unique individuality. This dialectical interrelationship of the natural origin – genetically determined ethnic prerequisites for the formation of human capital, – and the spiritual origin – the value orientations and attitudes of actors – can be seen on the basis of comparison of human concepts in Western (Protestantism), Eastern (Buddhism and Confucianism) and national (Russian) philosophy. The socio-philosophical concept of a person can explain: 1) the origins of the basic values of human behavior (first of all, their attitude to work as the main condition and basis of human life); 2) the character of economic activity of separate ethnic groups caused by climatic features; 3) forms of organization of the economic activity of ethnic groups and their relation to material wealth; 4) moral, ethical and legal forms of regulation of labor activity on the basis of moral and legal principles reflecting mentality of specific ethnic groups.

Social philosophy explains the dual nature of human capital and the specifics of its formation. From the perspective of the socio-philosophical approach, human capital acts as

a measure of development in the process of various forms of social practice of the essential forces, laid in a man by nature. These forces are manifested in the following generic human abilities as a biological species Homo Sapiens: 1) to learn the essence of things and phenomena of the world around us; 2) to act with knowledge of the matter on the basis of knowledge and skills acquired in the process of interaction with the outside world, and achieve the goals; 3) to communicate with their own kind of species through a joint collective activity, which greatly multiplies efforts of the individual; anticipating their fate, based on the understanding of: a) their individuality; b) belonging to a certain socio-ethnic community; c) socio-historical and economic forms of organization and social practice. Respectively, in a private capitalist form of the organization of economic activity, the measure of a person's realization of his/ her essential forces, generating income and ensuring profitability of economic activity of the community, to which the socialized individual belongs, can be defined as his/ her individual personal human capital. In the meantime, human capital can be a measure of realization of the essential forces of workers at the level of a specific production organization. It is also possible to speak about human capital at the level of a region, of a country and the society as a whole.

Respectively, when identifying the structure of human capital, it is necessary to understand dialectical interrelations of the society as a multi-level system of social relations, and a man as a subject of these relations. Being a part of this system of social relations and performing there various kinds of social activity, the actor reproduces himself as a social personality forming his/ her individual personal human capital. Application of the analysis of interrelation of categories "single-special-general" within the framework of socio-philosophical methodology, allows correlating forms of human capital with the structural organization of the society. Thus, from the positions of *the sociological approach* it is possible to consider human capital as a multi-level system reflecting structural organization of the society. Human capital is built as a system with the following levels: 1) *systemic* that embraces the society as a whole; 2) *regional* as an economic system of a specific region; 3) *organizational* – a team of workers of the organization; 4) *individual personal*, at the level of an individual. All these levels are interrelated in the framework of the structural organization of a social system. These interrelations are determined by the universal laws defining the processes of formation and functioning of human capital. For constructive utilization of these laws in the process of formation of human capital, it is necessary to apply complex methodology integrating methods of social philosophy, sociology and socio-philosophical anthropology, which are concretized by the practical experience of the social management.

Formation of human capital at all levels of the organization of the socium, the carrier of which are labor resources, is carried out in the framework of the organizational managerial and cultural educational technologies, which are constructed on the basis of the two dialectically interconnected sides. The first side is a regulation of activity of workers in the organization from the position of performing their functions in the framework of possibility to achieve strategical and tactical objectives of the organization. The second side is a management of social processes in the organization based on the need of accumulating profitability of the organization on the basis of accumulation and effective use of human capital. These two sides of the organizational managerial and cultural educational activity are dialectically interlinked and focused on the formation of specific aspects of human capital of the production organization based on the tasks to be solved by the particular organization.

The structure of human capital proposed by I. V. Tsapenko and D. D. Mironova seems to be optimal in this respect. These authors suggest to include the following components in the structure of human capital: 1) capital of health and a healthy way of life; 2) capital of education; 3) capital of educational professional training of personnel in the production

organization; 4) scientific capital; 5) capital of culture; 6) capital of possessing the economically important information; 7) capital of migration; 8) motivation of the economic activity [29]. This interpretation of structure of human capital corresponds to its concept as a socio-economic phenomenon, which is formed in the system of social labor relations of the society as the core element of labor resources of the innovation economy. In terms of its content, human capital embraces: 1) knowledge as integrity of the *intellect of specialists* – the ability of the actors to put and solve tasks; 2) *goal-oriented productive labor*; 3) *health and the quality of life* of particular social communities – ethnos, team of workers, particular organizations, and a society as a whole. Human capital is concretized in particular organizations at the level of consciousness and activity of their employees and actualized in their innovation potential that is a source of the economic, production, technological and administrative managerial innovations [42].

6.5. Human capital in the situation of digital economy

Innovation society that is dynamically developing in the situation of the fourth industrial revolution in the first decade of the 21st century has a number of peculiarities, which allow analyzing its economy through the prism of digital characteristics. It impacted solution of the problems of formation and realization of human capital. The digital economy is rooted in 1980s, and its formation was conditioned by the design of the convergent SNBIC and NBIC technologies and their introduction into all spheres of social production. As I.V. Lefanova, the Professor of the Belarus State University, writes, “the specificity of convergent technologies is determined by the fact that they are based on the principle of synergetic combination, and the final product is produced within the framework of interdisciplinary research at the junction of various fields of science and technology” [43]. The ontological basis of convergent technologies is the quantum-field natural science picture of the world (according to the classification of V. S. Stepin) associated with the names of M. Planck, E. Schrödinger, V. Heisenberg, and N. Bor.

It determines the following features of the SNBIC and NBIC technologies: 1) intensive interrelations between the scientific and technological fields; 2) a breadth of consideration and influence - from the atomic level of matter to the intelligent systems; 3) technological perspective of the growth of human being abilities. Because of general ontological background, convergent technologies form a technological order representing a set of interrelated productions, which have a common technological level and are developing synchronically. Technologies that belong to the same technological order are concentrated on their common “technological platform” and determine the economic specifics on the particular stage of the economic development. Changes in technology lead to the changes of the economy. It proceeds cyclically and on the basis of the objective laws. For the first time, the ideas about cyclical development of the economy were put forward by the Russian scientists N.D. Kondratiev (1882-1938). In 1920s, he elaborated a theory of “the economic cycles” which received a name “Kondratiev cycles”. In 1925 he published a work “Large cycles of conjuncture”, where he formulated a theory of the economic cycles on the basis of the system analysis of the integrity of economics, social and cultural development of capitalist countries. The system approach developed by N.D. Kondratiev for understanding the economic cycles, allows defining the specifics of the innovation economy that is being formed on the basis of the sixth technological order, the forms of its production and technological organization and the role of specialists in its functioning. This form of the innovation production is now called “Industry 4.0” – the industrial system without people. The production systems of the “Industry 4.0” are built on the basis of digital technologies and include the following segments: 1) technologies that function on the basis of robotics; 2) artificial intelligence as a regulator of the organization of management; 3) machine

learning – self-learning machines. The management of the digital system economy is performed with utilization of the following “technological corridors”: 1) “all are in the digit”, reading of data through sensors, its “cashing” and correction of processes with the use of digital mandates; 2) utilization of the automatic “intelligent system” that not only regulate technological process but transform them in a new quality; 3) new thinking technology of specialists engaged in these processes (thinking must be systematic, strategically focused and of communication character, and decisions must be taken in the basis of collective “brain storming”).

The new form of the organization of production on the basis of the 6th technological order requires fundamentally new approaches to the training of personnel. The content of the professional training for “Industry 4.0” should have a socially oriented, humanitarian and systematic character. Thus, in MIT (USA) a half of departments are of the humanitarian profile. For educating engineers a lot of humanities are in use. Also a significant attention is delivered to the managerial training and educating methodology of the management decisions, as well to the solution of the creative tasks.

The Russian scientists are unanimous in the opinion that the development of digital economy will allow to make a breakthrough in the technological development of their country with achieving fundamentally new technological level, and the future of Russia should be connected with socially oriented digital economy that will allow opening up human capital of the Russian people.

7 Conclusion

On the basis of this research of human capital as a socio-economic phenomenon, the authors came to the following conclusions:

- At the postindustrial stage of modern technogenic civilization, a peculiar type of the society is being formed, which in contemporary social sciences is defined as “the knowledge society”, or the innovation society. In this society, knowledge becomes the direct productive force materializing in the production technological systems (NBIC) and socio-technological (SNBIC) convergent technologies. Their implementation in the system of the social production leads to the increase of labor productivity and profitability by many times, providing formation of social labor capital as a source of national wealth of the society.
- In the innovation society, social labor capital is embodied in such forms as economic, financial, cultural, intellectual, social and human capital. Thanks to the systematic organization of the society, all forms of capital are interconnected in a single system of economic relations of social production, and each forms performs relevant and systematically determined functions. *Human capital* plays, however, a priority role as the integrator of creative abilities of the subjects of highly technological production of the innovative economy.
- Human capital is formed thanks to the incorporation of the socialized individuals into the system of cultural educational and social labor types of social practice that allow them to form their own creative potential. A set of socio-psychological qualities of a personality that was formed in the process of various kinds of social practice and determined by its natural (genetic) abilities, and also knowledge, skills and know-how is seen as *intellectual capital* – the background and driving force of its subsequent creative and productive activity multiplying his ability to create wealth. Based on a broad understanding of capital as a set of opportunities for socialized individuals to increase wealth, we can argue that human capital is a synthesis of elements of cultural, intellectual and social capital.
- The study of human capital on the basis of complex methodology integrating methods of social philosophy, economic science, sociology and socio-philosophical anthropology

allowed us to determine the essence of human capital and its structure in the innovation society.

- The authors determine the essence of human capital in the innovation society in the following way: 1) on the social systemic level, as a set of physical and intellectual abilities of specialists that defines their capability to participate in the labor activity with the purpose of providing its profitability and high competitiveness on the basis of development in introduction of innovations; 2) at the individual personal level as a measure of implementation by a human being his/ her essential qualities that brings profit and provides for profitability of the economic activity of the community to which a socialized individual belongs.

- In terms of sociological approach, the authors consider human capital as a multi-level system reflecting the structural organization of the society. All levels of this system are dialectically interrelated in the framework of the structural organization of the social system that is defined by the general laws determining process of formation and development of human capital.

As a result of their analysis of human capital in the digital economy, functioning on the basis of convergent SNBIC and NBIC technologies, the authors came to the conclusion that the identified capabilities of human capital and their practical implementation open up perspectives for the transition of the innovation society to a fundamentally new level of high tech digital production.

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