Human Capital Development under Innovative Economy Conditions: Methodological Aspect

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Methodological aspects of coming into being and development of the innovative economy as a phenomenon of the transformation period are considered in the article. An argumentative conclusion about the fact that the fundamental basis for realization of the model of innovative development is formation and further development of human capital is made. It is argued, that priorities of investments into man, his/her creative, intellectual and innovative potential can be considered as a perspective direction of the state policy of socio-economic development. It is shown, that to the basis of the new scientific paradigm, which would adequately reflect the demands of social progress, should be placed the principle of rational correlation of economic purposefulness and social orientation as the phenomenon of innovative economy is, first of all, the phenomenon of human capital.

Keywords: innovative economy, intellectual property, economic and social development, innovative model of development.

Introduction

Innovative economy is a complex, system phenomenon that needs substantial changes not only in the sphere of technologies, but also in society on the whole. It...
predetermines topicality to the development of new methodological approaches for human capital formation. First of all it concerns development of the staff potential for a modern economy.

Organization of production on innovative basis needs plenty of specialists in innovative management of entrepreneurial activity in the field of investing in innovative projects and programs, marketing innovative product and production, transfer of technologies, protection of intellectual property. Increasing number of workers engaged in new technological processes, and highly skilled personnel who are able to handle these processes (in conditions of outstripping pace of increasing number of these professionals over a general quantity in industry) is one of the most important (together with introduction of new technologies) criterion signs of forming innovative-directed development of economy.

Effectiveness of production in the context of development tendencies of world economic processes is determined by the use of highly skilled personnel, new knowledge, new technologies and methods of production management. In the conditions of information revolution creative potential of a person, his/her knowledge and professionalism comes to the first place and human capital becomes main factor of innovative production without which technical and economic progress is impossible despite of any amount of money invested in production equipment and technology.

General tendency of innovative economies that develop under influence of information revolution is characterized by a new correlation between human and physical capital and human capital becomes priority in economic development. So, according to the calculations of the World Bank, national wealth of the USA consists of production funds (buildings and premises, machines and equipment) that make only 19%, natural resources – 5%, human capital - 76%. In Western Europe these indexes are 23%, 3% and 74%; in Russia – 10%, 40% and 50% [1].

Forming of human capital acquires new features: the first one is continuity of studying and indissoluble connection of education and production activity of a person (during the whole period of work); the second one is ability of creative application of the accumulated knowledge and skills for generation of new know-how; the third one is the fact that development of innovative economy stipulates requirements of continuous studying and elements of creation of not only separate workers but also whole groups of enterprises, firms and organizations. Thanks to these features a notion of intellectual capital on a micro level appeared in economic research. Russian scientist M. P. Ivanov characterizes intellectual capital structure of a firm as a constituent of two-parts: human and structural capital. The first one is presented by complex of knowledge, skills, and creative abilities of workers, moral values and culture. The second one is technical and program providing of information systems and firm data-base, its organizational system, patents and trademarks that belong to it [2]. The difference between these types of capitals is that human capital does not belong to the organization and the structural does.

1. Methodological fundamentals of the human capital theory

The study of scientific publications of foreign and home authors showed that scientists did not attain unanimity in the definition of the essence of human capital as
an economic category. In methodological approaches to the interpretation of its essence there are considerable differences at different levels of its display and definition. In general understanding economic theory defines human capital as education, professional knowledge, intellectual potential, accumulation of work experience that is used in economic activity.

The founder of human capital theory G. S. Bekker distinguishes six types in the structure of human capital, three of them are: capital of education (knowledge); capital of professional training (qualification, skills, abilities, work experience) and possession of new information [3].

Evolutional increase of human capital took place on the basis of development of science and education, health care and culture. In the conditions of information revolution specification of human capital concept takes place in the direction of the broadening of its essence by investments in a person which include expenses on education, training and retraining of personnel; science (research and development); health (expenses on health care, ecology, physical culture), culture and so on.

Researchers in the theory of human capital distinguish four levels of human capital: personal (human capital of individuals), micro level (human capital of enterprises), mezzo level (human capital of industries, regions), macro level (joint human capital) [4].

The problem of influencing of intellectual potential of a separate person and society as a whole on economic development was studied from the beginning of XVII century, from those times, when Y. Patty who stood at the sources of classical political economy, suggested an idea of the primary value of working skills of population in the national wealth of a country [5]. A. Smith developed this idea and included knowledge and qualification in the main capital of society together with earth and machines [6]. Further development of human capital theory took place under the influence of scientific and technical progress. In the 1960 T. Shoults and G. Bekker applied investment approach to the conception of human capital development [7].

Economic researches do not have a united opinion about human capital structure. G. Bekker considers that it includes the capital of education (general and special knowledge); capital of health, capital of professional personnel training (qualification, skills, work experience); capital of migration; possession of economic information; motivation to economic activity.

In modern conditions under the influence of technological, information revolution the evolution of human capital concept is developing in the direction of broadening and deepening of understanding of its essence by investing in a person. In particular in order to form human capital it is offered to spend money on education, training and retraining of personnel; science, including expenses on research and development; expenses on innovations, including technological innovations, stimulating innovative activity and creating intellectual property; health, including expenses on health care, ecology and physical culture; mobility and culture [8].

Russian researcher S. Dyatlov develops investment approach in the theory of human capital and reveals the category of human capital on the personal level as
human capital that is formed as a result of investments. Definite supply of health, knowledge, skills, abilities and motivation accumulated by a person and used in the sphere of public production favours the growth of labour productivity and affects the rise of profits (expenses) of a person. Thus, a person is a carrier of this accumulated complex of supply and the person himself is not a capital, the results of his or her work are on sale but not the person himself/herself.

Summing up different approaches to the research of human capital category, we define human capital of any type of economic activity (branch, region, country) as a sum of human capital of personal level in the appropriate sphere of activity and definite level (macro-, mezzo-, micro-). So, in particular, regional level includes the sum of human capital of all enterprises and all individuals of the region (except for repeated counting).

The world tendencies of XXI century development show that the rise of economic development in modern conditions, first of all, depends on the quality of human capital, that is determined by the appropriate level of knowledge, qualification, ability to work; potential abilities of the population of the country, by ability to provide innovative development of productive forces. In order to achieve exactly such quality of human capital investments are required. It will provide sufficient level of education and science for fulfilling economic function and permanent reproduction of intellectual human capital, the capital, incarnated in people capable to create new things.

Intellectual human capital is characterized by the level of people education, scientific potential of the country and quantity of highly skilled specialists according to the development tasks of different types of economic activity. Studying intellectual human capital on a micro level, it is necessary to stop on its unique feature that it cannot be the property of an enterprise: it is possible to hire carriers of intellectual human capital, but it is not possible to own them.

The products of intellectual human capital are non material goods, which exist as methods, inventions, patents, theories, models, formulas, software products and so on. All intellectual products - non formalized and formalized (patents, author’s right, software, now-how, data-bases, rights to design) - can be intellectual property. They have intellectual value and in the articles of enterprise assets they are represented as non-material assets. In market conditions they are non-material commodities. Joining the process of capital reproduction (in the turnover of main and circulating funds), non-material assets act as independent economic resource, that provides the most perspective type of innovative development of industry and increase of GDP.

In modern economic literature scientists-economists use a term “intellectual capital” widely and interpret its meaning in different ways. Wide definition of this category was provided by Russian specialists. They consider intellectual capital as knowledge which can be converted into income and estimated. Such interpretation, in their opinion, takes in any technological, administrative and market innovations which bring additional profit [9].

Intellectual capital (intellectalis capitalis) is one of the types of capital which has its proper signs as well as its own unique properties.
In economic literature there are offers to include intellectual property in the intellectual capital. Intellectual property is interpreted as intellectual acquisition and innovations common to all mankind and incarnated in scientific, technical and technological objects and products.

One part of intellectual capital is represented by products of intellectual work which can be found in different forms of property: state, private, collective. Consequently, intellectual property appears in the form of the right on this part of intellectual capital in the cause of its application in the innovative process and the process of commercialization.

Intellectual property determines the right on the domain of the products of intellectual work, i.e. all types of objects of intellectual activity. Relations that arise up in connection with creation, legal protection and application of objects of intellectual work are regulated by the proper laws in the field of intellectual property.

The Convention on Establishment of Worldwide Organization of Intellectual Property (1967) determines that the rights to the following results of intellectual work belong to it:

- scientific inventions;
- industrial prototypes, trademarks, labels of service, brand names and commercial denotations;
- protection from unfair competition;
- literary, artistic and scientific works;
- artists performances, audio records, radio and television programs;
- inventions in the spheres of human activity;
- all other rights that belong to intellectual activity in production, scientific, literary and artistic spheres.

Consequently, intellectual property gives the right on the domain of a product created by human intellect.

2. Practical aspects of realization human capital theory

According to the international standards, objects of intellectual work are divided into the objects of industrial property (industrial prototypes, inventions in the spheres of human activity, trademarks, labels of service, now-how, brand names, etc.) which are protected by the right of industrial property and other (literary, artistic and scientific works, artists performances, audio records, radio and television programs, etc.) which are protected by a copyright.

Intellectual property in modern understanding reveals itself as the rights on the results of intellectual activity. These rights include mutual rights and duties for the creation of intellectual values. Such approach is of particular importance for forming of the mechanism of commercialization and distributing of intellectual rent.

The analysis of commercialization of the objects of intellectual property in Ukraine shows that the greater part of domestic scientific products is not patented. As a rule, the gained results of scientific research are published in public press or passed
to the foreign colleagues free of charge, as a result intellectual rent remains outside Ukraine. Moreover, the majority of them is gained in scientific institutions financed from the state budget. However, if the state secures the rights on all intellectual products it creates the grounds for inhibition of any business that works in the field of transferring technologies. In this connection it is necessary to develop scientific and methodological approach to determine who a copyright proprietor is and secure the rights on the results of intellectual work and their commercialization.

In most countries there is a tendency of fixing of property rights of intellectual products that are created at the expense of the state directly onto universities and other nonprofit scientific organizations. For example, in the USA before 1980s patents on the university research results financed by the state were passed to the government which had no special mechanism of their commercialization. As a result, the government licensed only 4% out of 28 thousand of patents which he had in its property. After adoption the Bey Dowl's law in 1980 that abolished the government monopoly and stimulated the transmission of inventions, most universities, participants of large research programs, passed the act on a patent policy and opened special departments of commercialization of intellectual property.

Abdicating the property, the state placed universities to the market of the real proprietors of scientific and technological results, stimulated forming of necessary infrastructures as for legal protection, transmission and commercialization of technologies and thereby provided basic terms for co-operation of all participants of the process of development, protection, transmission and application of technologies in the economy of the country. University system of the USA became one of the main sources of new technologies and the great licensee.

In Russia the state power agreed to pass the rights on scientific research results, fully or partly financed by the state, to the authors that will improve the investment climate in the sphere of scientific transfer.

Taking into account foreign experience in distributing royalty from realization of intellectual property it is possible to select the methodological approaches acceptable for Ukraine:

- the first one - departments that finance science set the fixed norms of distributing between state research institutions and universities;
- the second one - higher ranked organizations develop so-called scope rules and lower-ranked organizations determine concrete proportions and sums of payments themselves.

Countries in which the legislation in the field of intellectual property is under reformation are predisposed to the second approach, as organizations need a definite autonomy and flexibility in order to most effectively meet the requests of industry and researchers. Methodological approach to the economic evaluation of intellectual capital as a part of the national wealth of the country is based on understanding of its essence from the point of view of both knowledge accumulation and intellectual products.

The growth of productive forces of the economic system is determined by the proper resource priorities of development. In the preindustrial society the priority
belonged to natural and labour resources, in the industrial society it belonged to material and labour ones, in the postindustrial one it belonged to intellectual human and informative capitals.

Technological revolution that is taking place in the developed countries of the world forms new economic systems in which knowledge and information become the main source of development of productive forces. As it was stated immaterial resources: ideas, inventions, other innovative products, patents, software, trademarks, etc., which are a commodity and are used for getting high incomes and social and economic growth are a part of intellectual capital that is presented by a product created by a human intellect which in market relations economies is bought and is sold. In intellectual capital structure a human capital presents its second part.

Summarizing the conducted researches we consider an intellectual human capital as a unique mental energy capable to create intellectual products - the newest values on the basis of accumulated knowledge, information, skills, production experience.

Education, knowledge, skills, production and creative capabilities, professional qualification are common properties of a human capital and intellectual human capital.

The specific features of an intellectual human capital are the capacity for the generation of new ideas, creation of an innovative product and it provides progressive development of various types of economic activity and society in whole (the ability to get the newest results in the process of intellectual work thanks to unique creative nature is a high-quality criterion of perfection of intellectual human capital). The second important feature consists in objectively existing scantiness of its productivity.

Thus, it is logical to assert that the category of the human capital virtually is more capacious than the notion of the intellectual human capital. It is the basis for the methodological separation of the intellectual human capital. The essence of the category of the intellectual capital reveals itself in the unity of the intellectual human capital and intellectual scientific products and the newest values created on its basis.

At a national level an intellectual capital is the most important property of the country, its national wealth.

The role of human and intellectual capitals in the industrial branches of economic activity is constantly growing and spreading not only onto large industrial enterprises that produce scientifically capacious innovative products but also onto small enterprises that produce an insignificant part of innovative products. In the conditions of labour intellectualization the problem of saving and increasing of human capital acquires special attention. One of the main factors of management of an innovatively-oriented enterprise becomes the rise of the level of general and professional education of personnel, strengthening their personal interest in development and perfection of production, the use of the proper personality qualities of an employee which are the ability to perceive a new information quickly, purposefulness, criticism of thought and so on. Different forms of personnel preparation and retraining are used for this purpose: programs of business-leadership stimulation, self-education, leadership skills improvement of different rank specialists, in-service training and others.
Innovative development of an economy is based on direct and feedback connections between science, production and personnel training. Otherwise the continuous development process of high technologies and advancement of new types of industrial products to the market can not be carried out. As the result, clear concordance with the tasks of innovative industrial production becomes the basic principle of improvement of the system of personnel preparation and retraining.

The changes to the highly skilled personnel able to work on innovative directions of industrial production must take place according to the strategies of development of separate types of economic activity of an industry, priorities of innovative activity at a national and at a branch level, strategic directions of new technologies development in 2003-2013, ratified by Verkhovna Rada of Ukraine which include: machine building and instrument engineering as a basis of highly technological updating of all industries of production; high-quality metallurgy; nanotechnology, microelectronics, information technologies, TV communications; improvement of chemical technologies; development of biotechnology; high technological development of processing industry; modernization of power-stations, new and updated energy sources; the newest resource-saving technologies.

Realization of the state industrial policy aimed at activation of innovations is the priority component of the general strategy to increase competitiveness of the economy of the country that, in turn, requires the change of qualitative characteristics of workforce, which are stipulated by the level of education and qualification. For this reason in post-industrial countries, in particular the USA, a kind of a cult of education is formed, when the best students, post-graduate students, teachers are perceived by society as intellectual property of the nation, and firms invest in training, in-service training and retraining of the staff, as it promotes a more rapid mastering of the newest technologies. That is, such investments in a man are considered by a firm as a source to increase competitiveness and receive a higher income.

Gaining education and qualification is the process of investing in the innovative type of the industry development that will ensure an increase of the level of profitability of national enterprises for a long-term prospect. For this purpose it is necessary to have a flexible distinctly adjusted system of anticipating training and retraining of the staff, who are professionals in the field of innovative-innovation activity, highly-qualified specialists, able to implement complex projects, reproduction and development of domestic enterprises on the innovation basis.

Realization of the investment-innovative model of economic development assumes forming of new requirements to the structure and quality of the staff potential of the industrial sector of Ukraine. It should be noted that it requires some time and must be carried out step-by-step. Accordingly, the requirements to the staff in the industrial sphere of production are also to change gradually, although with a bit of outstripping the changes in the pattern of production.

As a whole, the structure of the staff at the modern stage of industry development is related to the change of socio-economic conditions of production, to which could be included:

- the change of contents and character of professional activity;
speed-up renovation and perfection of socio-professional structure of the staff, appearance of new progressive forms of organization of professional activity;

top level of technical equipment of production processes with modern machinery and appliances at the expense of automation of practically all basic and auxiliary operations (necessary terms for clear, rhythmic work of the enterprise are thus created, the mode of labor gets better, possibility to adjust technological processes without direct interference of man appears, that is, human-free technologies spread further and further).

However here it is necessary to mark a contradictory character of the processes of introduction of new technologies and social consequences linked with that. As a rule, innovations, first of all, are directed on the decline of labor intensiveness, which diminishes the necessity in some definite types of professions especially related to unskilled labor. In addition, the degree of danger of implementation of some production operations grows in many cases, the social isolation of workers increases, which results in the appearance of technological and structural unemployment in some enterprises. Such negative consequences of technological development enter into contradiction with the concept of humanization of labor, which gets wide distribution in industrially developed countries and become the main object of the programs that are developed with the purpose of perfection of organization of labor and production.

Out of all social consequences of technological development changes in the contents and character of professional activity have the most substantial influence on the quantity and professional-qualification structure of the staff. Such changes are expressed in the following tendencies:

1) functions of labor change. Simple monotonous functions of the specialized labor while maintaining machine-tools, conveyor lines are replaced by a complex of new, more difficult functions on the part of management, control, adjusting, retooling, repair, programming of automated systems and robotized production. The value of universalization of labor, its combination grows;

2) definite types of professional activity become, as a matter of fact, unique. The number of professions that do not have analogues, which require new skills and wider erudition from the workers, promote the process of deepening their specialization, is multiplied. Expansion of the sphere of unique types of professional activity creates special conditions for such a professionalization that does not surpass the measures of a once chosen profession and is related to the achievement of higher and higher levels of professional skills;

3) there occur changes of the qualification structure of the industry. If earlier it was formed on the basis of acquisition of skills and abilities which depended upon work experience, now basic value belongs to the knowledge brought from outside. In modern conditions, when public production becomes more dynamic, the tasks of production units, methods of selling of the put out products constantly change, knowledge of modern methods of solving problems, knowledge of the results of theoretical researches and ability to implement scientific recommendations in practice become more and more important in the activities of workers. Therefore part
of the workers who differ by the width and variety of knowledge grows objectively. Significance of creative abilities of workers is multiplied. On the one hand, a man with developed creative abilities executes the task of the vocational training more successfully, achieves significant successes in the primary mastering the profession, on the other - the developed creative abilities are needed in the process of professional activity and its rationalization. The level of the workers’ competence rises, their socio-professional status in connection with the changes of quantity and role of different functional groups, that take part in the production process changes;

4) the character of tension of professional activity changes. If earlier the degree of tension was determined first of all by the physical loading, now - mainly by nerve-and-mental. Therefore intensive labor in modern conditions assumes the highest level of development of psychical, volitional qualities of man.

The changes of professional-qualification structure of the staff of the modern highly technological production are especially considerable, first of all:

- the change of correlation of workplaces, that require performers with a higher and secondary special education. The need in workers who have a higher education grows steadily, and accordingly it goes down in workers with the secondary special education;
- substantial update of the list of professions which provide successful functioning of enterprises and branches. Not only do separate out-of-date professions disappear, but also their groups.

So, in industrial enterprises the proportion of the transport workers and longshoremens, machine-operators, fitters goes down substantially. New professions appear instead: to replace workers-operators come workers-adjusters operators of machineries and machines. The number of those working in shifts and foremen, workers of such services as the planning and technical bureaus, bureaus of workshop control and wages departments as well as auxiliary workers: distributors, storekeepers, transport workers, inspectors goes down. New categories of personnel that mind the highly technological equipment, for example computer operators, adjusters of electronics and others, appear.

No less intensively goes alteration of the structure of ingenieurs-technicians and office workers. The proportion and role of the specialists related to front-rank technologies rises, in particular research workers, computer specialists, engineers-researchers, developers of electronic apparatuses, etc. At the same time the quantity of engineers-operators relatively goes down. Most dynamically develops the category of computer specialists. In industrial enterprises there is a perceptible demand for workers of such professions as system analysts, program developers, engineers-researchers, designers and technologists. The portion of ingenieurs-technicians involved in maintenance of the processes of management, managers (economists) grows. In the enterprises that enter the market with highly technological products, specialists with a higher degree are a new component in the qualification structure of ingenieurs-technicians.

In this connection, for successful realization of the strategy of innovative development of the industrial economy and upgrading the quality of training proper
specialists, it is expedient to provide for: introduction in comprehensive and technical schools courses on the bases of intellectual property as well as special courses “Fundamentals of intellectual property” in higher educational establishments; improvement of standards of teaching, training and retraining of specialists on the basis of a new scientific-methodical provision, including the bases of intellectual capital and intellectual property; application of the system of distant learning for specialists in the field of intellectual property, transfer of technologies and innovative activity by means of the internet [10].

Bases of the organization of industrial production and management of an enterprise change under the influence of technological progress. It sets new requirements to the training of specialists, when intellectual capital wider and wider captures industrial production - from large enterprises, which produce unique products, to small.

Before the specialists of industrial production there appear new tasks of cognition of not only practical details of work of the industry, but even to a greater extent, the study of economic and social problems of this type of economic activity (management of an enterprise, industrial technology, social relations). Consequently, being based on the fact that in modern conditions a high technological development is the main source of achievement of social process, it can be said that the acquaintance with technical disciplines is needed not only while gaining technical education, but also while studying humanities by the personnel who will work in the industry, or those, who study this sphere of economic activity.

Conclusion

Innovative economy is a complex, system phenomenon that needs substantial changes not only in the sphere of technologies, but also in society on the whole. It predetermines topicality to the development of new methodological approaches to forming human capital. First of all it concerns training of the staff potential for a modern economy.

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Žmogiškojo kapitalo vystymas inovacinių ekonomikos sąlygomis: metodologinis aspektas

Santrauka

Straipsnyje analizuojami inovacinių ekonomikos kaip transformacijų laikotarpio feno-meno formavimosi ir vystymosi metodologiniai aspektai. Argumentuotai pagrindžiama, kad pagrindas inovacinio vystymosi modeliui įgyvendinti yra žmogiškojo kapitalo formavimas ir tolimesnis vystymas. Investicijų į žmogų, jo kūrybingumą, intelektinį ir inovacini potencialą prioritetai nagrinėjami kaip perspektyvi valstybės socialinio ir ekono-minio vystymo politika. Pagrindžiama, kad mokslinė paradigma, kuri adekvacijai atspindėtų socialinio progreso reikalavimus, turėtų būti grindžiama racionaliu ekonominio tikslinumo ir socialinės orientacijos principu.