

TRANSFORMATION AND CONCENTRATION OF INTELLECTUAL CAPITAL AS A FACTOR OF ECONOMIC GROWTH IN THE MODERN ECONOMY

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Abstract. World experience shows that the high economic and social performance of the industrialized countries, their dynamism and flexibility in a progressive change in the structure of production in the direction of post-industrial society is directly related to the development of scientific and technological revolution, the effective use of its achievements. The hypothesis of the study is the assumption that the capacity of scientific and intellectual potential and its penetration into all areas without exception social production contributes to economic growth. At the present stage the concentration of intellectual capital has significant potential for economic activity, projecting the vector of development of society. This is a key factor, the development of which has a fairly comprehensive resource for qualitative and quantitative changes and time parameters. The study attempts to influence the transformation of scientific evidence and the concentration of intellectual capital on economic growth. The author defines the concept and essence of the concentration of intellectual capital, explores the main ways the concentration of intellectual capital, analyzes the process of reproduction of the intellectual capital and reveals a link gain imbalance of scientific and technological development of the major subsystems of the world economy and individual countries with the outflow of intellectual capital.

Keywords: intellectual capital, transformation, concentration, economic growth, modern economy.

1. Introduction

The history of development of human society is based on social and public progress of knowledge. We cannot claim that just at the present stage of development of human society particularly the question of necessity of managing knowledge acutely raised. The urgency of the problems knowledge economy today is explained by mild asthenia of the society concerning certain unsolvable global issues in the field of ecology, demography, medicine, sociology, etc.

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In this case, some researchers see a panacea for many ills in building of scientific and intellectual capacity and its penetration into all spheres of social production without exception. This study makes an attempt to scientifically prove influence of transformation and concentration of intellectual capital on economic growth.

2. Materials and method

During calculations using Mathcad, we found out that there is a positive relationship between R&D expenditure and GDP in Russia (table 1).

Table 1. Evolution of R&D (Research and Development) expenditure in Russia and its correlation with GDP in 2004-2014

Year	Russia`s GDP, billions of dollars	R&D expenditure in Russia, billions of dollars	%
2004	1.74	0.01	0.57
2005	1.75	0.01	0.57
2006	1.76	0.01	0.57
2007	1.76	0.02	1.14
2008	1.77	0.02	1.13
2009	1.78	0.02	1.12
2010	1.79	0.02	1.12
2011	1.80	0.02	1.11
2012	1.80	0.03	1.67
2013	1.81	0.03	1.66
2014	1.81	0.03	1.66

As a result of the correlation model and constructing a regression analysis based on the data of table 1 was obtained following simple linear regression model: $\hat{y}(x) = 185.7 + 126.4x$. Index $b_1 = 126.4$ suggests that an increase in the volume of R&D expenditure by 1 billion dollars. EU GDP increased by 126.4 billion. Dollars. The correlation coefficient for the model obtained $r_{xy} = 0,958$. So, we can conclude that there is a close relationship between the volume of R&D expenditure and GDP growth. Calculate the coefficient of determination: $D = r_{xy}^2 * 100\% = 95.8\%$. Consequently, the Russia`s GDP by 95.8% in volume is due to R&D expenditure.

Some international researches also find out the positive impact of education and R&D development in some countries. R&D expenditure and human capital has a high positive impact on economic development, we also show concern about the globalization that it is actually imposed in the world, with excessive difficulties for human capital and

researchers to remain in their countries. In our country for example there has been a great increase of highly qualified university graduates but they have not found work in the country and a great percentage had to emigrate (Khan and Samad, 2010; Gimenez and Sanau, 2009; Othman, Jafari, Sarmidi, 2014; Webster, 2013).

3. Results

Within the framework of the study intellect is viewed as an ability of an individual to develop a special kind of product that has the public utility, integrity, scientific importance and novelty. In turn, intellectual property is appropriation of these intellectual products.

Application of intellect to a certain sphere of activity of society determines the nature of labour activity of human. It would be shortsighted to say that it is science where the largest number of highly intelligent professionals is concentrated. In all spheres of human activity, there is an own level of general intellect (we define it as something more than a sum of certain intellects). But the scientific sphere represents a special environment for human search and human development. Science is the best sphere of realization of intellectual abilities.

Process within the sphere of science is realized through a system of scientific ideas and research groups. Scientific ideas are temporary, because they have a certain life cycle. From the microscopic point of view, complex dynamics of scientific research is determined by local interactions between scientists with the abilities, ideas and interests inherent to the latter. From a macroscopic point of view, the global dynamics of fields of research is determined by attractors ('order parameters'). Furthermore, there is a strong interaction between research and its environment [9].

In science, intellectual property is realized just partially. Fully intellectual property can be realized only in certain socially beneficial technologies, quietly transforming into intellectual capital. Intellectual capital as a factor of realization of intellectual property seems to be the most important today in terms of its key role in transformational economic processes. A society, based on knowledge, is the dominant characteristic of the Western way of managing.

Intellectual property, involved in the reproductive process, consists of materialized form of accumulated knowledge and human resources, representing total capacity for socially useful activity, including knowledge, education, creative abilities, experience, skills, creative thinking, intellect, ability to take risks, intuition, which are the source of future income.

Industrial type of economic growth, based on accumulation and subsequent concentration of industrial capital as a result of a number of high-quality transitions, acquired its new quality and transformed into a post-industrial type, built on prevalence of intellectual capital, its accumulation and concentration. In other words, as concentration of industrial capital is determining in the era of industrial development, concentration of intellectual capital (as a new form of social functioning) becomes a

leading factor of transformation of socio-economic system in the era of information society [10].

Concentration of intellectual capital is a process of concentration, accumulation of real and personal forms of intellectual capital in order to enrich knowledge of reproductive process with prepared knowledge, giving special dynamism to economic system [1].

The concentration of intellectual capital is carried out during the process of increase of share of high-skilled workers and share of high-end technologies used in the reproduction process. If this process is carried out continuously, the qualitative and quantitative characteristics of economic development are improving and increasing; as the intellectual capital is concentrated its yield rises up to a certain extent, restricted by the upper limit and then drops sharply.

At the present stage concentration of intellectual capital has significant potential for economic activity, which is a vector of development of society. This is a key factor, development of which has a fairly comprehensive resource for changing qualitative and quantitative and temporal parameters.

Intellectual and technological potential of post-industrial societies became apparent in the 1990s, demonstrated on the one hand, a certain self-sufficiency of the Western world, and on the other - the real extent of the chasm that separates the leading Western countries from those who appeared to be for whatever reason unable to take advantage of modern scientific and technological revolution.

Even in the beginning of 1990s, seven leading post-industrial countries possessed 80.4% of world computers, provided 90.5% of high-tech production and controlled 87% of 3.9 m patents registered in the world as of the end of 1993. In the same period, the number of scientific and technical workers in the US per 1 m people constituted 126.2 thous. people, while the world average rate is no more than 23.4 thous.

The volume of export of American intellectual property has increased from 8.1 bn dollars in 1986 up to 27 bn dollars in 1995, and the trade surplus in this sector exceeded 20 bn dollars. By 1995, the US accounted for three-quarters of the world market of information services and data processing services, whose capacity constitutes now 95 bn dollars. Successes of the Western countries activate new investments in high-tech sectors of the economy, which became the motor of all post-industrial economies.

Throughout the 1990s the countries – members of OECD were spending on research and development in average about 400 bn dollars (in prices of 1995), the US accounted for 44% of which. At the same time, the states of Latin America and Africa, taken together, provide less than 1% of global R & D expenses. Only on education and training of their employees private US companies spend about 30 bn dollars per year, which is equivalent to the total appropriations for research in Russia, China, South Korea and Taiwan. [5]

The main methods of concentrating intellectual capital are its reproduction within the country and intellectual transfer from outside (Fig. 1).

The process of reproduction of intellectual capital is considered in detail in the works of I. Ivanyuk. [6] In particular, she examines the process of reproducing intellectual capital, based on the theory of labor cost, involves the sequence of the following steps:

- 1) intellectual product production, which is an end in itself of the reproduction process;
- 2) the creative process, assuming active exchange of ideas, which is based on a certain level of intellectual activity;
- 3) allocation of capital, determining ratio of functional-resulting and functional-resource levels of reproduction of intellectual capital; 4) consumption of intellectual capital - the purpose of the reproduction process.

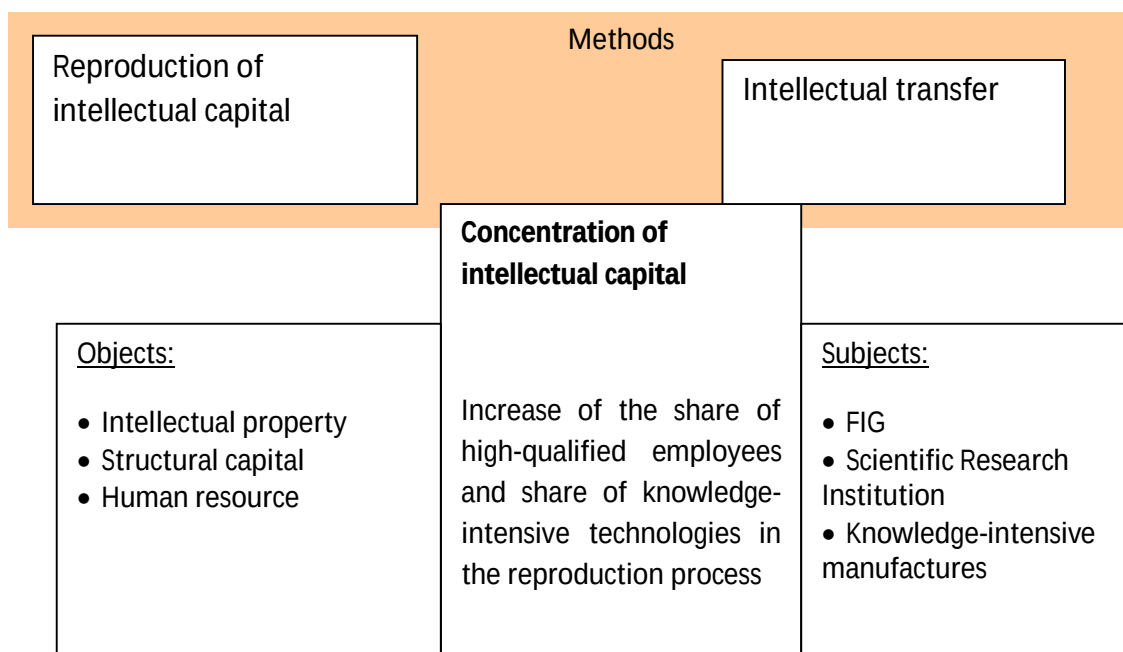


Figure 1. Concentration of intellectual capital

I. Ivanyuk changes the usual sequence of steps and offers the following: 1) distribution of capital: at this stage investment activities of an economic entity is justified with definition of the scope of innovation, forming the resource base of reproduction of intellectual capital; 2) formation of the concept of development: in the process of creative activity on the basis of the study, formation and development of needs, development, selection of ideas, formation of the concept of development occurs; 3) stage of consumption, when approbation, improvement and introduction of intellectual product reach unity; 4) stage of production - increase of the volume and (or) the quality of products occurs, the structure of intellectual property improves and marketing elements,

which allow achieving the best result in the company's activity in the market, actively develop. At this stage, the intellectual capital is a means of improving efficiency of the reproduction process, part of which in the form of the resource returns to the initial stage, closing the reproductive cycle and providing its permanent development.

Intellectual transfer (movement of intellectual capital) may take the following forms [2]:

- a) direct emigration of highly qualified personnel – departure for permanent residence;
- b) departure abroad on a contract basis;
- c) employment of scientists and experts by foreign companies, joint ventures with foreign participation within the territory of the donor country;
- g) full-service rent of a research center, institution of the donor country by a foreign firm. In this case, fundamental and applied researches are carried out under the program of the foreign company and in its interests. [7]

World experience shows that high economic and social effectiveness of the industrially developed countries, their dynamism and flexibility in progressive change of the structure of production in the direction of post-industrial society are directly linked with development of scientific and technological revolution, effective use of its achievements.

The process of development of the STR, began in the middle of the XX century, reached such an extent of maturity that allows to extract the essentials in its content - a radical change in the relations between science and industry, such their coalescence, which turns them into a single mechanism of cognition and transformation of nature and society [3].

Instead of separately existing science and manufacture the trend of formation of new manufacture becomes more clearly, where science, knitting with production, becomes its function, and production therefore becomes knowledge-intensive. Intensity of the process of increasing science-intensity of manufacture in the country is a barometer of acceleration of the STR and, as a consequence, of the progressive change of position of the country in the international division of labor.

4. Conclusion

A radical change in relations between science and production gives a powerful impetus to their development, revolutionize the science, machinery and production in whole, including the sphere of managing them. Experience of the industrially developed countries shows that development of the STR is related to radical organizational and structural changes. First of all, this is a dramatic acceleration of development of science itself as a sphere of labour activity related to the rapid growth of the total number of different research institutes, laboratories, research firms and employment in them [4].

The practical use of science causes not less rapid growth of designing organizations, which, in turn, in order to transmit invention to mass or serial production causes accelerated development of experimental production, etc. The growth of these

links and connections between them leads to their combination into unified scientific and industrial complexes. Capabilities of the country in constant technical and technological renovation of production, increase of its scientific intensity, and, as a consequence, increase of competitiveness of domestic products in the world markets depend on how effectively all parts of these complexes and their interconnections develop.

No country under the modern conditions can effectively develop, occupy a worthy place in the international division of labor without proper scientific and technical potential. Moreover, under the conditions of acceleration of the STR and globalization of the world processes scientific and technological potential becomes strategically important for each country. [8]

The outflow of intellectual capital often causes heavy damage to intellectual potential of the donor countries, which is the most valuable substance of any society. The essence of the problem constitutes in not as much as in the number of specialists departing abroad, but in their significance. Departure of this or that informally leading researcher can paralyze work of a creative collective. Outflow of intellectual capital intensifies imbalance of scientific and technical development of the main subsystems of the world economy and certain countries.

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