Reproduction of intellectual capital in innovative-digital economy environment

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Abstract. The important role of the intellectual capital in the innovative-digital economy generates an objective necessity in the immersed study of the processes of its creation, formation and application, which will allow making the correct selection of guidelines and directions of further development and will lead to creation of such an economic development strategy in the heart of which is a human being with the accumulated knowledge, skills and ground-breaking ideas. The article covers the peculiarities of the intellectual capital reproduction in the innovative-digital economy environment. The study of the human capital obsolescence processes is also carried out; the cycle, stages and forms of its reproduction are represented; the system of enterprise management is developed, which provides enhancement of production efficiency on the basis of its interspecific resources. The study shows that the objective necessity and peculiarity of the modern stage of the world community development is creation of conditions for generation and development of the human capital intellectual component facilitating the transition to the innovative-digital economy.

The results obtained in the course of the study can be used for making managerial decisions on creation of the efficient mechanism of reproduction and control over the intellectual capital relevant to tasks of the social-economic development of the country.

1. Introduction

Transition to a new model of economic development of the Russian Federation is taking place at the present time. In the age of globalization, advent of knowledge-based economy, transition to innovative-digital economy the sharp rise is observed in the importance of human capital intellectual component and search of growth drivers for hi-tech and highly-efficient production to ensure competitivenes of territories [1]. Deep conceptual and structural transformations of the economical actions have led to gradual transition to science-based activity [2].

The most important peculiarities of the knowledge-based economy began to appear impressively in the leading countries of the world in the end of the 20th century [3]:

1. The economy growth is connected with the results of innovations, efficiency of the innovative process organization. The unified theory of the growth assumes that the transition from stagnation to growth is an inevitable result of the development process which is impossible without innovations [4];
2. The hi-tech economic sectors have become the economy flagships the major part of which is connected with reproduction of new knowledge, predominance of intellectual labour, full-scale generation of intellectual products;

3. The scope of knowledge and information which have become the main product and subject of labour is developing at an accelerating pace;

4. The economy digitalization in progress results in the corresponding changes in the occupational structure;

5. The importance of intellectual property heightens, and intangible assets of enterprises prevail as compared to physical assets;

6. A number of innovatively active enterprises increases along with the traditional subjects of innovative activities: individual invents, scientific and educational institutions.

Transition to innovative-digital economy is impossible without the growth in the intellectual capital reproduction efficiency.

The purpose of the study is to summarize the theoretical knowledge and to extend empirical knowledge on the reproduction processes of the human capital intellectual component in the frames of the innovative-digital economy.

2. Essence of intellectual capital

From the point of view of the reproduction subjects the intellectual capital is subdivided into personal, corporate and state one. The basis for the personal capital is intellectual abilities and accumulated knowledge of a human being.

The corporate capital is the intellectual capital of all employees of the enterprise or organization. It should be noted that the enterprise income does not decrease, but even increases at investment in the employees' education despite of the growth in proposals for education of labour resources [5]. On the other hand, the human capital cost decreases during transitional phases in the economy development [6].

The state intellectual capital is the intellectual capital of all residents in the country. The higher is the intellectual capital of the population, the higher is the wealth of the state [7]. It has been established that the additional year of secondary-level education for a low-level worker increases the labour productivity by approximately 20%. Besides, the evidence exists that such significant effect can be conditioned by availability of the threshold phenomenon in the secondary-level education at the age from three to four years [8].

3. Human capital in production process

Increase of technology level, population growth and change in its composition has accelerated the technological progress which finally has increased the human capital importance in the production process [9].

At the present time, due to demographic ageing of population, lack of engineering stuff, migration of high-skilled workers abroad there is much concern about the intellectual capital reproduction. Notwithstanding that at the present time the offer of highly skilled workers at the labour market has increased and keeps growing [10], the level of population education is also increasing (a number of people getting higher education, defending master's and doctor's dissertations is increasing); at that, however, the lack of highly skilled workers and professionals is observed.
4. Results and discussion

4.1. Obsolescence of human capital
It should be noted that obsolescence of professional expertise, knowledge and skills of labour resources take place with time, which is connected, inter alia, with the technological progress acceleration. Criteria of professional obsolescence of labour resources are given in Table 1. For the first time these criteria have been distinguished by the Russian academic economist E. I. Komarov, and structured by D. A. Doronichev and S. L. Ivankovsky [11].

| Signs of professional obsolescence | Reasons of professional obsolescence |
|-----------------------------------|-------------------------------------|
| Obsolescence of professional expertise, knowledge and skills | Rapid development of science and technology |
| | Unwillingness of the management to increase the professional level of workers |
| | Indisposition of workers to increase their professional level |
| Stagnation of professional expertise and skills | Inflated self-concept, building on past success and merits |
| | Absence of incentives to increase qualification |
| | Absence of incentives to replenish, update and improve own expertise, knowledge and skills |
| Solution of new tasks by the existing but inefficient methods | Stagnation of a list of methods used |

4.2. Reproduction of intellectual capital
Prior to implement new equipment and technology the competitive enterprises reconstruct methods of organization and management, change HR policy, prepare competent stuff, i.e. carry out reproduction of intellectual capital.

The cycle of intellectual capital reproduction is given in figure 1.

![Figure 1. Cycle of intellectual capital reproduction.](image-url)
The process of intellectual capital reproduction includes the following phases (figure 2):

**Figure 2.** Phases of intellectual capital reproduction.

A system of industrial enterprise management ensuring increase in production efficiency with account of the use of its intellectual capital (inter-specific resources, as development factors of the second order) is given in figure 3.

**Figure 3.** The enterprise management system providing increasing production efficiency on the basis of its inter-specific resources.
Different types of education provide continuous reproduction of the corporate intellectual capital (inter-specific resource). Besides the primary forms of education at school, college, engineering school or university there are the secondary forms as well which are aimed at advancing the qualification level and re-training of labour force both at a single enterprise and in the industry sector on the whole.

The inter-company training plays the key role in the process of labour resources creation at the enterprise, since the majority of enterprises require that employees have special skills and knowledge that cannot be provided in the course of general education [12]. The inter-company training represents a systematic process included in the general policy of the intellectual capital development within the enterprise and aimed at increasing the knowledge level, improving the expertise and skills of an employee in order to enhance efficiency of the enterprise activity [13].

There are the following forms of the inter-company training (figure 4):

![figure 4](image)

**Figure 4.** Forms of labour resources qualification improvement at enterprise.

As mentioned before, the traditional view of economists consists in that education leads to improvement of the individual person production capacity and, hence, increases the market value of his labour [14]. The accounting rate of return for the additional year of education varies from 5% to 12% [15]. Organization of training courses provides improvement of qualification and versatility training which makes it possible to improve labour organization and expand the production profile of workers. If modernization of production and technological processes takes place at the enterprise then the special training courses are organized. The traditional form of qualification improvement is mentorship which gives a possibility to qualified workers to transfer their experience to the green employees of the enterprise.

The joint scientific and research activity facilitates transfer of best practices, exchange of ideas and self-education of the enterprise employees.

Thus, reproduction of the innovative intellectual capital at the enterprise can be performed by the following two ways: engagement of the highly qualified stuff; or, re-training or advanced training of the existing stuff.

The special place in the intellectual capital reproduction system is given to self-education, thanks to which an employee can independently search for possibilities to obtain the additional education. The negative point in this connection is that an employee becomes more independent of the employer, while the inter-company training gives specific professional training to the employee (development of the inter-specific resources), which cannot be always implemented at the different work place.

5. **Conclusion**

Substantiated in this article is that the objective necessity and peculiarity of the modern stage of the world community development is creation of conditions for generation and development of the human capital intellectual component facilitating the transition to the innovative-digital economy. In its turn, this requires making adequate and target-oriented changes to the system of human capital management within the dedicated territories and to search of factors providing increase in the process efficiency.

The innovative changes in the country, focused on more efficient management of the human capital, will be promotive of increase in the added value intermediated by the influence of the regional labour market [16] and will straighten the competitive ability of enterprises, regions and the country on the whole.

Our results consist in summarizing the mechanism of the intellectual capital reproduction in the innovative-digital economy environment, which makes it possible to use the intellectual capital in a
good and workmanlike manner and to change the economy structure through the practical implementation of new knowledge and rational use of the innovative activity results of the commercial entities.

The future studies must be focused on the development of the innovative development model of the human capital intellectual component, as well as the substantiation of the theoretical-methodological aspects of the organizational-economical mechanism of the human capital management in order to increase the competitive advantages of territories.

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