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Measuring human capital: methodological framework for assessing competitiveness and economic development

Medindo o capital humano: quadro metodológico para avaliar a competitividade e o desenvolvimento econômico

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RESUMO: Este artigo enfocou a relação entre capital humano (HC) e competitividade na Rússia. O estudo examinou (1) o impacto dos investimentos em indústrias intensivas em conhecimento no desenvolvimento socioeconômico; (2) o impacto da proporção de empregados; (3) o impacto de fatores religiosos no HC; e (4) os problemas de formação de H em empresas inovadoras. Em nível nacional, os investimentos em indústrias intensivas em conhecimento não têm efeito sobre o desenvolvimento socioeconômico do país. O crescimento do PIB provou estar diretamente relacionado ao desejo das pessoas de melhorar suas qualificações. O impacto dos fatores culturais, educacionais e de saúde diferem entre as regiões.
PALAVRAS-CHAVE: Capital humano; inovação; investimento; métodos de medição; qualificação.

ABSTRACT: This article focused on the relationship between human capital (HC) and competitiveness in Russia. The study examined (1) the impact of investments in knowledge-intensive industries on the socio-economic development; (2) the impact of the share of employees; (3) the impact of religious factors on HC; and (4) the problems of forming

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H at innovative enterprises. At the national level, the investments in knowledge-intensive industries exert no effect on the country's socio-economic development. The GDP growth was proved to be directly related to the people's desire to improve their qualifications. The impact of cultural, educational, and health factors differ across regions.
KEYWORDS: Human capital; innovation; investment; measuring methods; qualification.
JEL Classification: E24; J24; O15.

INTRODUCTION

The development of modern society is accompanied by the growth and complication of information and communication technologies and the external environment's dynamism and uncertainty. Under such conditions, human capital (HC) acquires decisive importance, being not only the main driving force of economic development but also the most critical factor of competitiveness. One may note that the abundance of literature on the evolution of highly developed economies is characterized by a sudden reorientation of views concerning the central factors of economic growth towards a person, his/her knowledge, skills, ability to create innovations, and other qualitative characteristics. That is, in the transition to a knowledge economy, HC becomes a factor determining economic growth (Januškaitė and Užienė, 2018; Mubarik et al., 2018). International economic statistics show that for the largest world corporations, the value of physical (tangible) assets is already significantly inferior to that of their intangible (intellectual) assets (Liu and Fraumeni, 2016). And, as envisaged by the general social development vector, this tendency is expected to affect all the other entrepreneurial structures.

The concept of HC was substantiated by the Chicago School economists, according to which it is a combination of knowledge, health, skills, and experience that an individual uses to generate income (Lim et al., 2018). Researchers admit the importance of its formation and development through the contributions in the form of health, knowledge, skills, abilities, and motivations. At the same time, they note that specifically these contributions will determine the resulting productivity and earnings, thereby stimulating further investment in HC and leading to a further rise in receipts (Angrist et al., 2019).

HC is a complex economic category that has qualitative and quantitative characteristics (Angrist et al., 2019; Chams and García-Blandón, 2019). The main aim of its measurement is to obtain the rates of return from HC investment to track the costs and benefits that can be received from the costs incurred. According to the modern theory of HC, not only the volume of investments in it is estimated but also the volume of HC accumulated by a person. Alongside this, the cost of the total volume of HC is measured both for the region and for the entire country. Against this background, it is essential to develop optimal and comprehensive approaches to its evaluation, with a subsequent formation of new and improvement of existing methods.

LITERATURE REVIEW

Modern methodologies of measuring HC are extremely diverse due to the use of a wide range of indicators. Conceptually, the components of HC are evaluated at various economic levels. At the macroeconomic level, HC determines the contribution of a whole country or region to workers' education, professional preparation, and health. At the enterprise level, HC represents the aggregate skills and productivity of all employees. At the level of the individual, HC implies knowledge, skills, accumulated experience, and other production characteristics acquired by a person in the process of education, vocational training, and practice with which he/she can make a profit (Kianto et al., 2017).

Since being developed, the very idea of HC has undergone a number of meaningful transformations. The world academic community distinguishes three stages of the HC theory development. The first stage corresponds to the early 1960s, the second – to the period from 1970 to 1990, and the third – to the period from the early 1990s to the present. During this time, the education-based structure of HC was enriched with the aspects of health, culture, and the economy. Apart from this, the procedure of measuring HC also changed. In particular, the initial (financial) indicators were supplemented with those characterizing the intangible side of HC and began to be measured not only by the amount of accumulated HC but also by the added value it created. The definition of HC has evolved dramatically as well: from a narrow meaning considering only innate abilities, talent, education, and acquired qualification it has shifted to a broader idea, regarding HC as a source of competitive advantages. Nevertheless, currently, no unity in the explanation of HC exists. Its most widely used interpretations are as follows (Angrist et al., 2019):

1) HC is a socio-economic category characterizing a person as a complex system of relations in a post-industrial society, capable of self-organization, renewal, self-improvement, and acting as an intellectual and creative factor as well as a key building resource of a socio-innovative model of economic development;

2) HC is a collection of traits formed and developed as a result of investments in one's knowledge, professional skills, abilities, experience, health, motivation, mobility, and spirituality, which can increase the productivity of an individual through the use of intellectual and creative components, act as a source of income in the future, and increase the national wealth of a country (Demenkova et al., 2018);

3) HC is a form of capital able to create new value in the form of certain abilities, knowledge, professional skills, experience, and health and thus generate future income.

In order to evaluate structural components of HC, researchers worldwide use the indices and indicators especially developed by leading international organizations. These include the Knowledge Economy Index, the Education Index, the Human Development Index, and the Key Indicators of the Labour Market (Kraay, 2019). Although their calculation provides valuable data on separate components, they fail to measure HC in general. In view of this, the World Economic Forum experts developed a comprehensive Human Capital Index expanding the notion of

HC with an indicator of health status (physical capacities, cognitive function, and mental health) (Kraay, 2019).

In total, the Human Capital Index (World Bank, 2018b) is based on four pillars: three core determinants of HC plus factors allowing these three core determinants to be translated into the assessments of the competencies and knowledge of the person carrying HC. Apart from the Human Capital Index developed by the World Economic Forum, HC measurement is also performed under the methodology proposed by the Organization for Economic Cooperation and Development (OECD). It combines three generally accepted approaches to measuring HC (cost-based, income-based, and investment-based) and provides for the calculation of three sub-factors (investment in HC within national boundaries, quality of management and regulation of these investments through the international comparison of academic achievements, and the process of using the investments' results in higher education). The use of the two indices mentioned above makes it possible to assess the state of HC development in the most accurate manner possible and identify the strengths and weaknesses of its formation. However, both are not perfect due to being limited only to the analysis of several structural components (OECD's Index analyzes the educational component solely, whereas the World Economic Forum's one is limited to education, experience, health, and external environment). None of them covers organizational, entrepreneurial, and intellectual abilities, cultural and moral characteristics, the ability to migrate, and the like. For this reason, one can confidently argue that today, an integrated index for measuring HC covering all its structural components has not yet been developed (World Economic Forum, 2017b).

Investigation of the formation of advanced economies allowed noticing a reorientation of views on the key factors of economic growth. Hence, now, the utmost importance is given to a person and his/her knowledge, skills, ability to create innovations, and other related qualitative characteristics (Lim et al., 2018). The intensification of innovative processes, widespread dissemination of information and computer technologies, intellectualization of labor, and globalization of the economy have transformed the content, structure, and impact of HC on economic development. This fact makes adjustments to the process of its formation, accumulation, and implementation (Angrist et al., 2019).

Modern concepts of HC development define an individual as the central resource and value of society's development. The primary attention here is drawn to raising the quality of HC by introducing lifelong learning and personal development with reference to one's abilities and capabilities. The complexity of measuring HC lies in the fact that its unit is not the person but the totality of his/her knowledge, skills, abilities, health condition, and the like determinants. HC is a complex category, which requires considering quantitative and qualitative indicators to be evaluated accurately. However, not all of its structural elements can be quantified. At the microeconomic level of HC measurement, the following scientific approaches are used:

1) Cost approach (method of determining initial costs, method of accounting for restoration costs, method of accounting for replacement costs) (Coad and Vezzani, 2017);

2) Income approach (discounting method, income capitalization method) (Tran and Vo, 2020);

3) Market approach (HC measurement is carried out by comparing similar indicators (employee competencies) and is determined by the method of intangible assets valuation and the method of comparative sales) (Mubarik et al., 2018);

4) Investment approach (HC measurement is performed taking into account the investment in a person) (Kucharčíková et al., 2018);

5) Residual approach (used by the World Bank and includes physical, natural, and intangible capital; the latter covers the quality of institutions, as well as human and social capital) (World Economic Forum, 2018).

Thus, the differences in the methodological approaches to HC analysis reside in:

- Determining HC components – most researchers distinguish two its elements: intellectual capital and health capital. Less often, mobility, motivation, awareness, and appearance are identified;
- Area of HC application – by and large, this area is limited to economic activity, particularly productive work in the enterprise to increase its income and the income of HC bearer; besides, cultural and social factors in HC formation are not taken into account (Askretkov and Koryakov, 2018).

Hence, the methods for measuring HC at various levels require further development and improvement in terms of expanding the range of structural components and taking into account the indicators of the impact of the external environment.

PROBLEM STATEMENT

The formation of the theory of HC is a process of accumulating scientific views and theoretical and methodological concepts corresponding to the role and place of a person in the economy and society. In contrast, the influence of society and culture on HC measurement has not yet been disclosed in detail. Researchers put forward the idea that successful HC development is possible only in a post-industrial society, where scientific knowledge and information are brought to the fore, and a new social environment is created (Dobrynin and Dyatlov, 1999).

In this connection, it is of scientific interest to determine the relationship between HC and competitiveness at different levels (national, regional, enterprise). The object of this research is represented by the Russian Federation since its regions are located both in Asia and Europe, and the country itself is characterized by the presence of mono – and multi-religious regions. Apart from this, the availability of 27 innovative regional clusters in the Russian Federation makes it possible to consider the influence of intellectual capital as part of HC on individual enterprises' competitiveness (Koryakov and Zhemerikin, 2019). This strategy enables conducting a quantitative examination of the influence of HC on the formation of the competitiveness of the country, its regions, and individual enterprises.

In such a manner, the ultimate goal of the study is to quantitatively demonstrate

the influence of HC on the formation of competitiveness at different levels (national, regional, and enterprise).

The research objectives are as follows:

- Determine the relationship between the amount of investment in knowledge-intensive industries and the socio-economic results of the country's development;
- Determine the relationship between the value of the gross domestic product (GDP) and the share of employees whose HC development is ensured by advanced training;
- Determine the influence of religious factors on the formation of HC at the regional level;
- Determine the features of HC formation at innovative enterprises.

The research object is the process of formation and use of HC in a modern economy at the national, regional, and enterprise levels.

The research subject is the theoretical foundations and organizational and economic approaches to the development and use of HC that consider the peculiarities of the innovative economy's formation.

MATERIAL AND METHODS

The research was carried out in several stages. At the first stage, the hypothesis that investments in knowledge-intensive industries increase the socio-economic results of the country's development was tested (H1). For this, regression relationships were constructed for generalized statistical data on enterprises in the Russian Federation (Federal State Statistics Service of the Russian Federation, n.d.; Voskoboynikov, 2019) (Table 1).

Table 1: Share of innovative enterprises in Russia (based on data retrieved from Federal State Statistics Service of the Russian Federation (n.d.) and Voskoboynikov (2019))

Indicator	Year						
	2014	2015	2016	2017	2018	2019	2020
Introduced new technological processes, % of the total	0.444	0.383	0.429	0.456	0.436	0.507	0.497
Underwent the production of innovative goods, % of the total	0.575	0.520	0.505	0.551	0.513	0.521	0.517
Distributed innovative goods, % of the total	0.856	0.842	0.792	0.786	0.756	0.786	0.774
GDP, billion USD	2056.58	1363.70	1282.66	1578.41	1630.66	1609.4	1557.9

Also, at this stage, the dynamics of such HC component as the proportion of employees whose HC development is ensured by advanced training was considered (based on data adapted from Federal State Statistics Service of the Russian Federation (n.d.) and Voskoboynikov (2019)). The initial data on this matter is presented in Table 2. The purpose of this action was to test the hypothesis about a direct relationship between the share of workers who have improved their professional skills and the country's GDP (H2).

Table 2: Dynamics of the share of Russian workers engaged in advanced training, by type of economic activity (based on data retrieved from Federal State Statistics Service of the Russian Federation (n.d.) and Voskoboynikov (2019))

Indicator	Year						
	2014	2015	2016	2017	2018	2019	2020
In general, to the total number of full-time employees	9.1%	9.5%	9.3%	9.4%	9.2%	9.2%	9.3%
Agricultural sector	1.2%	1.4%	1.2%	1.3%	1.4%	1.4%	1.4%
Production sector	14.2%	14.3%	14.8%	14.7%	14.2%	14.3%	14.5%
Construction sector	4.8%	5.3%	5.2%	5.1%	4.0%	4.5%	4.7%
Trade sector	1.8%	1.8%	1.9%	2.2%	2.4%	2.5%	2.4%
Finance and insurance sector	7.8%	7.4%	7.3%	7.5%	7.9%	7.5%	7.7%
Public administration sector	11.4%	13.2%	13.4%	14.2%	13.9%	14.1%	14.2%

The second research stage implied the analysis of the influence of cultural and religious environment on the development of HC at the level of the region. The hypothesis of this stage assumed that religious factors do not determine the HC development, or in other words, the indicators of HC are the same for regions with different predominant religions (H3). Due to the specifics of Russian administrative and territorial division, the considered regions were united by federal districts, for which the generalized indicators of educational, health, and cultural capital were compared. Thus, educational capital indicators encompassed the share of university students of all levels of accreditation per 10 thousand population (in people), the share of faculty with an academic title per university (in people), and the share of the university-educated population per 1 thousand population (in people). Health capital indicators covered the number of hospital beds per 10 thousand population (in people) and the number of practicing doctors per 10 thousand population (in people). In turn, cultural capital indicators embraced the number of arts and cul-

tural institutions per 100 population (units) and the average number of visits to arts and cultural institutions per year per 100 population. The choice of these particular criteria is explained by the presence of extensive statistical data for the districts considered (Federal State Statistics Service of the Russian Federation, n.d.). Aggregate HC for the federal districts of the Russian Federation was measured by the method of the multidimensional average:

$$\overline{p_i} = \frac{\sum_{i=1}^{n} p_{ij}}{k} \qquad (1)$$

where n is the number of federal districts, i is the ordinal number of the district (i = 1, 2, ... n), X is the indicator of a specific component evaluation, k is the number of evaluation indicators (3 for education capital and 2 for culture and health ones).

At the third stage of the study, HC was considered at the level of individual enterprises. The research hypothesis of this stage (H4) was that HC is among the key factors in individual enterprises' economic growth, provided that appropriate conditions are created. To test its validity, enterprises located in innovation clusters of the Russian Federation were selected. Clusters were selected randomly. Besides, an anonymous online survey was conducted among specialists of the enterprises (managers, economists, HR department staff, labor economics experts, etc.) whose activities are related to the solution of personnel-related issues. For this, a special questionnaire was developed to determine the main directions of HC formation and reproduction at the enterprise level. After that, data for individual enterprises were grouped, and a collective estimate of HC of enterprises in innovative clusters was obtained. Although being effective, this approach imposes the limitation in the form of a high probability of getting subjective results. The evaluation of HC at the enterprise level was carried out according to the parameters of health, knowledge, skills, abilities, motivation, professional experience, mobility, level of spiritual and cultural development, morality, talent, and leadership and personal qualities of an employee (World Bank, 2018a).

The process of surveying was performed using the online panel, i.e., the respondents were a group of registered internet users who realize that they have agreed to participate in the research on a paid basis. This approach is believed to be relevant and providing reliable results. The socio-demographic characteristics of respondents enrolled are presented in Table 3.

Table 3: Socio-demographic characteristics of interviewed persons

City	Females				Males			
	25-35	35-50	50-65	65+	25-35	35-50	50-65	65+
Perm	1	2			2	1	2	
Dubna			2	1	4	3	2	1
Nizhny Novgorod		2		3	3	5		1
Troitsk	2		3		2		4	2
Khabarovsk			2	2		2	2	1
Total	3	4	7	6	11	11	10	5

Within the investigation, the following data quality control was envisaged:

- Data obtained in the survey were compared with the profiling data;
- Restrictions on participation during a certain period were used;
- Multiple registrations were checked using built-in functions;
- Response uniqueness was monitored.

The sampling error did not exceed 5%. The study provided the ability to choose among several answer options.

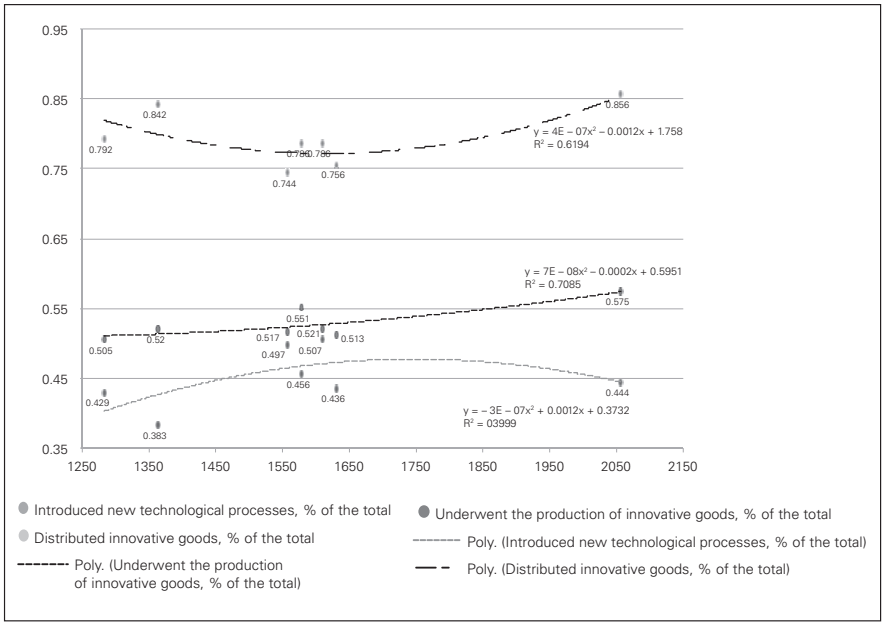
RESULTS

In order to confirm the relationship between the investment in knowledge-intensive industries and socio-economic results, correlation-regression analysis was carried out. For this, the dependence of GDP on R&D (research and development) expenditures for enterprises in the Russian Federation was taken as a regression function (Table 4 and Figure 1).

Table 4: Results of constructing regression models outlining the dependence of GDP on R&D expenditures, by types of Russian enterprises

Indicator	Regression equation	Correlation coefficient
GDP, billion USD = f (Introduced new technological processes, % of the total)	y = 154116x2 – 247234x + 100560	R^2 = 0.4566
GDP, billion USD = f (Underwent the production of innovative goods, % of the total)	y = 7E-08x2 – 0.0002x + 0.5951	R^2 = 0.7085
GDP, billion USD = f (Distributed innovative goods, % of the total)	y = 4E-07x2 – 0.0012x + 1.7548	R^2 = 0.6194

Figure 1: Dependence of GDP on R&D expenditures, by types of Russian enterprises

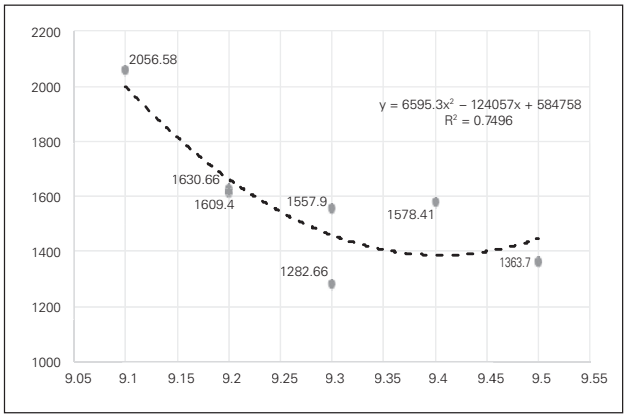


According to statistical data, the share of industrial enterprises introducing innovations is growing every year. However, since 2016 there has been a notable drop in the number of firms that have mastered the production of innovative products and those distributing them.

When considering the dynamics of the share of workers whose HC development is ensured by advanced training, a direct link between this indicator and the country's GDP was found (Figure 2):

$$y = 6595.3x^2 - 124057x + 584758 \qquad R^2 = 0.7496$$

Figure 2: Dependence between the share of workers who have improved their skills and the country's GDP



As stems from the data obtained, over the analyzed period (2014-2020), the share of employees undergoing additional professional training increased. The most considerable growth in the percentage of workers engaged in qualification upgrading was observed in public administration (60.95%), construction (27.86%), and trade sectors (27.35%), whereas the most significant reduction in their portion was noted in agriculture. In general, in terms of economic activity types, during 2014-2020, the share of employees who improved their qualifications in the total number of full-time workers remained practically unchanged only in financial activities and education.

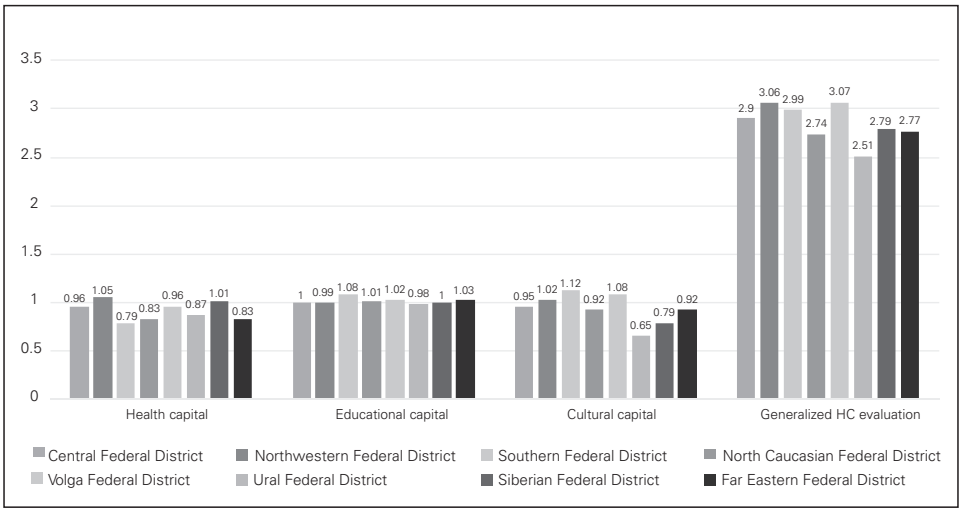
The second research stage focused on investigating whether HC development is determined by religious factors (Table 5).

Table 5: Religious impact: generalized calculation results by federal districts

Federal district	Health capital	Educational capital	Cultural capital	Generalized HC evaluation	Prevailing religion
Central Federal District	0.96	1.00	0.95	2.90	Orthodox Christianity, 67%
Northwestern Federal District	1.05	0.99	1.02	3.06	Orthodox Christianity, 64%
Southern Federal District	0.79	1.08	1.12	2.99	Orthodox Christianity, 44%
North Caucasian Federal District	0.83	1.01	0.92	2.74	Islam, 67%
Volga Federal District	0.96	1.02	1.08	3.07	Orthodox Christianity, 53%
Ural Federal District	0.87	0.98	0.65	2.51	Orthodox Christianity, 71%
Siberian Federal District	1.01	1.00	0.79	2.79	Orthodox Christianity, 64%
Far Eastern Federal District	0.83	1.03	0.92	2.77	Orthodox Christianity, 8%

According to the investigation results, it was found that the factors of culture, education, and health differ slightly across regions, despite the predominance of one or another religion in it. With that knowledge in mind, the following factors of innovative environment and personal motivation are of primary importance for training and further labor potential growth: formation of an organizational and institutional environment to promote innovative activities, innovations in education and science, innovative development of modern enterprises. A well-developed innovative environment tuned to bring up an individual ready for productive activities, as well as capable of adapting to changes and creating new ideas, products, and services, is becoming crucial for effective HC development. The prerequisite for this is precisely the system of education and science designed in close connection with the innovative activity in various business sectors (Figure 3).

Figure 3: Variation in the values of HC components by federal districts



At the third stage of the study, HC was considered at the level of individual enterprises located in innovative regional clusters. Its outcomes are presented in Table 6.

Table 6: Distribution of respondents' answers to the questions about the HC parameters at the enterprise level

Questions	Answers	%
What measures are being taken to improve the health of workers at your enterprise?	a) Regular medical examinations	67.74%
	b) Issuance of health resort or gym membership vouchers	32.26%
	c) Prevention of occupational diseases	45.16%
	d) Arrangements for meals (canteen, catering)	58.06%
	e) Other	19.35%
How does your enterprise utilize benefits from staff members' knowledge?	a) Training young specialists	70.97%
	b) Improvement of existing equipment and technology	64.52%
	c) Improvement of activities' organization	48.39%
	d) Other	16.13%
Does your enterprise practice the movement of employees and specialists from one department to another?	a) Yes	70.97%
	b) No	25.81%
	c) Only for employees of certain departments	3.23%

Does your enterprise have a well-functioning system for transferring experience from highly-qualified specialists to young ones?	a) Yes	56.77%
	b) No	43.23%
What motivation methods are used in your enterprise?	a) Coercion (moral)	0.00%
	b) Material	80.65%
	c) Moral (recognition, certificates, awards, etc.)	58.06%
What is the staff members' attitude towards employees who have leadership qualities and try to show them?	a) There are no such employees	3.23%
	b) Positive	83.87%
	c) Negative	3.23%
	d) Such workers are ignored	6.45%
	e) Your answer	9.68%
What is the attitude of management towards employees who have leadership qualities and try to show them?	a) There are no such employees	3.00%
	b) Positive	84.10%
	c) Negative	0.00%
	d) Such workers are ignored	6.45%
	e) Such workers are fired	0.00%
	f) Your answer	9.68%

The collected survey results revealed that respondents are highly interested in HC development, and the enterprises' leadership understands the critical importance of its proper management. Given that one of the main HC components is the state of health, such a situation not only characterizes the effectiveness of actions taken to develop HC and maintain its high quality but also allows assessing the social orientation of enterprise's economic activity. In general, the assistance of an enterprise in health preservation or improvement was rated by research participants as above-average.

Another aspect unveiled by virtue of the conducted survey is that a well-functioning system for transferring experience from highly-qualified specialists to young workers is actually absent (such system's existence was confirmed by about 50% of respondents). At the same time, among the factors of HC development and use, the increased value of professional education in the subjective evaluation of HC by employers was obvious. In general, it was uncovered that they are not ready to make more investments in the development of this HC component than in improving and maintaining an appropriate level of health. Moreover, having a strong influence on the results of using HC expressed in the form of wages, further career growth, and the possibility of saving money and acquiring property, vocational education is nowadays referred to as the main factor in ensuring workers' competitiveness. The high significance of this factor and its direct impact on the enter-

prises' economic outcomes were confirmed by employers' readiness to organize various types of personnel development. In view of this, a conclusion can be drawn that enterprises should pay more attention to improving such qualitative characteristics of the process of professional development of personnel as accessibility, practical orientation, progressiveness and effectiveness of training programs, their consistency with production needs, and the degree of employees' motivation to achieve high results during preparation. Such measures are expected to significantly increase the level of assimilation of new knowledge and skills by staff members. On top of this, they are supposed to gradually create conditions for increasing the socio-economic efficiency of professional development measures through a well-functioning system of advanced experience adoption. Fulfillment of this condition to the fullest extent possible will reduce the intensity of professional development activities with a simultaneous constant or even growing socio-economic return. Otherwise stated, enterprises will be able to obtain two positive effects at once – savings in terms of professional personnel development and advancement in the resulting economic activity indicators.

However, one should not miss the fact that obtaining the expected return on investment in HC is possible only if employees are fully aware of the need for their professional development or retraining. Achieving such an understanding is possible through the enhancement of their loyalty to the enterprise and an increase of the proportion of staff fully satisfied with the workplace and the working conditions. Thus, the positive point is that the enterprise managers put the central emphasis on the material motivation of workers (80.65%).

In sum, the study findings confirmed the assumption that HC is one of the key factors in the economic growth of an enterprise, provided that appropriate conditions are created. The utmost attention of the considered businesses was paid to the parameters of health (at each of the enterprises studied, at least one means is used to improve workers' wellness) and knowledge (96.77%). Moreover, the examination showed that the attitude towards employees of marked initiative is positive in most enterprises both on the part of the staff and management. At the same time, insufficient attention was revealed to be paid to motivation, morality, level of spiritual and cultural development, and employees' personal qualities.

The negative factors affecting HC of enterprises include the poor interest of employers and employees in investment in professional training, lack of relevant structural divisions or positions directly at the enterprises, and no effective motivation system. To ease the existing situation, representatives of enterprises' ruling circles should conduct thorough educational work with their managerial and HR staff regarding the importance of HC management, as well as introduce a comprehensive program for HC development and create a cooperative social partnership system. In the meantime, to achieve effective HC management at an enterprise, the formation, reproduction, and use of HC are to be performed with reference to each employee's individual characteristics.

DISCUSSION

The issue of the conditions and particularities of HC development gains more and more importance these days as it signifies an objective condition for the development of the national economy due to providing considerable competitive advantages. Nevertheless, modern HC measuring methods require considerable improvement through the expansion of the range of indicators characterizing the diverse components of this economic category. When designing a methodology for the comprehensive HC measurement, in addition to factors of health, education, and the like, the determinants describing the impact of the institutional system on HC development are also recommended to be considered. They ensure qualitatively new competitive advantages of an HC carrier as an environment for forming a particular worldview and life values as well as act as a driving force in determining one's life philosophy and priorities.

As such, HC development is impossible without a state-supported scientific and innovation policy. The conducted research failed to prove the hypothesis that investments in knowledge-intensive industries increase the socio-economic results of the country's development. This conclusion contradicts global practice and previous results reported in the literature as most developed countries are characterized by preserving the trend towards an increase in allocations for R&D. Over the past decade, global spending has grown faster than global GDP (World Bank, 2018a). Hence, throughout the last ten years, R&D investment growth has been observed in the US (by 46%), Japan (by 27%), and the EU-27 (by 18%). A similar increase in R&D investment is also inherent to Finland, Israel, Hungary, China, and India, which is a sign of widespread efforts taken by economies to intensify knowledge and technology development. What concerns the Russian Federation, the advancement of HC across its territory is constrained by the slow pace of innovation.

According to the data collected, there is a direct relationship between the country's GDP growth and the share of workers whose HC development is ensured through motivation to upgrade their qualifications. The main negative prerequisites for the slow development of HC in Russia are formed at the stage of its use. Around the same time, the problem of the discrepancy between the obtained education and the amount of remuneration remains particularly significant. The share of employees who have acquired new professions or underwent professional training in the total number of full-time employees is still low. Consequently, the theoretical foundations of the theory of HC in enterprises are applied inadequately. This drawback poses several challenges. The first lies in inconsistency between the enterprises' needs and the structure and volume of advanced training courses, whereas the second relates to enterprises' reluctance to invest in the retraining of specialists because later such workers may qualify for higher wages or change their place of work.

Today's world economy is dominated by a conceptual approach to HC as the goal of the country's socio-economic development, embodied in welfare, education, longevity, respect for human rights, and life safety (World Bank, 2018a; World Economic Forum 2017a, 2018). Thus, the policy of enhancing investment in HC

should be simultaneously implemented at all management levels (Batarlienė et al., 2017; Kianto et al., 2017). Improving the social mechanisms of the institutional system for the development of the national economy's HC presupposes ideological, image, and educational support to HC in the labor market. This helps build professional and life competencies, gain self-education skills, and acquire an awareness of one's own role in social activities. International export of educational services turned out to be a very promising area of investment in HC. It should be noted that scientific and educational institutions are turning into primary establishments of the information-oriented society that serve its interests and ensure its stable and effective functioning. These establishments provide the production, circulation, analysis, storage, and other operations with information and knowledge, representing the main products in the new knowledge economy. Therefore, the absence of a well-organized and effective policy for the development of these domains constitutes a threat of loss of competitiveness in global dimensions and backwardness compared to developed states.

In essence, the process of HC formation begins at the micro-level by education and gaining practical skills and experience in the workplace. In order to make this process more effective and move it to a qualitatively new level, the state must create an environment for business in which the latter would be interested and stimulated to accumulate HC and ensure the constant growth of its quality. Aside from that, the creation of favorable conditions for business in the direction of HC development at the micro-level can provide for a system of tax incentives, simplification of administrative procedures, and a policy of low-interest credits for enterprises investing in HC.

To increase the level of intensity of investment in HC of both employees and enterprises, senior management representatives should introduce programs at the national and regional levels and raise professional growth prestige. At the same time, relevant measures should also be taken by public authorities to revitalize and maintain business entities' contributions to HC. Their arsenal is wide enough and includes incentives of a legal, financial, organizational, and motivational nature. However, the maximum efficiency of their implementation is achieved with their complex and simultaneous large-scale application.

Underestimation of HC significance may lead to a distortion of indicators designating the value of a business. The lack of methods for evaluating HC on a national scale hinders the elaboration of directions for HC development as a valuable resource and an object of capital investment. Therefore, there is a real need to analyze the design of the institutional system to develop HC of the national economy at two levels: institutional (designing psychological and pedagogical conditions for the development of the national economy) and individual (designing a functional training facility in a person's living space).

CONCLUSIONS

At the current stage of the development of economy and society, many concepts require additional explanation and interpretation. This concerns, in particular, the concept of HC at the national level (in terms of the inclusion of environmental factors that may change its value), at the level of an enterprise (in terms of the company's policy in creating conditions for improving employees' qualifications), and at the level of an individual (in terms of personal motivations for advanced training).

The conducted examination revealed a discrepancy of the obtained results with the existing global tendencies. Despite the generally accepted judgment that the improvement of workers' qualifications facilitates GDP growth, the outcomes of the current research designate that an increase in investment in R&D does not cause a subsequent rise in GDP. Besides, it was noted that there is a demand for professional development at the level of individual workers to increase their labor market value, which, unfortunately, is not fully supported at the level of the nation.

The study process unveiled no differences between the environmental determinants that form HC at the regional level. In this connection, an innovative climate at enterprises and personal motivation acquire critical importance in HC development. This concerns, first of all, the formation of an organizational and institutional environment for promoting the implementation of new technologies in education, science, and modern enterprises. Thuswise, HC was proved to be among the key determinants of enterprises' economic growth, provided that appropriate conditions are created.

The practical significance of the present article lies in the proposed systematic approach to determining the relationship between HC and competitiveness at different levels (national, regional, and enterprise). It was shown that the short-term economic development of the country depends on the degree of orientation of educational, industrial, and state policies on ensuring a sufficient efficiency and intensity of investment in HC; implementation of investment programs for professional development and medical care of the economically active population; and the effectiveness of motivational measures directed at forcing business entities to finance HC development.

The major research limitation is represented by the possible subjectivity on the part of experts when measuring the degree of HC formation. This limitation is of a methodological nature since the respondents were mainly representatives of the HR services of enterprises, and the vision of employees may be completely different. On top of this, surveying individuals working in innovative enterprises suggests that data obtained cannot be applied to all types of businesses.

Future research is planned to consider systems for monitoring the quality of the formation and use of HC to develop practical methods for evaluating the impact of the motivational incentives of workers and employers on the effectiveness of investing in a person.

REFERENCES

Angrist, Noam, Simeon Djankov, Pinelopi Goldberg, and Harry Anthony Patrinos (2019) Measuring Human Capital. The World Bank.

Askretkov, A. D., and Alexey G. Koryakov (2018) "The some economic aspects of production of pharmaceutical substance hydroxyethyl starch in small industrial scale," Russian Technological Journal, 6(1): 53-62.

Batarlienė, Nijolė, Kristina Čižiūnienė, Kristina Vaičiūtė, Ingrida Šapalaitė, and Aldona Jarašūnienė (2017) "The impact of human resource management on the competitiveness of transport companies", Procedia Engineering, 187: 110-116.

Chams, Nour, and Josep García-Blandón (2019) "On the importance of sustainable human resource management for the adoption of sustainable development goals", Resources, Conservation and Recycling, 141: 109-122.

Coad, Alex, and Antonio Vezzani (2017) Manufacturing the future: is the manufacturing sector a driver of R&D, exports and productivity growth? JRC Working Papers on Corporate R&D and Innovation No 06/2017.

Demenkova, T. A., V. S. Tomashevskaya, and I. S. Shirinkin (2018) 'Mobile applications for tasks of distance learning,' Russian Technological Journal, 6(1): 5-19.

Dobrynin, A. I., and S. A. Dyatlov (1999) Human capital in transitive economy: formation, assessment, efficiency of use. SPb.: Science.

Federal State Statistics Service of the Russian Federation (n.d.) Official web site. https://rosstat.gov.ru/

Januškaitė, Virginija, and Lina Užienė (2018) "Intellectual capital as a factor of sustainable regional competitiveness", Sustainability, 10(12): 4848.

Kianto, A, Josune Sáenz, and Nekane Aramburu (2017) "Knowledge-based human resource management practices, intellectual capital and innovation", Journal of Business Research, 81: 11-20.

Koryakov, Alexey G., and Oleg I. Zhemerikin (2019) 'Digital transformation as a key to increasing the competitiveness of the Russian chemical industry,' in Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, pp. 96-103.

Kraay, Aart (2019) "The World Bank human capital index: A guide", The World Bank Research Observer, 34(1): 1-33.

Kucharčíková, Alžbeta, Martin Miciak, and Miloš Hitka (2018) "Evaluating the effectiveness of investment in human capital in e-business enterprise in the context of sustainability", Sustainability, 10: 3211.

Lim, Stephen S., Rachel L. Updike, Alexander S. Kaldjian, Ryan M. Barber, Krycia Cowling, Hunter York, Joseph Friedman, R. Xu, Joanna L. Whisnant, Heather J. Taylor, Andrew T. Leever, Yesenia Roman, Miranda F. Bryant, Joseph Dieleman, Emmanuela Gakidou, and Christopher J. L. Murray (2018) "Measuring human capital: a systematic analysis of 195 countries and territories, 1990-2016", Lancet (London, England), 392(10154): 1217–1234.

Liu, Gang, and Barbara Fraumeni (2016) "Measuring human capital: Country experiences and international initiatives," in D. Jorgenson, K. Fukao, & M. Timmer (Eds.), The World Economy: Growth or Stagnation? Cambridge: Cambridge University Press, pp. 429-468.

Mubarik, Muhammad Shujaat, V. G. R. Chandran, and Evelyn S. Devadason (2018) "Measuring Human Capital in Small and Medium Manufacturing Enterprises: What Matters?" Social Indicators Research, 137: 605-623.

Tran, Ngoc Phu, and Duc Hong Vo (2020) "Human capital efficiency and firm performance across sectors in an emerging market", Cogent Business & Management, 7: 1738832.

Voskoboynikov, I. (2019) Official statistics for analyzing the productivity of the Russian economy. Moscow: National Research University – Higher School of Economics. https://www.hse.ru/data/2020/08/11/1600659729/26.11.2019.pdf

World Bank (2018a) The Human Capital Project. https://openknowledge.worldbank.org/bitstream/handle/10986/30498/33324RU.pdf?sequence=13&isAllowed=y

World Bank (2018b) World Development Report 2018: Learning to Realize Education's Promise. Washington, DC: World Bank. https://www.worldbank.org/en/publication/wdr2018
World Economic Forum (2017a) The Global Risks Report 2017. World Economic Forum. http://reports.weforum.org/global-risks-2017/
World Economic Forum (2017b) The Global Human Capital Report 2017 – Preparing people for the future of work. World Economic Forum. http://www3.weforum.org/docs/WEF_Global_Human_Capital_Report_2017.pdf
World Economic Forum (2018) The Global Competitiveness Report 2018. World Economic Forum. https://www.weforum.org/reports/the-global-competitveness-report-2018