

Assessing the potential of a region for human capital development

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Abstract — The article presents the results of the research, the purpose of which was to develop a methodology for assessing the potential of a region for the development of its human capital. The proposed methodology is based on a quantitative model for the analysis of indicators of the demographic, economic, educational qualification, psychophysiological and innovation components of a region's potential that determine the conditions for the development of human capital. When developing the methodology, an index method and a linear scaling method were used. As an object of testing and verification of the methodology, regions belonging to the Siberian Federal District were taken. The object of the research was the Kemerovo region. The calculations that illustrate the application of the proposed methodology, allowed to carry out rapid diagnosis and characterize the potential of the Kemerovo region in the development of human capital in the region. At the same time, the suitability of the methodology was established to identify priority measures to reduce the gap in the values of indicators of the potential of leading regions and outsider regions, to search for the most effective regional management practices that contribute to the development of human capital at the regional level. The results of the assessment of the potential of a region for the development of human capital can be, first of all, the information basis for the activities of regional authorities in the formation of priority goals and objectives, programs and projects for the strategic management of regional socio-economic development aimed at creating conditions for the development of human capital in the territory. The application of a methodology for assessing the potential of a region can be embedded in the process of developing and making strategic and operational decisions on the development of human capital.

Keywords — *assessing the potential of a region, human capital, development of human capital, region, assessment methodology, rating of regions*

I. INTRODUCTION

Human capital in the modern paradigm of socio-economic development of regions is considered as the main factor for their long-term growth. At the same time, the pace and level of socio-economic development determine the conditions for the formation and quality of the human capital of the territory. These two processes are interrelated and interdependent, therefore the dynamics and strategy of socio-economic development and the development of human capital are in the center of attention of the president, the government, and the authorities of the subjects of the Russian Federation. The intensifying differentiation in the socio-economic development of the territories of Russia, manifested in the narrowing of the "people's ability to make choices", negatively affects the quality of human capital in the regions, generates negative population migration, which further aggravates and actualizes the problem.

The theory of human capital has a long history of development. In research scientists have always considered the issues of assessing the quality of human capital and the factors determining its level of development. Russian scientists began to research these issues in the early 1990s, since the transition of Russia to market methods of management. Analysis of the works of foreign and Russian scientists allows us to identify in the evolution of the theory of human capital several established approaches (schools) [1].

Representatives of the first approach (H. R. Bowen, L. C. Thurow [2] and others) consider human capital as the stock and body of knowledge, abilities, skills, motivation, health status. The analysis of these elements gives an idea about the formed potential of the personality and its realization.

T. Schulz [3], G. Becker [4] and other representatives of the second approach interpret the category of “human capital” as certain characteristics formed by investing in human development, allowing him to perform specific labor functions and receive income commensurate with the quality of human capital (return on investment) and appropriate motivation.

Russian scientists - representatives of the third and fourth directions - in their works pay great attention to the research of the impact of human capital on the development of the economy of the organization and society as a whole (representatives of the direction: S. A. Dyatlov [5], A. N. Dobrynin [6], R. I. Kapelyushnikov [7, 8, 9, 10], E. D. Tsyrenova [11], M. M. Kritsky [12] and others). L. G. Simkina considers the implementation of human capital in the conditions of the innovative development of society and the economy [13]. The works of these authors substantiate the need for constant human self-development, adequate to the challenges of the new stage of technological progress, and the active realization of his creative abilities for the benefit of the further development of society.

Theories of human capital had a certain value for the formation of the concept of human development. In accordance with the central idea of this concept, human development is to empower people to make choices. In UN reports on human development, human development is defined as “both the process of expanding human choice and the level of human well-being achieved”.

Human capital, assessments and factors of its development are determined at the levels of a person, organization, and society. Given the diversity of approaches to the definition of the category “human capital”, as well as the evolution of the definition of its role in the economic development of an organization and society, the human capital of a region is determined by the authors of the article as a set of human resources concentrated on the territory, possessing accumulated knowledge, abilities, professional skills, health status, cultural level, appropriately used in activities and ensuring the innovative development of regional socio-economic systems, thereby improving the quality of life of the population of a particular territory, and creating conditions for further human development [14].

The foundation of the development of human capital at the regional level is the state policy in the field of human capital development, represented in the concept of long-term socio-economic development of the Russian Federation for the period till 2020, the Decree of the President of Russia "On the national goals and strategic objectives of the Russian Federation for the period till 2024 of the year, dated May 7, 2018, in the Strategies for the development of subjects of the Russian Federation and other regulatory legal documents. Successful and effective achievement of program goals and priorities largely depends on the quality of state management and the perfection of regional development management

technologies [15]. Assessment of the potential of regions in the conditions of their substantial differentiation in terms of socio-economic development is one of such management tools.

The purpose of the research, presented in the article, is to develop a methodology for assessing the potential of a region for the development of its human capital. The objectives of the research are: development and verification of a methodology for assessing the potential of a region for the development of human capital; assessment by the proposed methodology of the potential of the Kemerovo Region and other territories included in the Siberian Federal District of the Russian Federation.

II. MATERIALS AND METHODS (MODEL)

The calculation of the indicator characterizing the potential of the Kemerovo Region (Siberian Federal District, Russia) in order to develop human capital was based on the methodology described in the article by T. Yu. Kryshtaleva [16]. The following components of the region’s potential taken into account in ensuring the development of human capital were taken as structural elements for analysis: demographic, economic, educational and qualification, psychophysiological, and innovation.

TABLE I. INDICATORS OF THE ACTUAL CONDITION OF THE POTENTIAL OF THE REGION FOR THE DEVELOPMENT OF HUMAN CAPITAL

Indicator	Unit of measurement
<i>Demographic component</i>	
Total fertility rate	Number of births per 1,000 people
General mortality rate	Number of deaths per 1,000 people
Migration rate per 10,000 people	The proportion of units
<i>Economic component</i>	
Gross regional product	Million ruble
Average monthly nominal accrued wages	ruble
Unemployment rate	% of total population
<i>Educational qualification component</i>	
Graduation of middle level specialists, bachelors, specialists, masters	Thousand person
The number of educational institutions of higher education and scientific organizations	
<i>Psycho-physiological component</i>	
Life expectancy	Years
The number of registered crimes per 100 thousand people	
<i>Innovative component</i>	
The number of personnel engaged in research and development	Thousand person
Innovative activity of enterprises	%

In the presented structure of components for measuring the potential of a region, the indicators of the actual state are presented, presented in Table I.

An index approach was used to develop and describe estimates for the above indicators. This approach is particularly relevant in the study, since it allows comparing and comparing different territories in terms of indicators relevant to the development of human capital.

Since indicators have different dimensions, in order to bring them into a comparable form, **the linear scaling method** is used, the essence of which is to represent the value of each indicator as an index in the interval from 0 to 1, keeping all the proportions between the individual values.

To do this, the actual, minimum and maximum values of these indicators are compared. Indices are calculated in accordance with the nature of the relationship between the measured indicators of the structure of the potential of the region. For example, an increase in the birth rate in a region entails the development of human capital, therefore, there is a direct relationship between the variables, while an increase in the unemployment rate will be a consequence of the under-use of human capital in the future, the relationship between the variables is inverse.

To calculate performance indexes used formulas (1), (2):

1) if there is a **direct** relationship between the variables:

$$I_{xi} = (X_i - X_{min}) / (X_{max} - X_{min}) \quad (1)$$

2) if there is an **inverse** relationship between variables:

$$I_{xi} = (X_{max} - X_i) / (X_{max} - X_{min}) \quad (2)$$

where:

I_{xi} – the index of X in the i-th region;

I_i – the value of the indicator X in the i-th region;

X_{max} – the maximum value of the indicator X among all regions;

X_{min} – the minimum value of the indicator X of all regions.

Composite indices of complex indicators of potential of a region in the context of human capital development are calculated as an arithmetic average of indices characterizing the corresponding component of a region's potential. Further, the integral index characterizing the potential of the region is calculated as an average proportional to the composite indices of the complex indicators of the potential of the region. Based on the integral index, the regions are ranked.

The empirical base of the study was the data of the Federal State Statistics Service for the socio-economic development of the territorial units of the Siberian Federal District for the period 2015-2017.

The Kemerovo Region (Siberian Federal District, Russia), which is one of the most urbanized regions of the Russian Federation, was taken as a model region. In the Kemerovo region, 56% of the country's coal, 80% of coking coal, 100% of the most valuable types of coking coal are mined. Mining

accounts for more than a quarter of gross value added, about half of the volume of investments in fixed assets and in the total volume of enterprises' profits. At the same time, the structure of production in most cities of the region is a monoprodukt, and the socio-economic system is characterized by underdeveloped infrastructure, an unsatisfactory state of ecology, which affects the quality of life of the population and causes such a negative phenomenon from the standpoint of the formation of human capital in the region, as negative migration.

III. RESULTS AND DISCUSSION

The application of the proposed model allows to form a rating of regions according to the state of socio-economic potential for the development of human capital. It should be emphasized that the presented calculations were made solely on the basis of statistical data of the Federal State Statistics Service in terms of the actual state.

Table II shows the results of calculations of indices of indicators of the demographic component by regions of the Russian Federation of the Siberian Federal District.

The low values of the index of indicators of the demographic component are due to a number of reasons affecting the values of the initial indicators. Thus, the birth rate in the Kemerovo region is at a low level, for three years the region has been on the last position among the regions of the Siberian Federal District in terms of the birth rate. The main causes of declining birth rates can be identified, such as reduced marriage rates, an increase in the number of divorces, an increase in the proportion of elderly people, a worsening of the ratio of men and women, and an increase in unemployment.

Mortality in the Kemerovo region is at one of the highest levels among the regions of the Siberian Federal District.

TABLE II. VALUE OF INDEX OF THE DEMOGRAPHIC COMPONENT IN THE SIBERIAN FEDERAL DISTRICT

Region	Index value by year		
	2015	2016	2017
Altai Republic	0.61	0.69	0.61
Republic of Buryatia	0.54	0.44	0.44
Republic of Tyva	0.67	0.72	0.79
Republic of Khakassia	0.38	0.36	0.37
Altai region	0.17	0.11	0.13
Krasnoyarsk region	0.40	0.41	0.40
Irkutsk region	0.29	0.23	0.30
Kemerovo region	0.19	0.14	0.18
Novosibirsk region	0.49	0.48	0.46
Omsk region	0.29	0.20	0.17
Tomsk region	0.48	0.43	0.40

The main cause of death in the region are diseases of the circulatory system, but at the same time the level of morbidity in the circulatory system during the analyzed period decreased due to a set of measures to improve medical care, increase the level of doctors' skills, and increase the number of medical staff. The second place by causes of mortality is occupied by the class of neoplasms, whose share has grown. Also, a significant share is occupied by diseases of the digestive and respiratory organs, external causes.

The migration growth rate has a stable negative value, in 2017 it was -15%. The largest migration is typical for those regions of Russia where, according to the UN terminology, "human choice" is decreasing. For the population of the Kemerovo region, the main causes of migration are low career prospects for young people and relative dissatisfaction with living conditions. The able-bodied population of the region moves to the more prosperous regions of Siberia by all indicators of socio-economic development: in the Novosibirsk region, the Krasnoyarsk region (the migration rate of which in the same period was 55% and 17%, respectively), as well as in the cities of the Central and Northwestern federal districts, where the level of production and social infrastructure is higher. Thus, the region loses its human capital. External migration is more associated with the outflow of highly qualified specialists and talented youth to Western countries. In turn, all the processes of human capital migration have a negative impact on the socio-economic situation of the region.

Similarly, calculations of indices of indicators are carried out for the remaining components of the model. Here are the most significant findings of the analysis.

In terms of gross regional product per capita, the Kemerovo region is not a leader among other regions of the Siberian Federal District; it is ahead of Krasnoyarsk, Tomsk, Irkutsk, Omsk regions. The share of manufacturing industries in the formation of GRP was 16.3%. In 2015, the Kemerovo region ranked 8th in terms of the average wage. In 2017, she moved up two positions in the list and ranked 6th. It should be noted that in the Kemerovo region the growth rate of the average monthly nominal accrued wages is high, only the Irkutsk region is ahead (16.5%). The leader of the list is the Krasnoyarsk region, which has been consistently ranked 1st in the last three years analyzed, showing an annual growth rate of 6%. The level of registered unemployment in the Kemerovo region for three years decreased from 7.7% to 7.1%. This is lower than in the Siberian Federal District as a whole (7.3% at the end of 2017).

The innovative sector of the economy of the Kemerovo region has demonstrated an uneven pace of development for three years. However, the Board of the Kemerovo Region Administration is making great efforts to increase the level of innovative projects, including in the industrial sphere. For this purpose, the Kuzbass Technopark, the cluster development center, the regional engineering center, the regional integrated center, and the social innovation center function.

According to the rating of innovative development of the subjects of Russia, published by HSE in 2016 (prepared by the end of 2014), the Kemerovo region is above the middle of the rating (36th place out of 83). Within the framework of the

Siberian Federal District, the indicators of the Kemerovo region ensured its location, which is qualitatively similar to the all-Russian rating - 6 out of 12.

Higher in the ranking are Tomsk Region (7th place in Russia), Novosibirsk Region (11th place), Krasnoyarsk Territory (12th place), Altai Territory (30th place) and Irkutsk Region (33rd place). At the same time, the rank of the "Quality of Innovation Policy" sub-index in the Kemerovo region is significantly higher than in the Irkutsk region, and in the "Scientific and technical potential" sub-index is higher than in the Altai region, and both of these regions lag behind the Kuzbass in the "Social and Economic conditions of innovation".

Table III shows the results of the calculation of the integral index of the potential of a region and the rating of regions.

TABLE III. THE VALUE OF THE INTEGRAL INDEX OF THE POTENTIAL OF REGION AND RATING OF THE REGIONS OF THE SIBERIAN FEDERAL DISTRICT

Region	Integral index value		Rating of regions	
	2015	2016	2015	2016
Altai Republic	0.64	0.66	8	5
Republic of Buryatia	0.65	0.65	6-7	6
Republic of Tyva	0.43	0.00	11	11
Republic of Khakassia	0.66	0.70	5	4
Altai region	0.53	0.48	10	10
Krasnoyarsk region	0.77	0.79	2-3	1-2
Irkutsk region	0.65	0.64	6-7	7-8
Kemerovo region	0.57	0.55	9	9
Novosibirsk region	0.77	0.78	2-3	3
Omsk region	0.69	0.64	4	7-8
Tomsk region	0.79	0.79	1	1-2

A preliminary analysis of the calculated data allowed to determine the place of a typical industrial region, Kemerovo region, in the Siberian Federal District on the potential of human capital development. The position of the Kemerovo region on indicators such as life expectancy, total mortality, fertility, unemployment, can be defined as "outsider", since the region occupies a stable 9th place in 12 regions. The best values of the integral index were achieved in Tomsk, Novosibirsk regions, Krasnoyarsk region and the Republic of Khakassia. These regions are traditionally considered to be the leaders of socio-economic development in the Siberian Federal District.

The proposed methodology is effective in conducting rapid diagnostics of a region's potential in order to increase the level of human capital development, as well as in determining priority measures to reduce the gap in the values of indicators of leading regions and outsider regions, to search for the most effective regional management practices.

IV. CONCLUSION

The level of human capital development in the Kemerovo region is characterized by imbalance: significant achievements in certain areas are accompanied by a significant lag from the average level in other areas.

In order to improve the situation and bring the Kemerovo region closer to the regions leading in the development of human capital, it is necessary to qualitatively solve problems, namely, to develop and implement effective policies aimed at improving the quality of life of the population, developing small and medium-sized businesses, and industry (processing raw materials). In particular, in the region, special attention should be paid to the development of programs and measures to increase the birth rate of the population, reduce mortality, improve the environment, introduce innovative technologies, increase the competitiveness of education, based on Russia's national goals and strategic objectives.

The proposed methodology allows to obtain sufficiently complete information about the potential of the region in the context of ensuring the development of human capital, it is open, flexible and, if necessary, can be supplemented with other indicators.

The results of the assessment of the potential of the region are, above all, an information base that can be used in the activities of regional authorities in the formation of priority goals and objectives of the strategic management of the socio-economic development of the region based on the development of human capital. The application of a methodology for assessing the potential of a region can be integrated into the process of developing and making strategic and operational decisions on the development of human capital.

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