

Work on the Topic: Assessment of Social Infrastructure for the Human Capital Foundation.

Maksimenko I.V.

Graduate student, Vladimir State University

Named after Alexander Grigoryevich and Nikolai Grigoryevich Stoletov.

Abstract.

This article is devoted to assessing the state of social infrastructure of a distinctive asset- the human capital. In due course, an attempt will be made to consider the difference between the state of the all-Russian level and the specific subject of Russian Federation (the Central Federal District regions)The purpose of this study is to determine the level of social infrastructure of each Central Federal District region and obtain justification for such a situation in which the object of analysis is located (region).The methodology of this work is based on applying statistical and mathematical methods of analysis, which include an assessment of the level of social infrastructure of the Central Federal District regions. The conclusion of the study is to assess the state of social infrastructure in the regions of the Central Federal District as well as the difference in state between the region and the national level of the Russian Federation. In the course of the work, multiple influence of indicators on social infrastructure of human capital was established. The proposed methodology is universal and advisory for information users (business, public authorities).

Keywords: human capital, social infrastructure, regional systems.

1. Introduction

Various integration processes are happening in the world of economy, where its growing competition in various regions is at the forefront. As a result of these processes, changes in the external environment, as well in the vectors of regional development are starting to happen. Strategies, techniques and directions are needed in order to have an understanding of the competitive environment and see different ways of implementing important projects in regions for specific territories.

It is important to note who will be developing all of this?

And who will be implementing it?

And there for we come to man, but more specifically to human capital.

Human capital is the main subject of the economic systems transformation on both regional and national levels. Russian scientists (researchers) are focused on capital shortages and the quality of Russian employees¹. At the moment, researchers are engaged in such matters of the capital carrier (person) as motivation and needs, psychological problems, intellectual potential, health status, which will affect human capital, and it, in its turn, will directly affect the economy. This study is formed within the national borders: India², China³, Italy⁴. There is a group of work that investigates the relationship of human capital and economic growth^{5,6,7}. I would also like to note that the connection between human capital and the social negative aspect of society in OPEC countries is poverty. The greater the investment in human capital, the greater the level of poverty⁸ is reduced in these countries. The influence of human capital on the implementation of information and communication technologies in small and medium enterprises of Romania is considered⁹. The

¹ Natalia V. L. (2017). Characteristics of the human capital of Russian workers and workers of other countries TERRA ECONOMICUS [Online]. Vol. 15 No. 3 Available:doi: 10.23683 / 2073-6606-2017-15-3-159-177

² Chatterji, N and Kiran, R. (2017). Role of human and relational capital of universities as underpinnings of knowledge economy: A structural modeling perspective from north Indian University International Journal of Educational Development [Online]. 56 pp. 52–61 Available:https://doi.org/10.1016/j.ijedudev.2017.06.004

³ Fraumeni, B. M. and He, J. and Li, H. and Liue, Q. Regional distribution and dynamics of human capital in China 1985–2014. Journal of Comparative Economics [Online]. Available:https://doi.org/10.1016/j.jce.2019.06.06.003

⁴ Odoardi, I. and Muratore, F. (2019). The role of human capital after the crisis in Italy: A regional analysis Socio-Economic Planning Sciences [Online]. 66 pp. 58–67 Available:https://doi.org/10.1016/j.seps.2018.07.07.002

⁵ Han, J-S. and Lee, J-W. (2019). Demographic Change, Human Capital, and Economic Growth in Korea; Japan and the World Economy, [Online]. Available: doi: https://doi.org/10.1016/j.japwor.2019.100984

⁶ Ogundari, K. and Awokuse, T. (June 2018). Human capital contribution to economic growth in Sub-Saharan Africa: Does health status matter more than education? Economic Analysis and Policy. [Online]. Vol. 58, , pp. 131-140 Available:https://doi.org/10.1016/j.eap.2018.02.001

⁸ Comfort, O. B. and Okodua, H. and Oladosun, M. and Asaley, A. J. (August 2019). Human capital and poverty reduction in OPEC member-countries, Heliyon [Online]. Vol. 5, Issue 8, Available:https://doi.org/10.1016/j.heliyon.2019.e02279

⁹ Martin, F. M. and Laurentiu, C. and Cristescu, M. P. (2013). Implication of Human Capital in the Development of SMEs through the ICT Adoption, Procedia Economics and Finance [Online]. Vol. 6, pp. 748-753 Available:https://doi.org/10.1016/S2212-5671(13)00198-6

work carried out in Greece makes it clear that there is a strong positive relationship between secondary and higher education on the level of labor productivity, as well as the negative impact of primary education on this economic indicator¹⁰. A strong effect of human capital on Latvian GDP was revealed¹¹. The work carried out in Latvia indicates a need for education and the labor market to interact more strongly with the structure of the economy for the country's economic growth, due to it being less vivid at the moment¹². Let's go back to the chronology of the modern theory of human capital. Since the 1970s there was an update of the characteristics (signs) of human capital and the impact on a particular individual and changes in social relations of society¹³.

The ongoing economic and social processes should be recognized and taken into account while managing human capital and its formation in the economic system of the region, country¹⁴. The transformation of business also carries the transformation of skills, abilities, knowledge, which require a change, advanced training throughout the course of work¹⁵. Let's check out what definitions of human capital scientists give. T.U. Schultz, in his work, defined human capital as a key element in improving the assets of the enterprise, that is, employees of the company with the goal of productivity and sustainable competitive advantage of the company. Human capital refers to the process, which is associated with training, education and other professional initiatives of the employee in order to which he will increase the level of knowledge, skills, abilities, values and social skills, which will lead to satisfaction and productivity of the employee of the company, which will increase the efficiency of the enterprise¹⁶. So you can notice that it is human capital that is formed, exploited, improved within the company (organization). In his works G.S. Becker argues that there are aspects of capital such as involvement in education, computer courses, medical expenses. And even lectures about (self-discipline) punctuality and an honest attitude to work are the same as human capital. In a sense, they help improve health, increase incomes, and help comprehend literature throughout their lives. This practically confirms

¹⁰ Benos, N. and Karagiannis, S. (April 2016). Do education quality and spillovers matter? Evidence on human capital and productivity in Greece. *Economic Modeling* [Online]. Vol. 54, pp. 563-573
Available: <https://doi.org/10.1016/j.econmod.2016.01.015>

¹¹ Liepē, Ž. and Sakalas, A. (November 2014). Evaluation of Human Capital Role in the Value Creation Process, *Procedia - Social and Behavioral Sciences*. [Online]. Vol. 156, pp. 78-82 Available: <https://doi.org/10.1016/j.sbspro.2014.11.123>

¹² Šipilova, V. (December 2013). Human Capital, Education and the Labor Market: Evaluation of Interaction in Latvia. *Procedia - Social and Behavioral Sciences* [Online]. Vol. 106, 10 pp. 1384-1392
Available: <https://doi.org/10.1016/j.sbspro.2013.12.154>

¹³ Kuzminov, Ya. and Sorokin, P. and Froumin, I. (2019) Generic and Specific Skills as Components of Human Capital: New Challenges for Education Theory and Practice. *Foresight and STI Governance*, [Online]. vol. 13, no 2, pp. 19–41.
Available: doi: 10.17323 / 2500-2597.2019.2.19.41.

¹⁴ Dzhumaeva, R.A. and Gadzhiev, E. M. and Styazhkina, E. I. , (2018). “The cluster approach to human capital management for the innovative development of the region” *Vestnik KemSU Series: Political, Sociological and Economic Sciences* No. 3 pp 87-92 Available:doi: 10.21603 / 2500-3372-2018-3-87-93.

¹⁵ Abuzyarova, D. and Belousova, V. and Krayushkina, Zh. and Lonsheikova, Y. Nikiforova, E. and Chichkanov, N. (2019). The Role of Human Capital in Science, Technology and Innovation. *Foresight and STI Governance*, [Online]. vol. 13, no 2, pp. 107–119. Available: doi: 10.17323 / 2500-2597.2019.2.107.119

¹⁶ Marimuthu, M. and Arokiasamy, L. and Ismail, M. (2009). “Human capital development and its impact on firm performance: evidence from developmental economics”. *Uluslararası Sosyal Aratırmalar Dergisi The Journal of International Social Research* [Online]. Vol. 2/8 pp 265-272.

the concept of capital, that the costs of education, training, medical care are investments in human capital. These are not just costs; they are investments with output which can be calculated¹⁷. G.S. Becker also identified 3 forms of human capital expressed in general knowledge, special knowledge and other types of knowledge, which are combined together in one medium (person) and have investment security. After analyzing these definitions, it can be assumed that the person's expenses for training, healthcare are long-term investments with the possibility of calculation, and a possible surplus product in the future of this particular person.

I would highlight that knowledge and skills are also subjected to being an investment. L. Turrow considered "the human capital of people represents their ability to produce goods and services. The cost of human capital is simply the price of productive abilities times the number of these abilities"¹⁸. Here we can distinguish the inseparability of human capital and its carrier (person) and a transformative role in various investments, and more precisely, in productive abilities. In the work of R. G. Hammer, human capital is considered as various human abilities that occur in the production process and are presented as production capabilities. "The concept of human capital, while recognizing its internal heterogeneity, can be defined as total resources of knowledge, skills and health, life energy concentrated in society"¹⁹. In this definition you can notice the abilities that are acquired in economic activity, the recognition of the society of the accumulated knowledge and skills and health needed by society. F. Mahlup noticed in his work the differences between unskilled and skilled labor. Where skilled labor was acquired through investments that provided physical and mental skills²⁰. Here one can see the interpretation of human capital through various levels of labor, in which various investments in (one's) skills and abilities are observed.

In his works L.I. Abalkin summed up that "human capital was perceived as the sum of innate abilities of general and special education, acquired professional experience, creative potential, moral-psychological and physical health, motives of activity"²¹. So you can see the differences of this definition with other researchers in the innate abilities of a person in his motivation and of psycho-physical state. Human capital was understood by J. Kendrick as "the ability for a certain time to create a product and income, including non-market forms of income"²². The distinguishing side of this definition is the ability to create and sell a product with profit over time using non-market forms of gaining (income). According to M.M. Krutsky the term of human capital was stated as "a universal concrete form of life, assimilating the previous forms and realizing as a result of the historical movement of human society to its modern state. It includes productive knowledge and abilities (to work), consumer knowledge and abilities (provide vital functions), educational abilities to learn". Here, the history and evolution of human capital in this treatise of this author can be noted, meaning that the concept of human capital changes over time.

¹⁷ Becker, G.S. (1993). Human Capital: "A Theoretical and Empirical Analysis with Special Reference to Education". Chicago: University of Chicago Press 3rd ed.

¹⁸ Thurow, L. (1970). Investment in Human Capital, Belmont. pp. 1–15, 104.

¹⁹ Hammer, N. R. and Mannel, Ch. and Gotter, A. (1984). Die Bedeutung menschlicher Ressourcen den Entwicklungsprozess. Forschungsberichte des Bundesministeriums für Wirtschaftliche Zusammenarbeit, Band 55, München-Köln-London, p. 1

²⁰ Machlup, F. (1984). Knowledge: Its creation, distribution, and economic significance. Vol. II. The Economics of information and human capital. Princeton: Princeton University Press.

²¹ Soboleva, I. (March 2010). Paradoxes of the measuring human capital. Soboleva // Problems of Economic Transition [Online]. 52(11):43-70 .-Available: doi: 10.2753/PET1061-1991521103

²² Kendrick, J. (1976). The Formation and Stocks of Total Capital. N.Y.: Columbia University Press.

The effectiveness of the use of human capital with quality indicators of its value are revealed in the latest works^{23,24}. It is worth agreeing with the definitions, however, given the changes that have occurred in the economic sphere, it should be supplemented that the system of forming complex human capital also plays an important role. These conditions can be equated to the infrastructure of the human capital forming. In the works they pay attention to certain sections of the population where concentration and capitalization take place²⁵. Given that the regions of the Russian Federation are considerably differentiated by a significant number of factors: climate, geographical location, resource flows, etc., it should be noted that the region should be singled out as the basic unit of analysis of the processes of developing human capital infrastructure. The demographic criteria for the creation and exploitation of human capital is of particular importance. Understanding the definition in the modern theory of human capital expresses the sum of economic relations in which a psycho-physical and social lifestyle is formed combining motivation, skills and professional competencies acquired throughout a person's life. And the more capital this person has, the more profitable he can sell himself at the labor market and give an additional product to the company, region, country.

In this work, we will propose an author's methodology for measuring the sufficiency level of social infrastructure as an institution of the formation of human capital.

2. Research (development) methodology

So human capital has become the main asset of the modern economy. This asset is a real driver of the economy. It is necessary to solve a very important issue of personnel policy of the country, region, company. It is important to note that human capital is based on a certain social infrastructure (region) The state of social infrastructure can be evaluated by the list of indicators that were published by Rosstat in their official statistical collections, where it is possible to conduct observations over a sufficiently long period of time. The developed method is considered universal and gives access to do analysis on open sources and on all subjects of the Russian Federation. In this work, we will assess the level of social infrastructure in the regions of the Central Federal District from 2010 to 2017, as well as the level of national infrastructure. After that there will be a comparison of each region of the Central Federal District with the Russian level. The Statistica software toolkit was used.

Factor, correlation and cluster analysis were selected before carrying out this study. For understanding, you need to consider in more detail all these selected analyzes of the study. Factor analysis is a "multidimensional method used to study the relationships between variable values. Known variables are assumed to depend on fewer unknown variables and random error". Factor analysis reveals the relationship between phenomena, reveals the hidden basis of several phenomena, and answers the question of why phenomena are related. Correlation analysis "is a measure of the dependence of variables". Pearson's correlation is best known. Correlation coefficients vary from -1.00 to +1.00. A value of +1.00 means that the variables have a strong positive correlation. Note that a value of 0.00 means there is no correlation". Now let's move on to cluster analysis. Cluster analysis is a "classification analysis

²³ Kelchevskaya, N. R. and Shirinkina, E. V. (2019). Regional determinants of the effective use of human capital in the digital economy // *Regional Economy*. – [Online]. Vol. 15, no. 2. - pp. 465-482. Available:doi

²⁴ .17059 / 2019-2-12

²⁵ Karavay, A. V. (2017). The state and dynamics of the quality of human capital of Russian workers *TERRA ECONOMICUS* [Online]. Vol. 15 No. 3 Available:doi: 10.23683 / 2073-6606-2017-15-3-144-158

method; its main purpose is to break down the set of objects and features under study into groups or clusters that are homogeneous in a sense”.

Study progress plan

1. We choose the Central Federal District with all subjects included in it according to official statistical collections.
2. We carry out a factor analysis on the significance of indicators and clear insignificant indicators on the level of Russia (national level)
3. We form a thinned list of indicators.
3. We carry out the correlation of each block of indicators with GRP-GDP(3)
4. We produce a cluster analysis as of 2010 and 2017, as well as make a comparative point table of the state of the Russian Federation and each subject of the Central Federal District.
5. We draw conclusions.

A list of indicators was taken from official statistics. We will consider this data on the level of Russia and the regions of the Central Federal District (tab 1)

Table 1: List of indicators*

Indicators	
The number of hospital beds (thousand pieces)	X1
The capacity of outpatient organizations (at the end of the year) of thousands of visits per shift	X2
The number of nurses (at the end of the year) thousand people	X3
Graduation of skilled workers by institutions of primary vocational education (at the end of the year; thousand people)	X4
Graduation of specialists by secondary specialized educational institutions (thousand, people)	X5
Graduation of bachelors, specialists, masters (thousands, people) educational institutions of higher education	X6
Population (estimate at the end of the year; thousand people)	X7
Percentage of urban population in the total population (end-year estimate; percent)	X8
Percentage of rural population in the total population (estimate at the end of the year; percent)	X9
Labor force (according to sample population surveys on employment problems; thousand people)	X10
The average annual number of people employed in the economy (thousand people)	X11
The number of employees of state bodies and local governments (people)	X12
The number of spectators of theaters per 1000 population	X13
The number of visits to museums per 1000 population	X14
Public libraries library fund of public libraries per 1000 population (end of year; copies)	X15
Killed in accidents (accident), man.	X16
Number of crimes committed by minors and with their complicity	X17
Number of recorded crimes per 100,000	X18
Foreign trade mln. \$ Export with foreign countries	X19
Foreign trade mln. \$ Import with foreign countries	X20
Average per capita cash income of the population (per month; rubles)	X21
Commissioning of residential buildings m2 total area	X22
Commissioning of preschool institutions (places)	X23
Density of paved public roads) (end of year; km of tracks per 1000 km2 of territory)	X24

* Statistical compilation Regions of Russia 2010-2018

Since indicators on the Russian level express an average value, we will conduct a factor analysis that will provide us with the significance of the indicators.(Tab 2)

Table 2: Load factor

Load factor (Without rotation) (Data table2) Highlight: Main components (Marked loads>, 700000)	
	Factor - 1
The number of hospital beds (thousand pieces)	-0,964469
The capacity of outpatient organizations (at the end of the year) of thousands of visits per shift	0,939559
The number of nurses (at the end of the year) thousand people	0,754659
Total dis.	2,382483
Share total	0,794161

In the course of work, we found that X5 is the least significant (fifth indicator). Graduation of specialists by secondary specialized educational institutions (thousand, people) -0.604. For the most part, we received feedback on this factor. Almost all indicators have (the degree of manifestation of properties to the object (factor)) significance.(Tab 3) Let us evaluate the correlation with GDP – GRP

Table 3: Correlations

Correlations (Data Table 2) Reported correlations are significant at the p level	
	GRP - GDP
Number of hospital beds (thousand pieces)	-0,963248
The capacity of outpatient organizations (at the end of the year) of thousands of visits per shift	0,988539
The number of nurses (at the end of the year) thousand people	0,613174

Having analyzed this correlation between GDP and GRP, we have more significant indications. Now we will analyze all areas included in the Central Federal District. For which tables of significance of the adjusted set of indicators were made on the example of the Belgorod region(Tab 4)

Table 4: Significance indicators (after 2 analyzes)

	Indicator	Correlation number
X1	The number of hospital beds (thousand pieces)	-0,827428
X2	The capacity of outpatient organizations (at the end of the year) of thousands of visits per shift	0,214531
X3	The number of nurses (at the end of the year) thousand people	-0,779156
X4	Graduation of skilled workers by institutions of primary vocational education (at the end of the year; thousand people)	-0,877606
X5	Graduation of specialists by secondary specialized educational institutions (thousand, people)	-0,108120
X6	Graduation of bachelors, specialists, masters (thousands, people) educational institutions of higher education	-0,707125
X7	Population (estimate at the end of the year; thousand people)	0,941433
X8	Percentage of urban population in the total population (end-year estimate; percent)	0,988483
X9	Percentage of rural population in the total population (estimate at the end of the year; percent)	-0,988483
X10	Labor force (according to sample population surveys on employment problems; thousand people)	0,512650
X11	The average annual number of people employed in the economy (thousand people)	0,881131
X12	The number of employees of state bodies and local governments (people)	0,726838

X13	The number of spectators of theaters per 1000 population	0,915661
X14	The number of visits to museums per 1000 population	0,973719
X15	Public libraries library fund of public libraries per 1000 population (end of year; copies)	-0,983157
X16	Killed in accidents (accident), man.	-0,782532
X17	Number of crimes committed by minors and with their complicity	-0,824729
X18	Number of recorded crimes per 100,000	-0,847989
X19	Foreign trade mln. \$ Export with foreign countries	-0,445777
X20	Foreign trade mln. \$ Import with foreign countries	-0,438103
X21	Average per capita cash income of the population (per month; rubles)	0,980413
X22	Commissioning of residential buildings m2 total area	0,675490
X23	Commissioning of preschool institutions (places)	0,030249
X24	Density of paved public roads) (end of year; km of tracks per 1000 km2 of territory)	0,858087

Using the results, we proceed to the cluster analysis of the regions of Russia. After conducting a cluster analysis for the years 2010 and for 2017, using the processed statistics. Now we will conduct a cluster analysis as of 2010. In the course of work, Moscow and the Moscow Region are again statistical emissions. Therefore, we exclude them. As of 2010, we can distinguish a large cluster including Orel, Tula, Ivanovo, Tambov, Smolensk, Kursk, Ryazan, Yaroslavl, Vladimir, Bryansk. Lipetsk and Kostroma regions, and Tver and Voronezh regions. Belgorod and Kaluga regions are autonomous. Let's analyze the results of the cluster analysis as of 2017.

We excluded Moscow and the Moscow Region, since they are statistical emissions. This observation recorded the condition of 2017. Voronezh, Kaluga, Belgorod, Kostroma stand separately from the main cluster. Tula, Lipetsk, Oryol, Ivanovo, Ryazan, Vladimir, Tver, Tambov, Smolensk, Kursk, Yaroslavl, Bryansk, Belgorod regions are included in the main cluster. After the cluster analysis is done, we produce deviations. We analyze the deviation of the model of subjects from the national model (in Russia) This analysis is carried out according to table 5.

Table 5: Comparative analysis of parameters by region of the Central Federal District

	X 1	X 2	X 3	X 4	X 5	X 6	X 7	X 8	X 9	X 10	X 11	X 12	X 13	X 14	X 15	X 16	X 17	X 18	X 19	X 20	X 21	X 22	X 23	X 24
Belgorod	1	0	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	1	0	0	1
Bryansk	1	1	0	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	0	1	1	0	1	1
Vladimir	0	1	0	1	1	1	1	1	1	1	0	1	0	1	1	1	1	0	0	1	1	0	1	1
Voronezh	1	0	1	1	0	1	0	1	1	0	1	1	0	0	1	0	1	1	0	0	1	1	0	1
Ivanovo	1	0	0	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	0	1	0	1	1	1
Kaluga	0	0	0	1	1	1	0	0	0	1	1	1	0	1	1	0	1	0	0	0	1	1	0	1
Kostroma	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	0	0	0	1	0	1	1	1	1

Kursk	1	1	1	1	0	1	0	1	1	0	1	1	1	1	1	0	1	1	0	1	1	1	0	1
Lipetsk	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	1	
Moscow	0	0	0	1	0	1	1	1	1	0	1	1	1	1	1	1	1	0	0	1	0	0	1	
Oryol	1	1	1	1	0	0	1	1	1	1	1	1	0	0	0	1	1	1	0	1	1	0	0	1
Ryazan	1	1	1	1	0	0	1	1	1	1	0	1	1	1	1	1	0	0	0	0	1	1	0	1
Smolensk	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	1	0	0	1	1	0	1
Tambov	1	1	0	1	0	0	1	1	1	1	0	1	1	1	0	0	1	0	1	1	1	1	0	1
Tver	1	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	1	1	0	0	1	1	0	1
Tula	1	0	1	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	0	0	1	1	0	1
Yaroslavl	1	0	1	1	0	1	0	1	1	0	1	1	0	1	1	1	1	0	0	0	1	1	0	1
City of Moscow	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	1
Russia	1	1	0	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	1	1	0	1

Having done the analysis, we identified several groups:

- 1 group (4 and less deviations from the national model)
- 2 group (5-7 deviations from the national model)
- 3 group (more than 7 deviations from the national model)

The 1st group includes: Belgorod, Bryansk, Kursk, Lipetsk, Moscow, Moscow.

Group 2 includes: Vladimir, Voronezh, Ryazan, Smolensk, Tver, Tula, Yaroslavl regions.

Group 3 includes: Kaluga, Kostroma, regions, Ivanovo, Oryol, Tambov regions.

We see that the regions of the Central Federal District are located on three different levels, which indicates that they have a different degree of provision of social infrastructure.

3. Conclusion

Having concluded that it is possible for there to be serious differences between the regions of the Central Federal District and Russia in terms of social infrastructure. On the comparison table, we see that only 6 regions have slight deviations from the national level: Belgorod, Bryansk, Kursk, Lipetsk, Moscow. The remaining regions are in a greater deviation, which means that, relying on federal programs for the development of human capital 12 out of 18 regions will not be able to provide sufficient social infrastructure and will lead to the collapse of this program.

In my opinion, it is necessary to solve the problems of each region and develop an individual development plan for them.

List of references

[1] Natalia V. L. (2017). Characteristics of the human capital of Russian workers and workers of other countries TERRA ECONOMICUS [Online]. Vol. 15 No. 3 Available:doi: 10.23683 / 2073-6606-2017-15-3-159-177

https://www.researchgate.net/publication/326347487_Characteristics_of_the_human_capital_of_Russian_workers_and_workers_of_other_countries

[2] Chatterji, N and Kiran, R. (2017). Role of human and relational capital of universities as underpinnings of a knowledge economy: A structural modeling perspective from north Indian University International Journal of Educational Development [Online]. 56 pp. 52–61

Available:https://doi.org/10.1016/j.ijedudev.2017.06.004

https://www.researchgate.net/publication/318411787_Role_of_human_and_relational_capital_of_universities_as_underpinnings_of_a_knowledge_economy_A_structural_modelling_perspective_from_north_Indian_universities

[3] Fraumeni, B. M. and He, J. and Li, H. and Liue, Q. Regional distribution and dynamics of human capital in China 1985–2014. Journal of Comparative Economics [Online].

.Available:https://doi.org/10.1016/j.jce.2019.06.06.003

https://www.researchgate.net/publication/334396118_Regional_distribution_and_dynamics_of_human_capital_in_China_1985-2014

[4] Odoardi, I. and Muratore, F. (2019). The role of human capital after the crisis in Italy: A regional analysis Socio-Economic Planning Sciences [Online]. 66 pp. 58–67

Available:https://doi.org/10.1016/j.seps.2018.07.07.002

https://www.researchgate.net/publication/326629465_The_role_of_human_capital_after_the_crisis_in_Italy_A_regional_analysis

[5] Han, J-S. and Lee, J-W. (2019). Demographic Change, Human Capital, and Economic Growth in Korea; Japan and the World Economy, [Online]. Available: doi: https:

//doi.org/10.1016/j.japwor.2019.100984

https://www.researchgate.net/publication/336991615_Demographic_Change_Human_Capital_and_Economic_Growth_in_Korea

[6] Ogundari, K. and Awokuse, T. (June 2018). Human capital contribution to economic growth in Sub-Saharan Africa: Does health status matter more than education? Economic

Analysis and Policy. [Online]. Vol. 58, , pp. 131-140

Available:https://doi.org/10.1016/j.eap.2018.02.001

https://www.researchgate.net/publication/323060170_Human_capital_contribution_to_economic_growth_in_Sub-Saharan_Africa_Does_health_status_matter_more_than_education

[7] Comfort, O. B. and Okodua, H. and Oladosun, M. and Asaleye, A. J. (August 2019). Human capital and poverty reduction in OPEC member-countries, Heliyon [Online]. Vol. 5,

Issue 8, Available:<https://doi.org/10.1016/j.heliyon.2019.e02279>

https://www.researchgate.net/publication/335369199_Human_capital_and_poverty_reduction_in_OPEC_member-countries

[8] Martin, F. M. and Laurentiu, C. and Cristescu, M. P. (2013). Implication of Human Capital in the Development of SMEs through the ICT Adoption, *Procedia Economics and Finance* [Online]. Vol. 6, pp. 748-753 Available:[https://doi.org/10.1016/S2212-5671\(13\)00198-6](https://doi.org/10.1016/S2212-5671(13)00198-6)
https://www.researchgate.net/publication/271028935_Implication_of_Human_Capital_in_the_Development_of_SMEs_through_the_ICT_Adoption

[9] Benos, N. and Karagiannis, S. (April 2016). Do education quality and spillovers matter? Evidence on human capital and productivity in Greece. *Economic Modeling* [Online]. Vol. 54, pp. 563-573 Available:<https://doi.org/10.1016/j.econmod.2016.01.015>
https://www.researchgate.net/publication/295840868_Do_education_quality_and_spillovers_matter_Evidence_on_human_capital_and_productivity_in_Greece

[10] Liepė, Ž. and Sakalas, A. (November 2014). Evaluation of Human Capital Role in the Value Creation Process, *Procedia - Social and Behavioral Sciences*. [Online]. Vol. 156, pp. 78-82 Available:<https://doi.org/10.1016/j.sbspro.2014.11.123>

https://www.researchgate.net/publication/275544824_Evaluation_of_Human_Capital_Role_in_the_Value_Creation_Process

[11] Šipilova, V. (December 2013). Human Capital, Education and the Labor Market: Evaluation of Interaction in Latvia. *Procedia - Social and Behavioral Sciences* [Online]. Vol. 106, 10 pp. 1384-1392 Available:<https://doi.org/10.1016/j.sbspro.2013.12.154>

https://www.researchgate.net/publication/275543154_Human_Capital_Education_and_the_Labor_Market_Evaluation_of_Interaction_in_Latvia

[12] Kuzminov, Ya. and Sorokin, P. and Froumin, I. (2019) Generic and Specific Skills as Components of Human Capital: New Challenges for Education Theory and Practice. *Foresight and STI Governance*, [Online]. vol. 13, no 2, pp. 19–41. Available: doi: 10.17323 / 25002597.2019.2.19.41.

https://www.researchgate.net/publication/334047251_Generic_and_Specific_Skills_as_Components_of_Human_Capital_New_Challenges_for_Education_Theory_and_Practice

[13] Dzhumaeva, R.A. and Gadzhiev, E. M. and Styazhkina, E. I. , (2018). “The cluster approach to human capital management for the innovative development of the region” *Vestnik KemSU Series: Political, Sociological and Economic Sciences* No. 3 pp 87-92 Available:doi: 10.21603 / 2500-3372-2018-3-87-93.

https://www.researchgate.net/publication/324906598_CLUSTER_APPROACH_TO_THE_HUMAN_CAPITAL_MANAGEMENT_FOR_THE_BENEFIT_OF_INNOVATIVE_REGIONAL_DEVELOPMENT

[14] Abuzyarova, D. and Belousova, V. and Krayushkina, Zh. and Lonsheikova, Y. Nikiforova, E. and Chichkanov, N. (2019). The Role of Human Capital in Science, Technology and Innovation. *Foresight and STI Governance*, [Online]. vol. 13, no 2, pp. 107–119. Available: doi: 10.17323 / 2500-2597.2019.2.107.119
https://www.researchgate.net/publication/334046900_The_Role_of_Human_Capital_in_Science_Technology_and_Innovation

[15] Marimuthu, M. and Arokiasamy, L. and Ismail, M. (2009). "Human capital development and its impact on firm performance: evidence from developmental economics". *Uluslararası Sosyal Araştırmalar Dergisi The Journal of International Social Research* [Online]. Vol. 2/8 pp 265-272. Available:

https://www.researchgate.net/publication/26628217_Human_Capital_Development_and_Its_Impact_on_Firm_Performance_Evidence_from_Developmental_Economics

[16] Becker, G.S. (1993). *Human Capital: "A Theoretical and Empirical Analysis with Special Reference to Education"*. Chicago: University of Chicago Press 3rd ed.

[17] Thurow, L. (1970). *Investment in Human Capital*, Belmont. pp.. 1–15, 104.

[18] Hammer, N. R. and Mannel, Ch. and Gotter, A. (1984). *Die Bedeutung menschlicher Ressourcen den Entwicklungsprozess*. *Forschungsberichte des Bundesministeriums für Wirtschaftliche Zusammenarbeit*, Band 55, München-Köln-London, p. 1

[19] Machlup, F. (1984). *Knowledge: Its creation, distribution, and economic significance*. Vol. II. *The Economics of information and human capital*. Princeton: Princeton University Press.

[20] Soboleva, I. (March 2010). *Paradoxes of the measuring human capital*. Soboleva // *Problems of Economic Transition* [Online]. 52(11):43-70 .–Available: doi: 10.2753/PET1061-1991521103

https://www.researchgate.net/publication/227457464_Paradoxes_of_the_Measurement_of_Human_Capital

[21] Kendrick, J. (1976). *The Formation and Stocks of Total Capital*. N.Y.: Columbia University Press.

[22] Kelchevskaya, N. R. and Shirinkina, E. V. (2019). *Regional determinants of the effective use of human capital in the digital economy // Regional Economy*. – [Online]. Vol. 15, no. 2. - pp. 465-482. Available:doi 10.17059 / 2019-2-12

https://www.researchgate.net/publication/334034798_Regional_Determinants_of_Effective_Use_of_Human_Capital_in_the_Digital_Economy

[23] Karavay, A. V. (2017). *The state and dynamics of the quality of human capital of Russian workers* *TERRA ECONOMICUS* [Online]. Vol. 15 No. 3 Available:doi: 10.23683 / 2073-6606-2017-15-3-144-158

https://www.researchgate.net/publication/333389422_State_and_Dynamics_of_the_Quality_of_the_Russian_Workers%27_Human_Capital_Sostoeanie_i_dinamika_kacestva_celoveceskogo_kapitala_rossijskih_rabocih