

## **THEORY AND PRACTICE OF HUMAN CAPITAL ASSESSMENT IN THE CONTEXT OF INNOVATIVE ECONOMY DEVELOPMENT**

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Human capital is one of the most important indicators in assessing the welfare of countries. The article explores the concept of human capital and the methods of its evaluation. The purpose of the study is to carry out of a comprehensive analysis and human capital assessment in developed countries, countries with economies in transition and developing countries due to a number of indicators in the context of the existing state financial policy and to obtain the final data of human capital assessment in 75 countries. The methodology of human capital assessment was framed by the authors, taking into account the specifics of the financial policies of countries, based on a system of indicators that characterize the level of development of economy, health, education and culture of the country. It has been carried out a comprehensive assessment of human capital based on the formed system of relative indicators, taking into account the economic and social aspects of state financial policy. As a result of the study, conclusions were drawn about the importance of the elements that form human capital, their interrelations and mutual influences, and it has been identified the countries that implement an effective state policy in the field of human capital. The framed methods of assessment of the effectiveness of public financial policy make it possible to identify the close relationship between the socio-economic situation of the country and human capital.

**Keywords:** human capital, integral estimate, system of indicators, standardization, consolidated standardized indicator, efficiency.

### **INTRODUCTION**

The timeliness of the assessment of human capital is defined by the objective needs of the current stage of global social and economic development, the specifics of the current situation in Russia and all over the world (Ogorodova, Kuryleva & Kul, 2016).

The assessment of the level of human capital is one of the most important components in studying the processes of the influence of various factors on the level of economic, social, political and cultural development of countries (Jones & Chiripanhura, 2010). The formation of human capital is directly related to the standard of living in the country (Schulz, 1971). Due to this there is a need to develop a mechanism and make an assessment in this field, such as the calculation of a set of coefficients for assessing the level of human capital, taking into account state investment in a particular industry.

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Under modern economic conditions human capital can be considered as an effective resource that is used for social and economic development of the state on the basis of its quantum growth and proliferation in all society structures, including business entities (Korchagin, 2005; 2006; 2008; 2009; 2011).

These circumstances require the adoption of not only investment but integrated solutions that form new resources in the state, society and individual companies which ensure the sustainable economic growth and the achievement of a higher level of the wellness of the population and a decent life quality (Dyatlov & Davydova, 2000).

### **METHODOLOGICAL FRAMEWORK**

The most common and basic approach to the allocation of human capital types is the classification on investments that are invested in the development of human capabilities. Investments in human capital include: investments in school education, training, on-the-job education, healthcare, information transparency in socio-economic development (Dobrynin, Dyatlov & Tsyrenova, 1999). Investments in labor resources mean any action that contributes to an increase in the growth of labor productivity and future incomes.

K. R. Makkonel and S.L. Bryu (1992) point out three types of investment in human capital:

- health-care expenditure: disease prevention, medical service, dietary nutrition
- educational expenditure: general, special, formal, non-formal education, technical training and reeducation
- investments in “mobility”: the possibility of migration to places with higher labor productivity.

J. Kendrick (1978) describes the “integral approach” which is more directly affects investments in the person according to which he points out the following types:

- material: necessary for the human physical development, that is, the costs of the birth and education of children;
- non-material: accumulated costs on education, special training, health care, migration.

Depending on the levels of manifestation of human capital there are: individual capital, company capital, national human capital (Kritskiy, 1991; 1995). All elements of human capital are closely interrelated. In the context of this study are considered: health capital, social capital, entrepreneurial capital, consumer capital, organizational capital, intellectual capital.

Human capital is studied at the following fundamental levels:

1. Universal (mega-economics): the functioning of human capital in the global economy, its movement, migration between countries and regions.

2. General (macroeconomics): it considers the national human capital: the political and social capital of the country, the national capitals of education and science, the capital of the national culture, the national intellectual capital, the capital of scientific and technical development of the country, the capital of information resources.
3. Meso-economics: human capital is manifested at the level of economies of industries, regions, complexes, large enterprises.
4. Individual (private) level: it considers at the levels of microeconomics, mini-economics (separate business units), nanoeconomics.

## **RESULTS AND DISCUSSION**

As a result the combination of all elements of human capital forms “the aggregate human capital”. In the most developed countries of the world over 60% of the national wealth is human capital.

The formation of human capital takes various types, forms and gets the various stages of the human life cycle (Il'inskiy, 1996; Klochkov, 1985; 2004). The factors due to the formation of human capital can be grouped into the following groups: Socio-demographic, Institutional, Integration, Socio-mental, Ecological, Economic, Production, Demographic, Socio-economic.

We are of the opinion that human capital which is formed in the state means making appropriate human living conditions, characterized by a system of indicators that disclose the level of development of health care, education, culture and economy.

With the view of assessing the human capital in Europe it has been used the Human Development Index (HDI), developed in accordance with the development program of the United Nations (Zhukov, 1996). HDI is an important indicator of the quality of population life, it allows to assess the level of the wellness of the population, the opportunities for obtaining quality education and medical service. It includes three main components: GDP per one person, life expectancy, literacy rate of the country's population.

The state of human capital can be measured in indicators of the Human Capital Index. The human capital index is closely related to the level of education, health and livability of life, such as: the mortality rate among children under the age of five; the overall indicator of the education of children in secondary school; literacy rate among the adult population.

In the process of formation of human capital it ensures: increasing of housing access for citizens through mortgage mechanisms, facilitating the use of financial instruments for stimulating the development of the housing market in general; increasing of information transparency and openness of the consumer lending market; expansion of opportunities for citizens to use maintenance loans; assistance

in increasing the level of protection of the quality of life and personal welfare of citizens through life and property insurance; - assistance in development of additional pension insurance mechanisms; availability of medical assistance; education and professional development.

Human capital is one of the most important indicators in assessing the wellness of countries. Each state in its own way sets priorities and conducts policies in the field of building human capital of citizens (Krut'ko & Smirnova, 2012; Kapelyushnikov, 2012).

In the period of formation of a new economy, the “knowledge economy”, the importance of assessing human capital takes the first place.

In this study it has been done the assessment of the financial policies of 75 countries with different levels of economic development and quality of life in the field of human capital on the basis of indicators which are characterized health, education, economic development in order to studying and describing the conclusions on the quality of life in these countries.

So far as the assessment of the level of wellness and human capital was performed on the basis of indicators which were expressed in different ways and units of measurement, their meanings were reduced to a dimensionless comparable type by the standardization method.

Due to standardization indicators are classified into two groups according to their semantic content (effects on the complex social and economic situation in the country): the growth of some goes to deterioration (less the lower meaning of coefficient is better), and the growth of others goes to improvement (more the higher meaning of coefficient is better).

The aggregates of indicators were determined on the basis of 3 blocks:

- 1) Assessment of human capital in health and demographic indicators
- 2) Assessment of human capital according to the meanings of socio-economic indicators
- 3) Assessment of human capital in the field of science, culture and development

The indicators of each of the three groups were divided into co-directional and contra-directional. The groups of indicators are presented, respectively, in Tables 1, 2, 3.

TABLE 1. THE FOCUS OF INDICATORS ASSESSMENT OF THE LEVEL OF HUMAN CAPITAL OF THE WORLD BANK IN THE FIELD OF HEALTH AND DEMOGRAPHY

<i>Nº</i>	<i>Contra-directional indicators group</i>	<i>Co-directional indicators group</i>
1	Child mortality at the age to 5 years (per 1000 persons)	General population
2	Maternal mortality index (per 100.000 live-born persons)	Population increase (% in a year)

*contd. table 1*

<i>Nº</i>	<i>Contra-directional indicators group</i>	<i>Co-directional indicators group</i>
3	Child mortality rate (per 1000 live-born persons)	Medicine expenditure (% from GDP (%))
4	HIV prevalence, total (% at the age from 15 to 49)	Birth rate (per 1000 persons)
5	Tuberculosis rate (per 100000 persons)	Advanced hospital hardware (% population, have access)
6		Able-bodied population, from 15 years, million persons
7		Immunization, Dpt vaccine (% children at the age from 12 to 23 months)
8		Immunization against morbilli, (% children at the age from 12 to 23 months)

TABLE 2: THE FOCUS OF INDICATORS ASSESSMENT OF THE LEVEL OF HUMAN CAPITAL OF THE WORLD BANK ACCORDING TO SOCIO-ECONOMIC INDICATORS

<i>Nº</i>	<i>Contra-directional indicators group</i>	<i>Co-directional indicators group</i>
1	The index of simplicity of doing business	GDP, in market rates, milliard dollars
2	External debt (in current dollars, \$)	GDP rate (% in a year)
3	Inflation of consumer prices, annual basket (% per a year)	Direct foreign investments (in current dollars, \$)
4	Overall unemployment	Current account balance
5	Long-term unemployment to the total number of unemployment	Export of products and services (% from GDP)
6		GNI, calculated according to purchasing power parity (in current dollars, \$)
7		Gross savings (% from GDP)
8		Able-bodied population (from 15 years)
9		Annual increase of money supply and quasi-money (% in a year)
10		The index of employment of population from 15 to 24 years to general population, %
11		Urban population (% to general population)
12		Trade in products (% to GDP)
13		Trade in services (% to GDP)
14		The number of registered air transport
15		The total length of the railway

TABLE 3: THE FOCUS OF INDICATORS ASSESSMENT OF THE LEVEL OF HUMAN CAPITAL OF THE WORLD BANK IN THE FIELD OF SCIENCE, CULTURE AND DEVELOPMENT

<i>Nº</i>	<i>Co-directional indicators group</i>
1	Education expenditure rate (% to GDP)
2	The index of education rate in the countries all over the world
3	Adult literacy rate
4	Rating of countries in the world according to science and research activity
5	Number of cinemas in the country

The considered indicators are taken based on the statistical data of World Bank “TheWorldBank” for 2014. In order to simplify and qualitatively assess the relationship between these indicators, norming and standardization of data, the following formulas were used:

for co-directional indicators:

$$K_{ij}^{*+} = 0.5 * \left( 1 + \frac{K_{ij}}{\max_j |K_{ij}|} \right) \quad (1)$$

for contra-directional indicators:

$$K_{ij}^{*-} = 0.5 * \left( 1 - \frac{K_{ij}}{\max_j |K_{ij}|} \right) \quad (2)$$

where  $K_{ij}$  – estimated measure of the i-coefficient of the system of social and economic indicators in j-country,

$K_{ij}^{*-} (K_{ij}^{*+})$  – standardized measure of the i-coefficient of the system of social and economic indicators in j-country, the maximum is considered by running through all measures (i.e., the maximum measure of the i-coefficient among all countries).

The aggregate integral indicator of human capital assessment in countries with different levels of economic development was figured up based on the results of the received coefficients of health care and demography, economy, science and culture. The measures of the resulting integral indicator of the assessment of human capital in different countries are presented in Table 4.

TABLE 4: THE AGGREGATE INTEGRATED COEFFICIENT OF HUMAN CAPITAL, TAKING INTO ACCOUNT THE SPECIFICS OF STATE FINANCIAL POLICY

<i>Country category</i>	<i>№</i>	<i>Country</i>	<i>The integrated Health and Demographic coefficient</i>	<i>The integrated coefficient in the economic field</i>	<i>Integrated coefficient in the science and culture fields</i>	<i>Total index</i>
Developed countries	1	China	7,76	10,74	3,5	22
and	2	Sweden	8,19	9,99	3,39	21,57
countries	3	Norway	8,09	9,48	3,41	20,98
with	4	Slovenia	7,84	9,84	3,28	20,96
economies	5	Slovakia	7,74	9,62	3,27	20,63
in transition	6	Ireland	7,75	9,23	3,3	20,28
	7	Russia	7,3	9,53	3,22	20,05
	8	Belarus	7,4	9,36	3,19	19,95
	9	Poland	7,65	8,93	3,16	19,74
	10	Kazakhstan	7,54	8,86	3,08	19,48

*contd. table 4*

<i>Country category</i>	<i>№</i>	<i>Country</i>	<i>The integrated Health and Demographic coefficient</i>	<i>The integrated coefficient in the economic field</i>	<i>Integrated coefficient in the science and culture fields</i>	<i>Total index</i>
	11	Azerbaijan	7,06	9,29	3,05	19,4
	12	Armenia	7,19	8,25	3,05	18,49
	13	Moldova	6,63	8,37	3,34	18,34
	14	Uzbekistan	7,03	7,95	3,35	18,33
	15	Kyrgyzstan	7,02	7,48	3,18	17,68
	16	Ukraine	6,52	7,9	3,23	17,65
	17	Tajikistan	7,07	6,63	3,06	16,76
Developing countries	18	Malaysia	7,73	10,12	3,14	20,99
	19	Mexico	7,78	9,35	3,16	20,29
	20	India	7,41	9,52	3,23	20,16
	21	Thailand	7,66	9,42	3,05	20,13
	22	Vietnam	7,63	9,42	2,99	20,04
	23	Costa Rica	7,88	8,81	3,14	19,83
	24	Chile	7,85	8,76	3,17	19,78
	25	Brazil	7,82	8,57	3,38	19,77
	26	Colombia	7,64	8,99	3,05	19,68
	27	Ecuador	7,69	8,7	3,26	19,65
	28	Paraguay	7,73	8,83	3	19,56
	29	Peru	7,53	8,97	2,97	19,48
	30	Tunisia	7,8	8,56	3,03	19,4
	31	Indonesia	7,06	9,23	2,96	19,24
	32	Oman	8,22	8,04	2,96	19,22
	33	Dominican Republic	7,43	8,79	2,93	19,15
	34	Honduras	7,65	8,46	2,97	19,07
	35	Fiji	7,61	8,29	3,13	19,03
	36	Philippines	7,32	8,73	2,96	19,01
	37	Cambodia	7,16	8,99	2,79	18,94
	38	Iran	7,84	7,85	3,18	18,88
	39	Morocco	7,56	8,51	2,78	18,84
	40	El Salvador	7,57	8,38	2,88	18,83
	41	Congo Republic	6,78	9,03	2,98	18,79
	42	Jamaica	7,49	8,09	3,1	18,68
	43	Egypt	7,86	7,82	2,93	18,6
	44	Guatemala	7,34	8,49	2,78	18,6
	45	Panama	7,6	7,94	3,03	18,56
	46	Bolivia	7,29	8,03	3,11	18,42
	47	Botswana	6,72	8,31	3,1	18,13
	48	Nepal	7,11	8,29	2,71	18,12
	49	Ghana	6,89	8,35	2,86	18,11
	50	Senegal	7,18	8,24	2,65	18,07
	51	Bangladesh	7,14	8,34	2,59	18,07
	52	South Africa	6,43	8,31	3,18	17,92
	53	Ethiopia	6,79	8,5	2,6	17,89
	54	Argentina	7,73	6,85	3,3	17,88

contd. table 4

<i>Country category</i>	<i>№</i>	<i>Country</i>	<i>The integrated Health and Demographic coefficient</i>	<i>The integrated coefficient in the economic field</i>	<i>Integrated coefficient in the science and culture fields</i>	<i>Total index</i>
	55	Malawi	6,88	8,15	2,82	17,85
	56	Sri Lanka	7,69	6,99	3,01	17,7
	57	Namibia	6,68	7,91	3,07	17,67
	58	Zimbabwe	6,63	8,15	2,87	17,65
	59	Madagascar	6,67	8,19	2,76	17,62
	60	Cameroon	6,57	8,22	2,79	17,58
	61	Pakistan	6,67	8,14	2,61	17,42
	62	Mauritania	6,59	8,18	2,65	17,41
	63	Zambia	6,79	7,76	2,83	17,39
	64	Equatorial Guinea	6,27	8,32	2,79	17,38
	65	Nigeria	6,11	8,32	2,77	17,2
	66	Sudan	7,08	7,36	2,59	17,03
	67	Turkmenistan	6,88	6,89	3,04	16,81
	68	Afghanistan	6,68	7,38	2,44	16,5
	69	Chad	5,76	8,28	2,4	16,45
	70	Haiti	6,59	6,94	2,56	16,1
	71	Liberia	6,34	6,96	2,63	15,93
	72	Guinea	6,18	7,23	2,43	15,84
	73	Lesotho	5,92	6,35	3,25	15,52
	74	Central African Republic	5,46	6,58	2,49	14,53
	75	South Sudan	5,79	3,88	1,86	11,54

China takes the first place according to human capital rate with the largest integral coefficient of human capital development. The second place is Sweden, as a country with a high level of economic development and health. The third place is Norway. There are the next countries: Slovenia, Slovakia, Ireland. Russia ranks the 7th place in the overall ranking of developed countries and countries with economies in transition. Among developing countries, Malaysia is the leader of human capital rate, then - Mexico, India, Thailand, and Vietnam. According to the received Kyrgyzstan, Ukraine and Tajikistan have a low human capital rate among developed countries and countries with economies in transition. Lesotho, the Central African Republic and Southern Sudan have a low human capital rate among developing countries as well.

Figure 1 presents the structural composition and measures of the integral indicator of human capital for 2014 in countries with developed economies.

Brazil has high indicators of science. All the obtained standardized coefficients are at a level significantly higher than the average measures. A high level of expenditure leads to a high index of the level of education and the level of literacy of the population. In Brazil it is not necessarily any higher education, however, the absolute majority of federal investments are directed specifically at him. Public



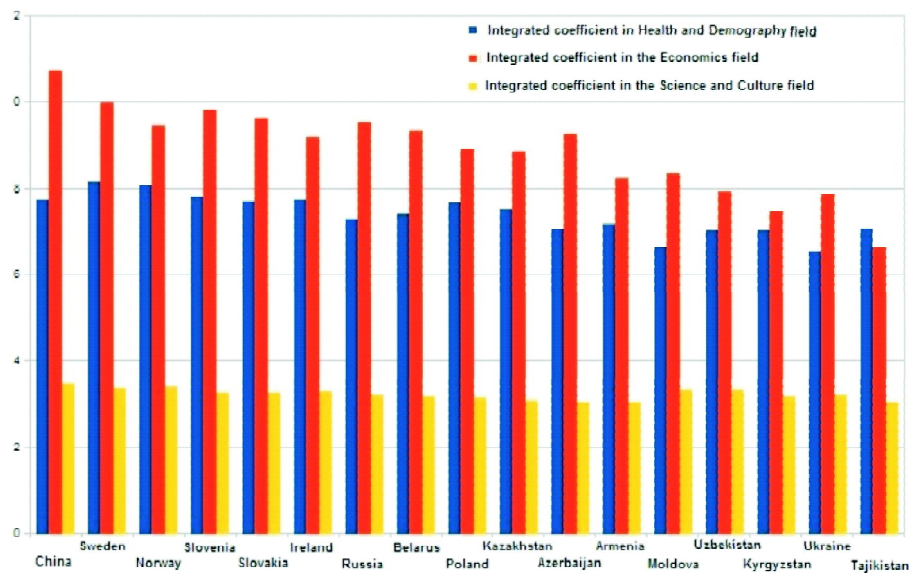


Figure 1: The aggregate integrated coefficient of human capital in developed countries

educational institutions are supported by the government, states and some of them - by municipalities. Education in public universities is mostly free.

## CONCLUSION

On a long term horizon the development of human capital can be a more meaningful process in the global sense than an increase in productive capital. Investment in a person can affect all areas and industries of the country (Becker, 1964). This idea is common in many foreign countries, focusing on the development of intellectual capital. In a postindustrial society the most important advantages of the state are policies direct to forming of knowledge and skills which are created by investment funds. Intellectual property is becoming a key strategic resource that determines the competitiveness of the economy. High standards of life quality determine the level of national wellness and the development potential of the state.

## References

- Becker, G. S. (1964). *Human Capital*. New York: Columbia University Press, 1964.
- Dobrynin, A.I., Dyatlov, S.A. & Tsyrenova, E.D. (1999). *Chelovecheskiy kapital v tranzitivnoy ekonomike: formirovanie, otsenka, effektivnost' ispol'zovaniya* [Human capital in a transitive economy: formation, assessment, efficiency of use]. St. Peterburg: Nauka.
- Dyatlov, S.A. & Davydova, O.A. (2000). *Primery rascheta ekonomicheskoy effektivnosti kapitalovlozheniy v obrazovanie individa* [Examples of calculating the economic efficiency of investment in the formation of an individual]. St. Peterburg: SPbGUEiF.

- Il'inskiy, I.V. (1996). *Investitsii v budushchee: obrazovanie v innovatsionnom vosproizvodstve* [Investing in the future: education in innovative reproduction]. St. Peterburg: Izd. SPbGUEF.
- Jones, R. & Chiripanhura, B. (2010). Measuring the U.K.'s Human Capital Stock. *Economic and Labour Market Review*, 4(11): 36-63.
- Kapelyushnikov, R. I. (2012). *Skol'ko stoit chelovecheskiy kapital Rossii?* [How much is the human capital of Russia costs?]. Moskva: Izd. dom Vysshey shkoly ekonomiki.
- Kendrik, J. (1978). *Sovokupnyy kapital SShA i ego formirovanie* [The total capital of the United States and its formation]. Moskva: Progress.
- Klochkov, V.V. (2004). Chelovecheskiy kapital i ego razvitie [Human capital and its development]. V kn.: *Ekonomicheskaya teoriya. Transformiruyushchayasya ekonomika*. Pod red. I.P. Nikolaevoy. Moskva: YuNITI.
- Klochkov, V.V. (1985). *Ekonomika obrazovaniya: illyuzii i fakty* [Economics of education: illusions and facts]. Moskva: Mysl'.
- Korchagin, Yu. A. (2011). *Chelovecheskiy kapital kak intensivnyy sotsial'no-ekonomicheskiy faktor razvitiya lichnosti, ekonomiki, obshchestva i gosudarstvennosti* [Human capital as an intensive socio-economic factor in the development of the individual, economy, society and statehood]. Moskva: VShE, 2011
- Korchagin, Yu.A. (2006). *Regional'naya finansovaya politika i ekonomika* [Regional financial policy and economics]. Rostov-na-Donu: Feniks.
- Korchagin, Yu.A. (2005). *Rossiyskiy chelovecheskiy kapital: faktor razvitiya ili degradatsii?* [Russian human capital: a factor of development or degradation?]. Voronezh: TsIRE.
- Korchagin, Yu. A. (2009). *Shirokoe ponyatie chelovecheskogo kapitala* [The broad concept of human capital]. Voronezh: TsIRE.
- Korchagin, Yu.A. (2008). *Sovremennaya ekonomika Rossii* [The Modern Economy of Russia]. Rostov-na-Donu: Feniks.
- Kritskiy, M.M. (1991). *Chelovecheskiy kapital* [Human capital]. Leningrad: Izd-vo Leningradskogo un-ta.
- Kritskiy, M. M. (1995). Teoriya chelovecheskogo kapitala kak prioritetyy faktor reformirovaniya ekonomiki [The theory of human capital as a priority factor in reforming the economy]. In: Sb. nauch. trudov «*Ekonomicheskaya teoriya i khozyaystvennaya praktika*» (5-28). St. Peterburg.
- Krut'ko, V.N. & Smirnova, T.M. (2012). *Chelovecheskiy kapital: problema i resurs innovatsionnogo razvitiya Rossii* [Human capital: the problem and resource of Russia's innovative development]. Moskva: «Tsifrovichok».
- Makkonel, K.R. & Bryu, S.L. (1992). *Ekonomiks: printsipy, problemy i politika, T. 2* [Economics: principles, problems and politics, T. 2]. Moskva: Respublika.
- Ogorodova, M.V, Kuryleva, O.I. & Kul, T.N. (2016). About contemporary issues compulsory insurance system in the Russian Federation. *Bulletin of the Minin University*, 1. URL: <http://vestnik.mininuniver.ru/reader/search/o-sovremennykh-problemakh-sistemy-obyazatel'nogo-st/>
- Schulz, T.W. (1971). *Investment in Human Capital: The Role of Education and of Research*. New York: Free Press.
- Zhukov, V.I. (1996). Chto takoe IChRP? K voprosu o «chelovecheskom potentsiale» [What is the HDI? To the question of “human potential”]. *Sotsiologicheskie issledovaniya*, 4: 101-112.