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## THE BIOPHYSICAL CAPITAL AND ITS INFLUENCE ON THE FORMATION OF THE HUMAN POTENTIAL OF THE REPUBLIC OF BELARUS

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This article is dedicated to the human capital and its main structural components. Human capital is analysed as a complex conception which can be divided into three main parts: the biophysical capital, social capital, intellectual capital. This article reflects the author's opinion that biophysical capital is the basic structure part of human capital. The aim of the article is to study the biophysical capital as the main component of human capital. The object of article biophysical capital of the Republic of Belarus. The subject of article is biophysical capital and its influence on the formation of the human potential. This article contains the analysis of quantitative changes in the human development index (HDI) for the Republic of Belarus for the last 25 years (1990–2015). Moreover, this article contains calculation of the HDI of the Republic of Belarus as if life expectancy at birth indicator was 75 years). Explored main directions of development of the Republic of Belarus in the field of human development and health in accordance with the socio-economic development program for 2016–2020 years in Belarus.

**Key words:** human capital; human potential; human development index; biophysical capital; social capital; intellectual capital; life expectancy at birth; the Republic of Belarus.

## БИОФИЗИЧЕСКИЙ КАПИТАЛ И ЕГО ВЛИЯНИЕ НА ФОРМИРОВАНИЕ ЧЕЛОВЕЧЕСКОГО ПОТЕНЦИАЛА РЕСПУБЛИКИ БЕЛАРУСЬ

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Посвящена изучению человеческого капитала, в том числе его основных компонентов. Человеческий капитал анализируется как комплексное понятие, включающее биофизический, социальный и интеллектуальный капитал. Приводится мнение о том, что биофизический капитал – несущая конструкция человеческого капитала. Цель статьи – изучить влияние биофизического капитала как главной составляющей человеческого капитала. Объект исследования – биофизический капитал Республики Беларусь. Предмет исследования – влияние биофизического капитала на формирование человеческого потенциала. Проведен анализ количественного изменения индекса человеческого развития для Республики Беларусь за последние 25 лет (1990–2015). Произведен расчет данного показателя Республики Беларусь при условии, что ожидаемая продолжительность жизни при рождении

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составит 75 лет. Рассмотрены основные направления развития нашего государства в области человеческого развития и здравоохранения в соответствии с Программой социально-экономического развития Республики Беларусь на 2016–2020 гг.

**Ключевые слова:** человеческий капитал; человеческий потенциал; индекс человеческого развития; биофизический капитал; социальный капитал; интеллектуальный капитал; ожидаемая продолжительность жизни при рождении; Республика Беларусь.

Nowadays production of goods continues to be important but the production efficiency depends to a greater extent not on prices and materials used but on the production technology, software, staff development, management system that is to say that the production efficiency depends on the effective use of human capital.

As we know, there are three key economics problems: which goods and services should be produced; who consumes the goods and services produced and how goods and services should be produced. According to L. Robbins, “economics is a science that studies human behaviour as a relationship between limited resources and unlimited wants which have alternative uses” [1, p. 11].

Considering the fact that we have unlimited (endless) needs of society and limited (finite) resources, the author’s attention is focused on the question how goods and services should be produced; it means that we should answer the question – what technology is to be used? In my opinion, the optimal solution to the question “How goods and services should be produced?” in particular period of time will make it possible to preserve and save scarce resources for the future population of the planet. Moreover, resources which would be saved by highly efficient production technology could be used more effectively and rationally in the distant future. Efficient production technology is directly related to efficient use of human capital.

The definition of human capital is given by T. Schultz (the laureate of the Nobel Prize in Economics). T. Schultz acknowledged that “all human resources and abilities are either inborn or acquired. Everyone is born with a set of individual genes, which defines a person’s inborn human potential. Acquired valuable human qualities which can be improved (reinforced) by investments, we call human capital”. Nowadays human capital inputs can be considered as investments because the man refuses part of current consumption in favour of greater income in the future [2].

The broader definition of human capital is offered by Russian scientist U. Korchagin. According to the Russian scientist, “human capital is the intensive productive factor of economic and social development which consists of labour resources, knowledge, tools of intellectual and organizational labour, environment and intellectual work” [3]. It leads to the effective and efficient functioning of the human capital as the productive development factor.

Human capital consists of three main components.

Biophysical capital can be explained as vital resources of personality, its physical and psychological potential which can be considered as possibility to create value [4]. There are some examples of generating income (value) from the biophysical component of human capital. For example, model men – people who show clothes at shows and exhibitions because they (model men) have a certain reserve of biophysical capital: slim bodies, relatively high growth, etc. Bodybuilders also have unique biophysical capital, in their case it is a very well-developed muscle structure. Thus, athletes, models and bodybuilders all over the world with the help of their hard work and natural biophysical capital can generate profit from the biophysical component of human capital. Moreover, this profit is usually higher than the average wage (income) in the country (region), where the owner of a unique (or high-quality) biophysical capital lives. The role of biophysical resources is very important because of indirect influence of biophysical resources as natural limiter of professional capabilities of individuals (age, sex, the state of health) [4]. It is not necessary to have outstanding biophysical capital (abnormally high or low growth, high body plasticity, a well-developed muscle structure, etc.), it is enough to be a healthy person to generate relatively high income. A bright example is the wage of airpilots (pilots), miners, flight attendants, astronauts (cosmonauts).

The other important component of the human capital is social resources of the individuals that is to say that every man has its own social interaction potential and its own inclusion in a particular social environment as the form of social capital [4].

Intellectual resources of the individual mean formed knowledge in the process of formal and informal education plus information awareness and creative human abilities. Intellectually rich persons are the people who demonstrate successful features of personality, good general and professional background and brilliant tactical abilities. These people are able to make the right decisions to solve problems and take responsibility for their decisions [4].

However, the main structural component of the human capital is the biophysical capital, also known as the vital capital and the health capital. The reality shows us that without physical and mental health the person is not able to create value and, moreover, the person can't accumulate individual human capital [4]. If we look at the ability of men to work through marginal product we can notice that healthier people (physically and mentally) have better skills and as a result have bigger salaries (wages). That is why the maintenance expenses and improvement of human health are, in my opinion, the most important investments in human capital. High-quality biophysical capital allows us to use acquired skills in the long term period. For example, inputs (time, money and etc.) in healthy nutrition, medicine, sports and other health expenditures can be classified as investments in biophysical capital. Efficiency of investments in biophysical capital can be measured by life expectancy at birth index.

The Human Development Index (HDI) is used with the aim to compare the level of human development in countries all over the world since 1990. HDI is a summary measure of achievements in key dimensions of human development: a long and healthy life (can be estimated by the indicator – life expectancy in years); access to knowledge (can be measured by two indicators: mean years of schooling index and expected years of schooling index); and a decent standard of living (can be estimated by gross national income per capita (PPP) American dollars) [5, p. 1–2].

The HDI is the geometric mean of normalized indices for each of the three dimensions [5, p. 1–2]. This indicator is calculated and used by the United Nations to compare standard of living in different countries and regions.

Not only western economists and owners of large innovative companies are interested in human potential development but the government officials of the Republic of Belarus have the same interest. For example, on the website of the Belarusian National Assembly the results of the fundamentals of the socio-economic development program of the Republic of Belarus were summed up: “Belarus took the 50<sup>th</sup> place in the Human Development Index (HDI) and stayed in the group of countries with high human development”. The information is contained in the 2015 Human Development Report and was published by the Human Development Report Office of the United Nations Development Program (UNDP) [6]. The article featured the main ideas of the representative of UNDP in Belarus – Mr. Sanaka Samarasinha and was published on the official website of the Republic of Belarus. The article was headlined “Samarasinha: Belarus reached nearly all Millennium Development Goals”. It's contents were devoted to the Belarusian progress in the sphere of human development. Further on, the author stressed the fact that Belarus had reached almost all UN Millennium Development Goals of 2015 and the fact that Belarus had taken the 53<sup>th</sup> place out of 188 in the Human Development Index. Finally, the article underlined the fact that the poverty rate in Belarus had been reduced to 5 % for the last five years [7]. Human potential development is the most important factor and a leading force to form an innovative economy and is used as a basic priority of socio-economic development program of the Republic of Belarus for 2016–2020 [8].

In order to estimate the dynamics of human development of the Republic of Belarus the tables and graphs are given below which serve to reflect the quantitative change of Belarusian HDI. The assessment objective is to reflect annual position of the Republic of Belarus in the total HDI in during certain time period, namely from 1990 to 2015 (see table). It allows us to see a complete picture of Belarusian human development. For the in-depth comparative analysis some countries were added to the list. The following countries were included: Russia, Sweden, the USA, Norway and China. R. Descartes noticed that «everything is relative» [9] and I agree with that. Russia was chosen because, first of all, it is the largest country in the world geographically, it also takes the 9<sup>th</sup> place among the most populous countries. It has the 15<sup>th</sup> largest economy in the world by nominal GDP and the 6<sup>th</sup> largest economy by purchasing power parity (PPP). Russia is the biggest committed and trade partner of Belarus. More than 50 % of all Belarusian exports are sold to Russia [10]. Secondly, Sweden was chosen because it is a representative of a different geographical region, it is situated in Northern Europe. The total population accounts for 10 million people which is approximately equal to the amount of population in Belarus. Belarus and Sweden have the same economic model which is known as a socially-oriented market economy [11]. The USA was chosen because of the fact that it has one of the biggest economies and one of the most efficient economic management system in the world [12]. Norway was added to the list above for the following reasons: it is a sovereign and unitary monarchy which territory comprises the western part of the Scandinavian Peninsula and the island Jan Mayen and the archipelago of Svalbard. Since 2009 Norway has been the first country in the HDI rating [13]. Last but not least is China. The country was included in the comparative analysis because it is a unitary sovereign state in East Asia with a population of over 1.381 billion. It is the world's most populous country [14].

In 1990 HDI for Belarus and Russia had the same quantitative measure and equals 0,920, because these countries used to be the parts of the Union of Soviet Socialist Republics [15]. From 1990 to 2000 human development index for the Republic of Belarus was declining as it can be seen in the table. This negative tendency can be explained by the following reasons.

HDI rank of the Republic of Belarus and other countries from 1990 to 2015

No.	Country	Year									
		1990		2000		2005		2010		2015	
		HDI	HDI rank	HDI	HDI rank	HDI	HDI rank	HDI	HDI rank	HDI	HDI rank
1	Belarus	0.920	26	0.781	57	0.786	67	0.732	61	0.798	50
2	Russia	0.920	26	0.771	62	0.795	62	0.719	65	0.798	50
3	Sweden	0.987	2	0.926	6	0.949	6	0.885	9	0.907	14
4	USA	0.961	13	0.929	3	0.944	10	0.902	4	0.915	8
5	Norway	0.983	6	0.934	2	0.963	1	0.938	1	0.944	1
6	China	0.716	65	0.706	79	0.755	85	0.663	89	0.727	90

Note. Own design based on [15].

The first reason of a decrease in the Belarusian HDI is the dissolution of the Soviet Union. In the 1990s almost all key macroeconomic indicators of Belarus tended to decline. The dissolution of the Soviet Union impacted Belarusian economy in a negative way. Belarus had to handle the absence of the formed national economic system. Also Belarus faced the necessity to find new trade partners to buy raw materials and commodities.

Secondly, the Union of Soviet Socialist Republics (USSR) was the leader in the sphere of science and technology. Moreover, the USSR had the highest level of comprehensive education and research base. Lots of researches, experiments were conducted by the USSR scientists.

Furthermore, the union between the Byelorussian Soviet Socialist Republic and USSR allowed free migration of the population between member states of the USSR. Many professionals, specialists, workers, scientists from the Russian Soviet Socialist Republic, the Ukrainian Soviet Socialist Republic, the Kazakhstan Soviet Socialist Republic were sent to the Byelorussian Soviet Socialist Republic which served an outsourcing facility of the USSR. This, as a result, created a large number of job opportunities in Belarusian industry and brought about an increase in GDP per capita.

Summarizing the facts mentioned above, it is important to mention the fact that there are methodological difficulties in estimating and calculating the Belarusian HDI when the Republic of Belarus was a structure part of the USSR.

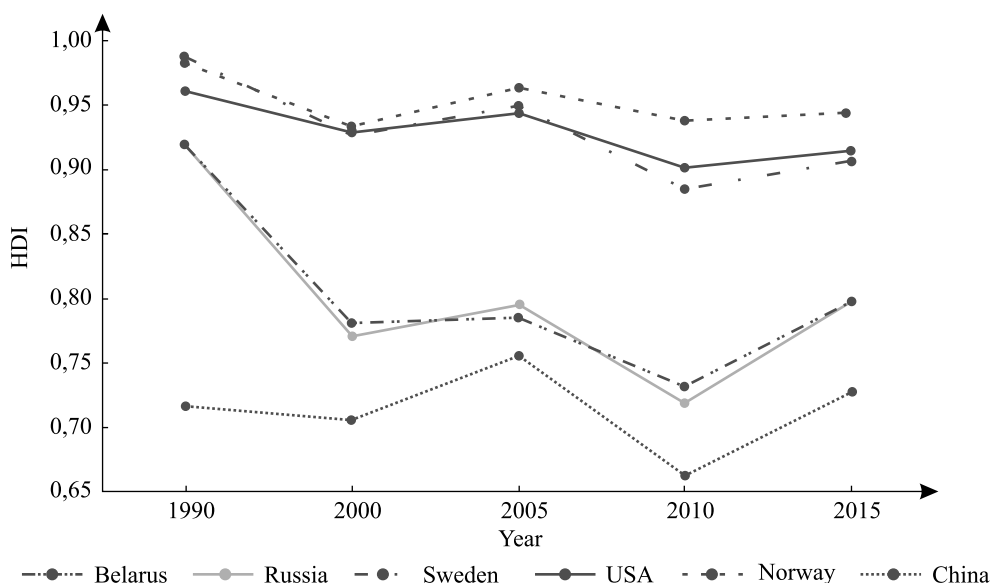
From 2000 to 2015 human development index for the Republic of Belarus demonstrates sustainable growth as it can be seen in the figure below. Human development index assumes the quantity in the number range [0; 1]. In order to have a more detailed graphic analysis, the minimum HDI is considered at the rate of 0.65.

Belarus ranks 50<sup>th</sup> out of 188 countries in the Human Development Index Report of 2015 with the following indicators:

- 1) HDI – 0.798;
- 2) life expectancy at birth – 71.3 years;
- 3) mean years of schooling – 15.7 years;
- 4) expected years of schooling index – 12.0 years;
- 5) gross national income per capita (2011 PPP, \$) – 16 676 US dollars [16, p. 1–2].

In order to estimate the level of development of biophysical capital in the Republic of Belarus the author compares life expectancy at birth (LEB) of the Republic of Belarus with the same indicator of other countries. LEB is a statistical measure of the average time an organism is expected to live, based on the year of their birth, their current age and other demographic factors including sex. Life expectancy is used as one of the most important indicators of the government health care system of UNDP [15]. LEB has direct correlation with the indicator of the total health expenditure. Life expectancy can show the degree of investments efficiency in the biophysical capital of the Republic of Belarus.

Belarus ranks 139<sup>th</sup> out of 224 countries in the “World Fact Book” according to its life expectancy at birth parameter [16]. The health problem is a very important question of the Belarusian society and government. Medical services in the Republic of Belarus are free and available, moreover, the level of government health care is quite high. Nevertheless, the health problem is the “question of the hour” for the Belarusian government. Lots of medications are easy to find and to buy, there is a big amount of sporting facilities in Belarus. Moreover, the Belarusian government conducts active promotion of healthy lifestyle. At the same time life expectancy at birth in Belarus is estimated at the rate of 71.3 years in the “Human Development Report of 2015: Work for Human Development”. For example, life expectancy at birth of Honduras (ranked 131<sup>st</sup> by HDI) is 73.1 years, the same rate exists in Nicaragua (ranked 125<sup>th</sup> by HDI) and it is 74.9 years [17, p. 1–2]. In order to improve the health situation in the country the government of the Republic launched the program for the years of



HDI trend line from 1990 to 2015  
HDI trend line from 1990 to 2015 (own design based on [15])

2016–2020 that is intended to ensure the state policy in the field of public health. This policy is aimed at stabilizing the population and increasing life expectancy through the implementation of the state program “National health and the demographic safety of the Republic Belarus for the 2016–2020” [8]. Life expectancy at birth of the Republic of Belarus should be about 75.0 years [18].

According to the calculations below, if the life expectancy at birth of Republic of Belarus reaches the figure of 75 years, *ceteris paribus*, the HDI rank of the Republic of Belarus will be at the 47<sup>th</sup> place. Furthermore, Belarus will move from a group of countries with a high human development to the group of countries with a very high human development.

$$HDI = \sqrt[3]{I_{Health} \cdot I_{Education} \cdot I_{Income}}, \quad (1)$$

where HDI – Human Development Index;  $I_{Health}$  – health index;  $I_{Education}$  – education index;  $I_{Income}$  – income index [5].

$$I_{Health} = \frac{a - 20}{85 - 20}, \quad (2)$$

where  $a$  – life expectancy at birth, years [5].

$$I_{Education} = \frac{I_{Mean\ years\ of\ schooling} + I_{Expected\ years\ of\ schooling}}{2}, \quad (3)$$

where  $I_{Mean\ years\ of\ schooling}$  – mean years of schooling index;  $I_{Expected\ years\ of\ schooling}$  – expected years of schooling index [5].

$$I_{Mean\ years\ of\ schooling} = \frac{b - 0}{15 - 0}, \quad (4)$$

where  $b$  – mean years of schooling, years [5].

$$I_{Expected\ years\ of\ schooling} = \frac{c - 0}{18 - 0}, \quad (5)$$

where  $c$  – expected years of schooling, years [5].

$$I_{Income} = \frac{\ln d - \ln 100}{\ln 75\ 000 - \ln 100}, \quad (6)$$

where  $d$  – gross national income per capita (2011 PPP, \$), US dollars [5].



Let's calculate HDI for Belarus with the formulas (1)–(6) and the data from Human Development Report 2015 [17]. The author excludes the indicator of life expectancy at birth, which is equal to 75 years [18]. The result of calculation is presented in formula (7).

$$\text{HDI} = \sqrt[3]{0,846154 \cdot 0,836111 \cdot 0,772885} = 0,817729. \quad (7)$$

It is natural to think that if people make large investments in biophysical capital than the human beings will have longer and healthier life. Based on this logic, the rich people have to live a long life, but this logic does not apply to practice. This discrepancy can be explained by the following reasons. First of all, because of the existence of human genetic predisposition. In most cases the genes determine not only the color of the skin, eyes, bone structure, but also the quality of future life. As a rule, when a child is born healthy it is natural to think that his parents are also healthy or they lead a healthy lifestyle. For example, parents-athletes can expect that their child will be born healthy, meanwhile parents-smokers or parents-alcoholics are not sure that the baby will not have the problem with health. Secondly, there exists a possibility of genetic changes. Nowadays there are lots of cases of unexpected genetic changes. For instance, a mother with the human immunodeficiency virus can give a birth to an absolutely healthy child, meanwhile parents who lead a healthy lifestyle can have a baby with a mental retardation. Another reason relates to personal attitude to their own health. Every person has the right to choose. For example, you can eat a fried steak or a light fruit salad, or you can have bad habits, you can do sports or be a passive person. Anyway all human actions will have impact on human health.

In this way life expectancy at birth first of all depends on rational human attitude to their own health. At the moment Belarusian population is not concerned about personal health. According to the current reports Belarus is the biggest alcohol consumer in the world. The average Belarusian consumes 17.5 liters of alcohol meanwhile the average world inhabitant aged over 15 years consumes 6.2 liters of alcohol annually [19].

The rational attitude of population to their own health and sufficient government investments into the health care system will allow Belarusians to work in a more intensive and efficient way. And as an outcome of this the Republic of Belarus will accumulate human potential and will be ranked as a country with a very high human development.

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