Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego
Studies of the Industrial Geography Commission of the Polish Geographical Society

35(2) • 2021

ISSN 2080-1653
DOI 10.24917/20801653.352.3

Gulnara Nyussupova
Al-Farabi Kazakh National University, Almaty, Kazakhstan
Gaukhar Aidarkhanova
Al-Farabi Kazakh National University, Almaty, Kazakhstan
Stephen S. Young
Salem State University, Salem, Massachusetts, USA

The impact of the transformation of the economy of the Republic of Kazakhstan on the reproduction of human capital: socio-economic aspect

Abstract: In the context of the transition of the national economy of the Republic of Kazakhstan to an innovative type of development, the issues of the formation and development of human capital are becoming increasingly important. Increasing labor productivity, developing high-tech production, creating innovative products in the republic is impossible without providing the branches of the national economy with personnel who have the necessary professional and personal competencies. In turn, social and economic factors affect the formation and quality of human capital, while there is an uneven spatial distribution of human resources. Accordingly, the priorities of the socio-economic development of the territories require coordination with the tasks of increasing human capital. The basis of this study is the analysis of the reproduction processes of human capital in the regions of the Republic of Kazakhstan, taking into account the socio-economic component. The object of the research is the human capital of the regions of the Republic of Kazakhstan, the subject of the research is the socio-economic aspect of the development of human capital. The method of the integral index for assessing human capital was taken as the main model for calculating human capital. We identified not only socio-economic factors affecting the effective use of human capital in the regions, but also demographic, environmental components and calculated indices based on these factors. The analysis showed that one of the key factors affecting the differentiation of the level of accumulated human capital is socio-economic. According to the results, the regions were identified as leaders and outsiders in terms of the level of accumulated human capital, regions with a post-industrial warehouse of the economy have high indicators of the human capital index, regions with agricultural specialization are low.

Keywords: human capital; innovative economy; institutions for the development and reproduction of human capital; measurement of human capital

Received: 10 December 2020
Accepted: 2 March 2021

Suggested citation:
Nyussupova, G., Aidarkhanova, G., Young, S. (2021). The impact of the transformation of the economy of the Republic of Kazakhstan on the reproduction of human capital: socio-economic aspect. *Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego* [*Studies of the Industrial Geography Commission of the Polish Geographical Society*], *35*(2), 38–52. doi: 10.24917/20801653.352.3

Introduction

The World Bank defines human capital as the most important element of national wealth and a factor of economic growth. The human factor plays a huge role in the processes of post-industrial transformation in the modern world. The greatest contribution to the creation of science-intensive products with high added value is made by the return on investment in human capital. Therefore, the establishment of conditions for the most effective formation, development, and implementation of human capital becomes decisive for ensuring sustainable economic growth and successful post-industrial transformation of modern society.

In this research, priority attention is paid to socio-economic processes forming the human capital in the Republic of Kazakhstan and its spatial distribution.

Some indicators characterizing the well-being and quality of life of the population should be attributed to human capital. Significant funds are spent annually on the reproduction of human capital, including the costs of the functioning of the system of education, health promotion, and other factors for increasing people's working capacity, increasing the working period and other aspects of conditions for favorable life. This, in turn, leads to an increase in labor productivity and an increase in the standard of living of the population. A certain structure and quality of human capital contribute to economic growth, improve the economic and social well-being of people. In this regard, it becomes necessary to develop and implement modern approaches to human capital management, taking into account its structure, factors contributing to the formation of high-quality human capital, the interdependence of development processes, and increasing human capital.

Material and Methods

The research uses theoretical and methodological analysis of scientific literature, methods of comparative, statistical analysis, grouping and systematization, structural analysis. Collected were publicly available statistical data for 2014–2018 from statistical collections, the Taldau information and analytical system, the national SDG reporting platform of the Statistical Committee of the Republic of Kazakhstan, monographs, scientific articles, publications and reports of the UN, the World Bank and others. This study proposes a methodology for a comprehensive assessment of the region's human capital. The proposed assessment indicators are grouped into large components of human capital: demographic, socio-economic and environmental. The components of assessing the state of the region's human capital should be considered in a system that gives an integral assessment of human capital. To calculate the integral indicator of the state of the human capital of the region, it is necessary to determine the coefficients of the significance of each of its indicators. The coefficients are determined by expert prioritization (Serebryakova, Volkova, Volkova, 2019).

Results and Discussion

The formation and development of human capital have been studied by many scientists who have studied the content of human capital, its influence on the process of creating public and individual benefits. G. Becker and T. Schultz are considered the founders

of the theory of human capital. T. Schultz researched to understand the importance of human capital as the main factor of production in industrial and post-industrial economies. G. Becker considered the concept of human capital concerning organizations and enterprises (Becker, 1975; Schultz, 1968; Schultz, 1971). Human capital has also been researched by scholars such as L.E. Engel (Engel, 1882), who proposed using the method of production prices to determine the monetary value of human capital, W. Petty (Petty, 1899), who proposed to estimate the amount of accumulated human capital by capitalizing earnings as a life annuity, Dublin and A. Lotka (Dublin, Lotka, 1930), W. Farr (Johnson, Kotz, 2011), improved the methodology of W. Petty by introducing into the model the factor of the possibility of death by mortality rates, and Jong-Suk Han, Jong-Wha Lee (Jong-Suk, Jong-Wha, 2020), estimated the value of human capital by the composition of the labor force by age, sex, education, and level of wages.

Human capital should be seen as a key resource and growth factor in any economic system. Human capital is a set of knowledge, skills, abilities, and competencies of people that create strategic opportunities for increasing the competitiveness of enterprises, industries, regions, countries. Income from the use of human capital can be obtained both by the owner of the capital, that is, a person who has certain knowledge, abilities, skills, and by an organization that provides him with the opportunity to realize these professional abilities, skills, knowledge.

The Organization for Economic Co-operation and Development (OECD) documents define human capital as "knowledge, skills, competencies and other properties embodied in people that contribute to the creation of personal, social and economic well-being," which places the focus on human capital research knowledge, skills, abilities of the individual (Human Capital Investment, 1998).

D. Begg, S. Fischer, R. Dornbusch, believe that "human capital is a measure of the person's ability to generate income. It includes innate ability and talent, as well as education and acquired qualifications" (Begg, Dornbusch, Fischer, 1991).

A.I. Dobrynin, S.A. Dyatlov, E.D. Tsyrenova define human capital as "a certain stock of health, knowledge, skills, abilities, motivations, formed as a result of investments and accumulated by a person, which lead to an increase in the qualifications of an employee, are expediently used in a particular sphere of social reproduction, contribute to the growth of productivity and the quality of his work and thereby lead to an increase in the earnings of a given person" (Dobrynin, Dyatlov, Tsyrenova, 1999).

Yu. A. Korchagin was engaged in research and assessment of Russian human capital. He adapted Western theories of human capital to Russian conditions. In his works, human capital is considered as the main productive and social factor in the development of the economic system. The main results of Yu. A. Korchagin's research are reduced to the thesis about the determining role of human capital in the socio-institutional system and the socio-economic development of the state. He defines human capital as "an intensive productive and social factor, which is not subject to the law of diminishing returns and which is able to accumulate through investments in intellectual property, information equipment of labor and life, education, training, knowledge, innovation and institutional potential, economic freedom, entrepreneurial ability and entrepreneurial climate, science, culture and art, safety and health of the population" (Korchagin, 2004).

R.I. Kapelyushnikov made a quantitative assessment of the human capital of Russia in his study, which made it possible to identify the pattern of social and managerial impact on human resources using quantitatively fixed indicators (Kapelyushnikov, 2012).

In domestic science, there is no single concept of the essence of human capital, and there are different approaches. Kazakhstani scientists are engaged in the study of various aspects of human capital, quality of life, and human development in general (Meldakhanova, Kalieva, 2012; Nyussupova, 2018). The Kazakhstan Institute is carrying out much work in the study of the human capital of Kazakhstan for Strategic Studies under the President of the Republic of Kazakhstan (http://kisi.kz/index.php/ru/). However, research on the assessment of human capital, with the definition of quantitative and qualitative indicators, is not enough in Kazakhstan.

The process of formation and development of human capital in modern Kazakhstan is closely related to the period of the collapse of the USSR and the process of transformation of the socio-economic system of the already independent Republic of Kazakhstan. The trajectory of human capital development in the Republic of Kazakhstan can be conditionally divided into three periods: 1991–2004, 2004–2012, and 2012 up to the present.

The first period was characterized by a deep transformational recession that lasted for about 13 years. This period was accompanied by a strong economic recession, a drop in production, an increase in unemployment, a decrease in employment, a fall in wages, a decrease in the quality and competitiveness of products, a deficit in the state budget, high inflation, a depreciation of the national currency, etc. All this led to a deterioration in the social well-being of the population, a decrease in the level and quality of life of most of the country's population. At the present stage, human capital, on the one hand, goes through the stage of separation as an independent phenomenon of the market economy. On the other hand, there was a quantitative and qualitative degradation of its basis – human potential.

The second period was characterized as a period of recovery from the crisis, economic recovery, and stabilization, a period in which there was an improvement in the main indicators of the labor market and the quality of life of the population. After the crisis decline in production and financial markets in 2004, there was a steady growth of the Kazakh economy. This was facilitated by both internal and external (primarily, favorable conditions on the world raw material market) factors. As a result, human capital as an economic phenomenon entered the phase of maturity in the Republic of Kazakhstan (this does not exclude its further transformation and development).

The third period was associated with the beginning of the republic's movement towards a post-industrial world, in which the triad "education – science – innovation" rules. The "resource economy" has been replaced by the "knowledge economy", competitive human resources have become the most important in comparison with raw materials. Therefore, one of the main trends in the modern world is the increased competition for qualified and highly qualified human resources. Nevertheless, serious problems persisted in the country both in understanding the importance of human capital and in the development and implementation of models for its development.

Modern human capital is inextricably linked with human intelligence, his motivation for professional and creative development, with his mentality. It is formed through investments in various spheres of life: education, health, upbringing, self-education, culture and art, science, business development, information support, security. The formation of human capital, as we can see, is influenced by a whole complex of factors that can be combined into groups: demographic, economic, social, production, environmental, technological, institutional, behavioral, etc. This study is devoted to the study of some of these factors.

ANALYTICAL STUDY OF THE MAIN FACTORS OF HUMAN CAPITAL FORMATION IN THE REPUBLIC OF KAZAKHSTAN

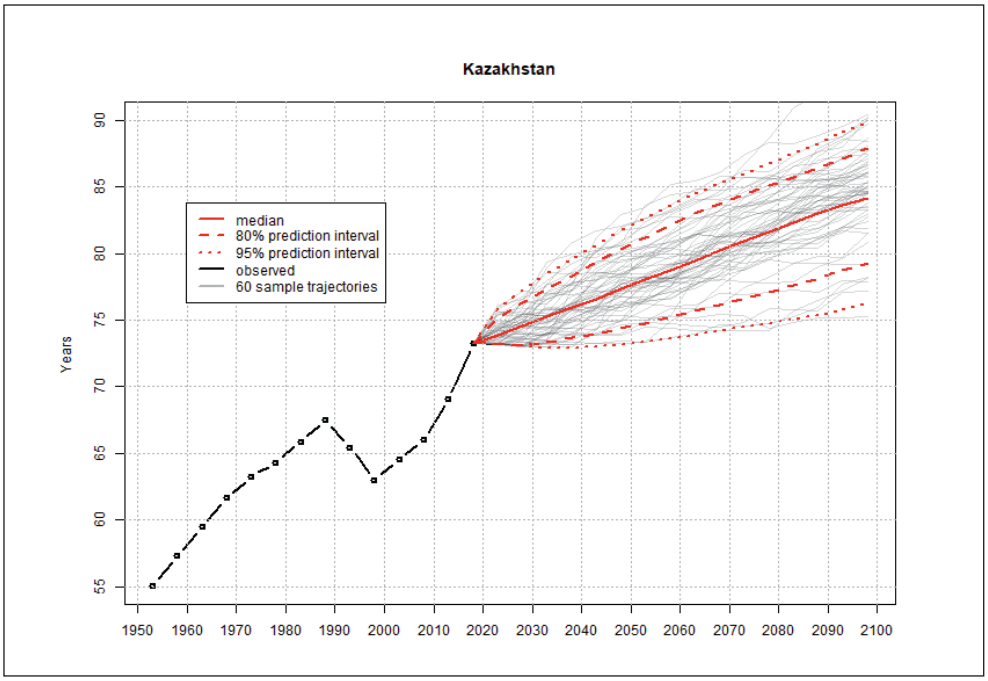
The main demographic indicators characterizing the level of human capital are the share of the region's population out of the total population of the country, population growth rates, and life expectancy at birth, aging rate, population mortality, infant mortality, etc.

The population of the Republic of Kazakhstan as of October 1, 2020, was 18.8 million people, including the share of the urban population – 58.7%, rural – 41.3%. The main source of growth is natural growth. In 2020, the natural growth of population in the Republic of Kazakhstan amounted to 269.2 thousand people (14.54%), while the migration loss amounted to 32.9 thousand people (Agency for Strategic…, 2020).

In Kazakhstan, since 2016, there has been a gradual decrease in the annual growth rate until 2027, when the growth will be 0.82%. This trend is explained by the fact that the population of reproductive age includes young people who were born after 1995 when the birth rate in the country was relatively low. From 2026, according to the forecast, an increase in the birth rate is expected, as a larger generation of those born in 2005–2010 will enter reproductive age (Department of Economic…, 2020).

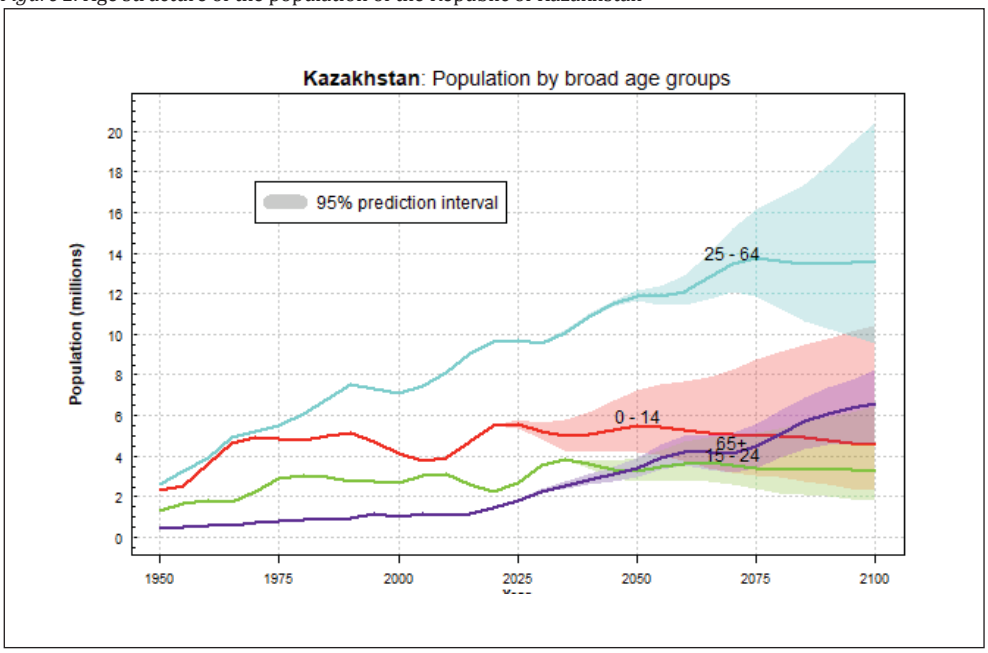
In the Republic of Kazakhstan, according to the Statistics Committee, life expectancy in 2020 was 73.19 years, for men – 68.82 years, for women – 77.30 years (https://gender.stat.gov.kz). By 2035–2040 according to the average version of the UN forecast, life expectancy at birth will be 75.93 years (Figure 1).

Figure 1. Life expectancy of the population of the Republic of Kazakhstan for 1950–2020 and forecast data up to 2100



Source: United Nations, DESA, Population Division. World Population Prospects 2019. https://population.un.org/wpp/

Figure 2. Age structure of the population of the Republic of Kazakhstan



Source: United Nations, DESA, Population Division. World Population Prospects 2019. https://population.un.org/wpp/

As of January 1, 2020, the working-age population amounted to 11 823 000 people, pre-working age (0–15 years) – 5 372 000 people, post-working age (women 55 years and older, men 60 years and older) – 1 435 000 people. In 2020, the share of the working-age population amounted to 63.5% of the total population, including 51.3% of women, and by 2030, the share of the working-age population may decrease to 57.9% (Information-analytical system..., 2020). This is since a small generation of those born in the late 1990s and early 2000s will enter the initial working age, and a large generation from those born in 1950–1955 – men (63 years old) and 1955–1960 – women (58 years old) will leave this age group. From 2025, the situation is expected to improve – a large generation of those born during 2002–2014 will enter the working age, and a small generation of men and women born in the second half of the 1950s and 1960s will leave this group (Figure 2).

The socio-economic factors in the formation of human capital include:

1. public health;
2. the general level of education and professional training of the population, the supply of skilled labor in the labor market;
3. the labor market, its quantitative and qualitative characteristics;
4. working conditions of workers, the level of material security and technical and economic development of enterprises, the level of development of their social infrastructure;
5. advanced training of employees in accordance with the requirements of the level of development of economic sectors;
6. social development of personnel of enterprises.

The health status of the population of the Republic of Kazakhstan can be assessed by some indicators of morbidity, by the state of the health care system. Particularly important are the incidence rates of socially significant diseases, the list of which was approved by the Decree of the Government of the Republic of Kazakhstan dated December 4, 2009, No. 2018. These diseases actually have a negative impact on human capital at all levels (Table 1).

Table 1. Sickness Rate of the Population of the Republic of Kazakhstan by Socially Significant Diseases

	Sickness Rate of the Population of the Republic of Kazakhstan (persons per 100 000 of the population)								
	2010	2011	2012	2013	2014	2015	2016	2017	2018
Tuberculosis incidence	95.3	86.6	81.7	73.4	66.4	58.5	52.7	52.2	48.2
Human immunodeficiency virus disease and human immunodeficiency virus carriers	120	130	140	150	160	180	190	210	230
Viral hepatitis	30.7	16.3	10.3	6.8	5.9	3.4	3.1	4.2	5.8
Malignant neoplasms	881.3	887.9	848.7	853.1	863.7	884.4	910.1	946.3	985.0
Diabetes	1278.9	1391.6	1539.7	1620.8	1794.2	1964.1	2135.2	2329.6	2324.4
Mental and behavioral disorders	350.7	330.9	311.4	278.2	241.5	216.4	156.6	108.7	105.4
Cerebral palsy	81.6	71.0	71.6	68.7	71.7	73.6	82.9	83.3	81.4

Source: compiled by the authors based on data of Agency for Strategic planning and reforms of the Republic of Kazakhstan Bureau of National statistics

The most serious increase in the number of newly diagnosed patients with such serious diseases as diabetes mellitus, malignant neoplasms, and diseases caused by the human immunodeficiency virus and characterized by increased blood pressure. Some of these diseases cause disability of people, that is, social insufficiency due to health disorders, which leads to the limitation of their life and the need for social protection from the state and society.

For the period 2010–2018 in the republic, there was an increase in the incidence of diabetes mellitus from 1278.9 to 2324.4 cases per 100 000 of the population, of oncological diseases from 881.3 to 985 cases per 100 000 of the population (Information-analytical system..., 2020).

The indicator of the provision of doctors in the period 2010–2018 increased by 2% and amounted to 39.6 per 10 000 people. In the context of regions, there was an uneven distribution of human resources. In all regions of the republic, there was an increase in the number of nurses. The provision of hospital beds in the republic in 2018 was 45.8 units per 10 000 people. The number of hospital beds for the period 2010–2018 decreased by 20.1 units per 10 000 people (31%).

An important factor influencing the formation of human capital is the development of education in the country, which makes it possible to form a certain stock of knowledge that is optimally and rationally used in a person's labor activity. Each additional

year of schooling increases a person's average earnings. At the same time, what a child can learn at school is more important than how many years he spends at his desk. For example, in the United States, replacing a low-skilled teacher in an elementary classroom with a teacher with an average skill level increases the total income of students in that class throughout their life by $250 000 (Chetty, Friedman, Rockoff, 2014).

Despite the importance of higher and secondary specialized education for the formation of human capital in a rapidly changing world, reliable indicators of the quality of this level of education have not yet been developed. Quantitative indicators are used in conjunction with data on the quality of what a child can learn in school, as measured by the country's performance in international tests of schoolchildren's learning achievement. These data allow the quantitative indicators of education to be calculated, adjusted for quality. Adjusting for the quality of education, this component reflects the fact that children in some regions receive much less knowledge than children in other regions, although they study in schools for approximately the same time.

The coverage of the population of Kazakhstan with education from preschool to higher education was considered. During the study period, the indicator of the provision of children with places (number of children per 100 places) in preschool organizations decreased by 14.7% and amounted to 90.2% in 2019. Primary education coverage of children aged 7–10 in the republic over the past 20 years has always been high and had a positive trend. For 2010–2018 the number of secondary school students increased by 31% and amounted to 3337.8 thousand students, and the gross enrolment rate in secondary education increased from 100.5% to 104.6%.

Higher education today has become a need for Kazakhstan society. The quality of education of the population largely determines the scientific and technological development of the state and the increase in the competitiveness of individual workers, enterprises, sectors of the economy, and the country. In 2019, the total number of educational institutions of higher education compared to 2010 decreased by 16.8% (or by 24 units), the number of students decreased by 16.1 thousand people, the gross enrolment in higher education (18–22 years) increased from 49.5% to 60.7% (Agency for Strategic…, 2020).

Another factor affecting the formation of human capital is economic factors. The indicators characterizing the economic factors of human capital include the average per capita monetary income of the population, the share of the population with incomes below the subsistence level, the share of the economically active population, the level of education of the employed population, the average monthly wage of one employee, the unemployment rate, etc.

In Kazakhstan, the share of the population with incomes below the subsistence level for the period 2010–2018 decreased by 1.5 times from 6.5% to 4.3% (Agency for Strategic…, 2020). The portrait of poverty in Kazakhstan has regional differentiation and is more pronounced in rural areas.

The basis for the effective formation of human capital and the economic development of the state is the labor market, which ensures an increase in the efficiency of the use of domestic labor and the most consistent structure of demand for it by economic actors, i.e., effective employment of the population. The demand and supply in the labor market are influenced by such factors as the state policy in the field of ensuring employment of the population, the level of development of the education and vocational training system, national characteristics, etc.

For the period 2010–2019 the number of the economically active population of the republic increased by 610.8 thousand people, the number of the employed population increased by 7.2% or by 580.8 thousand people, the unemployment rate decreased by 1% and amounted to 4.8% (Agency for Strategic..., 2020). Unemployment in the Kazakhstan labor market is structural, therefore, one can expect that in different segments of the labor market there is simultaneously a labor shortage and unemployment. When considering supply and demand in the labor market, it is necessary to take into account the complex interrelationships between the sectors of the economy and the vocational education system, since the presence of a certain level of education significantly affects a person's employment and the level of his wages.

During the study period, the average monthly wage in Kazakhstan increased from 525.1 $ to 534.2 $, while the highest wages were traditionally received by residents of the oil Atyrau region – 1004.1 $. This is 87.9% higher than the national average. Residents of Turkestan, Zhambyl, and Almaty oblasts receive the least (Atlas Information System..., 2020).

Against the background of the growth of indicators of the national economy, the growth of the nominal money income of the population was noted in the republic. So, in the period from 2010 to 2018 nominal cash incomes of the population of Kazakhstan per capita increased 2.7 times and amounted to 298.3 $ (Agency for Strategic..., 2020).

The environmental factors affecting the formation of human capital include the general ecological state and natural and climatic conditions in which the population of certain regions of the republic lives. The ecological state is characterized by such indicators as the availability and quality of natural resources, the interaction of man and the environment, the impact of anthropogenic activity on the environment, the level of compensation for damage caused to nature by society because of this activity, the consumption of non-renewable raw materials.

The obvious fact is that public health is used with an ecological situation. According to experts from the World Health Organization (WHO), the influence of environmental factors on the health of the population is from 17 to 20% of all significant factors (World development report, 2004). In our study, the main indicators characterizing environmental factors are emissions into the atmosphere of pollutants from stationary sources, current costs of environmental protection, the number of natural hazards, a survey of respondents about satisfaction with the cleanliness of the air (absence of emissions, smoke, dust, mud, etc.). These indicators are conditional.

Human capital has many dimensions, however, scientific works have found it expedient to abandon the "wide and eclectic set of indicators" in favor of a single generalized indicator (Stiglitz, Sen, Fitoussi, 2009). However, this would require a sequential aggregation method (Ravallion, 2011). Finally, the likelihood that comparisons between countries, regions can speed up the process of policy action increases if a transparent indicator is used to track changes in different countries, regions that can create a meaningful picture based on direct measurements.

This study proposes a methodology for a comprehensive assessment of the region's human capital. The proposed assessment indicators are grouped into integrated components of human capital: demographic, socio-economic, and environmental (Table 2).

Table 2. Structure of indicators for assessing the state of human capital in the regions of the Republic of Kazakhstan

Human capital component	Name of the indicator for assessing the state of human capital	Human capital component weight
Demographic Qdem	Share of the region's population out of the total population of the country	0.20
	Population growth rate	
	Life expectancy	
	Aging factor	
	Mortality rate	
	Infant mortality	
Socio-economic Qse	Morbidity of the population with socially significant diseases	0.62
	Provision of the population with doctors	
	Preschool education and training coverage	
	Primary education enrollment (children 7–10 years old)	
	Gross secondary enrollment	
	Gross enrollment in higher education (18–22 years)	
	Average score of the uniform national testing	
	Average score of external assessment of educational achievements in secondary education institutions	
	Share of population with incomes below the subsistence level	
	Average per capita nominal monetary income of the population	
	Economically active population	
	Employed population	
	Unemployment rate	
	Average monthly salary	
	The level of innovation activity of enterprises for all types of innovation	
Environmental Qecol	Air emissions of pollutants from stationary sources	0.18
	Current costs of environmental protection	
	Number of natural hazards	
	Opinion of respondents about satisfaction with clean air (absence of emissions, smoke, dust and dirt in it)	

Source: compiled by the authors based on data of Agency for Strategic planning and reforms of the Republic of Kazakhstan Bureau of National statistics

The components of assessing the state of the region's human capital should be considered in a system that gives an integral assessment of human capital. To calculate the integral indicator of the state of the human capital of the regions, it is necessary to determine the coefficients of the significance of each of its indicators. The coefficients are determined through prioritization by an expert method (Table 2).

The integral indicator of the region's human capital is determined by the formula:

$$I_{HC} = 0{,}20\ Q_{dem} + 0{,}62\ Q_{se} + 0{,}18\ Q_{ecol}$$

I_{HC} is an integral indicator of the region's human capital;
Q_{dem} – weighted demographic indicators for assessing the indicators of the region's human capital;
Q_{se} – weighted socio-economic indicators for assessing indicators of the region's human capital;
Q_{ecol} – weighted environmental indicators for assessing regional human capital indicators;

Based on the presented assessment methodology, it is possible to obtain a comparative characteristic of the human capital of the regions. When evaluating the values of all indicators were standardized. The calculation results are presented in Table 3.

Table 3. Integrated assessment of the human capital of the regions of the Republic of Kazakhstan 2014–2018

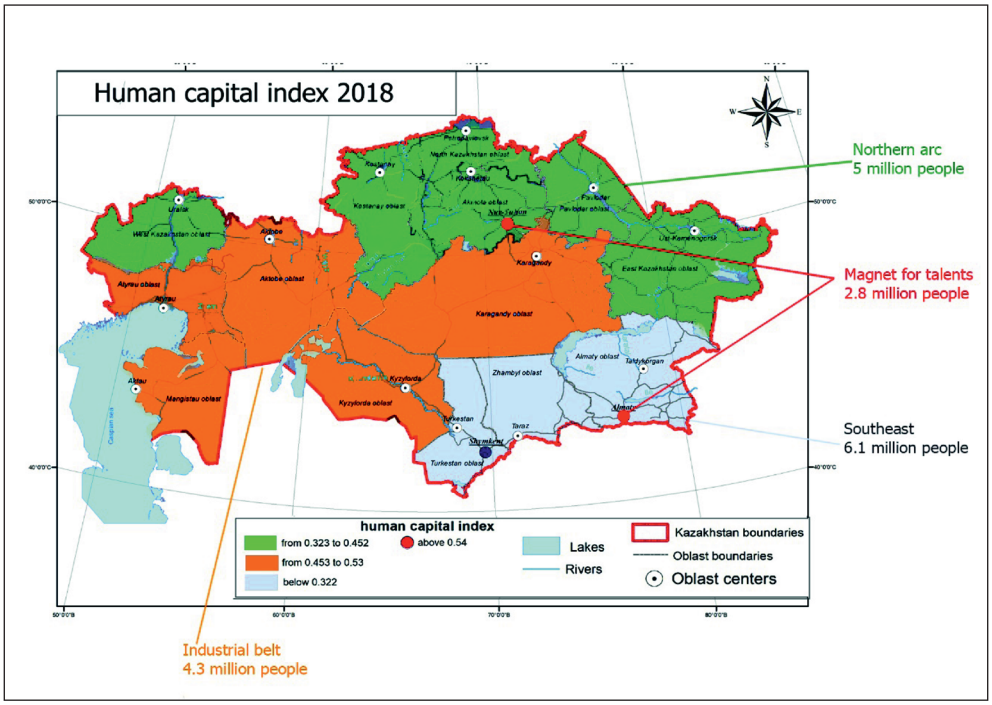
Regions	Integrated index of the human capital				
	2014	2015	2016	2017	2018
Akmola	0.462	0.399	0.447	0.424	0.405
Aktobe	0.578	0.440	0.482	0.534	0.485
Almaty	0.351	0.333	0.352	0.387	0.320
Atyrau	0.626	0.566	0.523	0.556	0.516
West Kazakhstan	0.515	0.421	0.437	0.486	0.434
Zhambyl	0.500	0.387	0.392	0.300	0.322
Karaganda	0.466	0.434	0.430	0.445	0.453
Kostanay	0.431	0.385	0.374	0.400	0.325
Kyzylorda	0.381	0.375	0.422	0.460	0.453
Mangistau	0.581	0.521	0.474	0.512	0.507
Pavlodar	0.480	0.401	0.390	0.450	0.412
North Kazakhstan	0.348	0.319	0.302	0.312	0.286
Turkestan	0.398	0.364	0.349	0.328	0.307
East Kazakhstan	0.466	0.351	0.350	0.421	0.372
Nur-Sultan city	0.750	0.722	0.676	0.678	0.667
Almaty city	0.575	0.541	0.595	0.597	0.546

Source: compiled by the authors based on data of Agency for Strategic planning and reforms of the Republic of Kazakhstan Bureau of National statistics

The calculations of the integral assessment of the human capital of the regions make it possible to conditionally distinguish the following types of regions by the level of accumulated human capital: "magnet for talents", "industrial belt", "northern arc", "southeast" (Figure 3).

The highest integral indicator of human capital in 2018 was noted in the cities of Nur-Sultan (0.667) and Almaty (0.546). These regions are conventionally designated as "magnets for talents", where there are high indicators of human capital in all its constituent indicators, except for the city of Almaty, which has an unfavorable environmental situation. The cities of Nur-Sultan and Almaty are distinguished by post-industrial

Figure 3. Typology of the regions of the Republic of Kazakhstan by the level of accumulated human capital for 2018



Source: authors' own work

specialization, high incomes of the population, high life expectancy of the population, low birth rates, and high migration inflow of the population.

The regions of the "northern arc" (North Kazakhstan, Akmola, Kostanay, Pavlodar, East Kazakhstan, and West Kazakhstan oblasts) are characterized by an agrarian-industrial type of economy, an average level of income of the population, low life expectancy, high morbidity and low birth rate due to unfavorable environmental conditions.

The regions "southeast", which include Almaty, Zhambyl, and Turkestan oblasts, are characterized by an agrarian type of employment, low income, average life expectancy, and high fertility.

Atyrau, Mangistau, Aktobe, and Kyzylorda oblasts, which are part of the "industrial belt" region, are distinguished by the raw material specialization of the economy, high-income levels, average life expectancy, and high birth rates.

Based on socio-economic, demographic, and environmental indicators of the human capital for 2010–2018 integral indices of human capital in the regions of Kazakhstan were calculated by the synthesis of different methods (Kraay, 2018; Mincer, Polachek, 1974; World Development Report 2019; Zubarevich, 2003), a typology of regions was carried out by the level of accumulated human capital.

Conclusion

Human capital in the modern paradigm of socio-economic development of regions and the state is recognized as one of the most important sources of long-term economic growth. Human development is considered as one of the main factors in new models of growth and development of the national economic system of Kazakhstan. In all strategic programs of the Republic of Kazakhstan, great importance is attached to the development of human capital. The development of human capital in the regions of the Republic of Kazakhstan is a complex multifactorial problem. All factors of the socio-economic development of the region have a direct or indirect impact on human development. At the same time, the calculated integral human development index as a complex indicator reflects the level of socio-economic development and the potential for its further growth.

The calculations of the integral indices of the human regions of the Republic of Kazakhstan made it possible to determine territorial disproportions and identify the types of regions with different levels of human capital. The Republic of Kazakhstan is a country with a large territory, the population of which is not evenly distributed and mainly along the perimeter. The analysis of socio-economic, demographic, environmental indicators of human capital revealed that different levels of human capital have formed in different regions of the republic. In the 4 regions of the country identified by the level of human capital, there is a large gap in indicators, as the level of income of the population in the post-industrial "magnet for talents" is 4 times higher than the level in the agrarian "southeast". The demographic component as an indicator of fertility in the agrarian "northern arc" is characteristic of developed countries with a demographic decline, in the agrarian "southeast" there are high fertility rates characteristic of developing countries. There is a large differentiation of the components of human capital across the regions of Kazakhstan.

In this regard, we believe that for the further development of the republic's economy it is important to pay attention to the development of human capital since it largely determines the effective development of the economy of our country.

References

Agency for Strategic planning and reforms of the Republic of Kazakhstan. Bureau of National statistics. (2020). Retrieved from https://stat.gov.kz/ (Accessed on 06.11.2020).

Atlas Information System of Quality of Life at al-Farabi Kazakh National University. (2020). Retrieved from http://ais.kaznu.kz/index/tables (Accessed on 06.11.2020).

Becker, G.S. (1975). *Human Capital. A Theoretical and Empirical Analysis, with Special Reference to Education.* (2nd ed.). New York: National Bureau of Economic Research: distributed by Columbia University Press.

Begg, D., Dornbusch, R., Fischer, S. (1991). *Economics*. McGraw-Hill.

Chetty, R., Friedman, J.N., Rockoff, J.E. (2014). Measuring the Impacts of Teachers II. Teacher Value-Added and Student Outcomes in Adulthood. *American Economic Review 104*(9), 2633–2679.

Department of Economic and Social Affairs Population Dynamics UN. (2020). Retrieved from https://population.un.org/wpp/ (Accessed on 06.11.2020).

Dobrynin, A.I., Dyatlov, S.A., Tsyrenova, E.D. (1999). *Human capital in a transitive economy: formation, evaluation, efficiency of use*. SPb.: Nauka

Dublin, L.I., Lotka, A.J. (1930). *Money Value of a Man*. New York: Ronald Press.

Engel, E. (1882). *Des Rechnungsbuch der Hausfrau und seine Bedeutung im Wirtschaftsleben der Nation*. Berlin: L. Simion [Russian translation].
Human Capital Investment. An International Comparison. Centre for Educational Research and Innovation. (1998). Paris: OECD [Organisation for Economic Co-operation and Development].
Information-analytical system of the Bureau of National Statistics of the Agency for strategic planning and reforms of the Republic of Kazakhstan. (2020). Retrieved from https://taldau.stat.gov.kz/ (Accessed on 06.11.2020).
Johnson, N.L., Kotz, S. (2011). *Leading Personalities in Statistical Sciences. From the Seventeenth Century to the Present*. John Wiley & Sons.
Jong-Suk H., Jong-Wha, L. (2020). Demographic change, human capital, and economic growth in Korea. *Japan and the World Economy*, *53*(March), 100984.
Kapelyushnikov, R.I. (2012). *How much is the human capital of Russia?* Moscow: National Researches University «Higher School of Economics».
Korchagin Yu, A. (2004). *Human capital and development processes at the macro and micro levels*. Voronezh: Tsire.
Kraay, A. (2018). *Methodology for a World Bank Human Capital Index*. Policy Research Working Paper 8593. Washington, DC: World Bank.
Meldakhanova, M.K., Kalieva, S.A. (2012). *Human capital in the context of ensuring the competitiveness of the national economy: modern concept, priorities and implementation mechanisms*. Almaty: IE KN MES RK.
Mincer, J., Polachek, S. (1974). Family investments in human capital: Earnings of women. *Journal of Political Economy*, *82*, 76–108.
Nyussupova, G.N. (2018). *Socio-demographic processes in the Republic of Kazakhstan. Regional aspects*. Almaty: Kazak University Publishing House.
Petty, W., Graunt, J., & Hull, C.H. (1899). *The economic writings of Sir William Petty*. Cambridge: University Press.
Ravallion, M. (2011). *On Multidimensional Indices of Poverty*. Policy Research Working Paper 5580, Washington, DC: World Bank.
Serebryakova, N.A., Volkova, S.A., Volkova, T.A. (2019). Human integral assessment methodology capital of the region. *Vestnik VGUIT* [Proceedings of VSUET], *81*(3), 375–380. doi:10.20914/2310-1202-2019-3-375-380 [in Russian].
Schultz, T. (1968). *Human Capital in the International Encyclopedia of the Social Sciences.* 6. New York: Macmillan.
Schultz, T.W. (1971). *Investment in Human Capital. The Role of Education and of Research*. New York: The Free Press.
Stiglitz, J., Sen, A., Fitoussi, J.-P. (2009). *The Measurement of Economic Performance and Social Progress Revisited*. Document de Travail de l'OFCE, *33.* Paris: Observatoire Francais des Conjonctures Economiques (OFCE).
World Development Report 2004. Equity and development. Washington DC: The World Bank.
World Development Report 2019. Changing the Nature of Work.
Zubarevich, N.V. (2003). *Social development of Russian regions. Problems and trends in the transition period*. M.: Editorial URSS

Gulnara Nyussupova, professor, Head of the Department of Geography, Land Management and Cadastre, Al-Farabi Kazakh National University, Almaty, Kazakhstan. Research interests: socio-economic asymmetry in the economic development of the regions, the impact of globalisation on the transformation of regions, GIS technology, economic geography. Author of over 300 works in this field, including 5 monographs.

ORCID: https://orcid.org/0000-0001-5294-2671

Address:

Al-Farabi Kazakh National University
71 Al-Farabi avenue
050040 Almaty, Kazakhstan

e-mail: Gulnara.Nyusupova@kaznu.kz

Gaukhar Aidarkhanova, PhD student, Al-Farabi Kazakh National University. Research interests: socio-demographic processes, human resources, human capital, quality of life.

ORCID: https://orcid.org/0000-0001-7280-7071

Address:

Al-Farabi Kazakh National University
71 Al-Farabi avenue
050040 Almaty, Kazakhstan

e-mail: gauhar_222@mail.ru

Stephen S. Young, PhD, professor, Salem State University, Salem, Massachusetts, USA. He is a professor of remote sensing and environmental sustainability in the Geography Department at Salem State University in Salem Massachusetts, USA. His recent research work has centered on climate and environmental change in NE North America and nature conservation in China. In addition to his environmental research, he bridges the arts and sciences through art gallery exhibitions which expose the public to science and geography.

ORCID: https://orcid.org/0000-0003-0895-8515

Address:

Salem State University
Geography and Sustainability Department
352 Lafayette Street
Salem, MA 01970, USA

e-mail: syoung@salemstate.edu