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The impact of education on the economic growth of Kazakhstan

Abstract

Object: To examine the factors influencing the development of human capital as the driving force of the economy, identify trends in relations, dynamics, prospects, and results in which human capital affects the economic development of Kazakhstan.

Methods: Methods of dialectics, a systematic approach, analysis and synthesis, typology, generalization, concretization, economic and statistical, factor analysis, institutional and cluster analysis.

Results: The obtained results show the relationship between human capital and economic growth. Using and the proponent of the endogenous growth model of R. Barro proved that human capital is directly related to economic growth. Human capital is a factor influencing growth, but the degree of impact varies depending on the initial level of accumulated human capital. For example, it is easier for a state with well-developed human capital to adapt future technologies, compared to a state with poor human capital.

Conclusions: Based on the results of regression analysis and the criteria of human capital, the following assumptions about the development of human capital are obtained. The knowledge gained from primary and secondary education lags behind, and the overall effect manifests itself after higher education. Higher education is a variable of human capital that affects GDP growth and investments in education, research and development and healthcare are needed, which lead to the accumulation of human capital in the country. Statistics show that primary and secondary education is available to the majority of the population of Kazakhstan. The situation with higher education is different. The acquisition of higher education disappears about 51% of the total population. This means that 49% of the population does not have a higher education. In conclusion, all three types of human capital (education, R&D, and healthcare) are underinvested, which negatively affects the development of human capital in Kazakhstan.

Keywords: education system, trends in education, human capital, future education, skills, competencies, labor market.

Introduction

Today we are witnessing a radical change in technology that is happening before our eyes. What seemed like science fiction yesterday is already a reality today, and tomorrow it will become an everyday occurrence without which we can no longer imagine our lives. For example, Apple's Siri application, Sophia, the Android robot with artificial intelligence that received the citizenship of Saudi Arabia, unmanned vehicles, drones, smart technologies, digitalization, and many others are proof of this.

A feature of the Fourth Industrial Revolution is that the introduction of new technologies is characterized by tremendous speed and will be accompanied by fierce competition. Therefore, to become the leader of the new world, we must understand in which direction technological development will take place in the coming years, and what breakthrough innovations await us in the future.

According to Klaus Schwab, President of the World Economic Forum, "a population of 17 % of the world's territory is waiting for the second industrial revolution, since about 1.3 billion people still do not have access to electricity. "About half of the world's population, or 4 billion people, expects a third industrial revolution, since most of them live in developing countries where there is no access to the Internet" (Schwab, 2017).

We set the task to become one of the 30 developed countries with a high standard of living. In the era of the fourth industrial revolution, the success of the state directly depends on the quality of human resources, so the comprehensive development of human capital takes on strategic importance.

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In this regard, the change in the paradigm of education is becoming particularly relevant. Both foreign and domestic scientists note that the education system does not meet modern requirements and, as a result, is in a state of crisis.

The essence of the global education crisis is seen primarily in turning the existing education system (the so-called "supportive learning") into the past, focusing on past experience, and lack of future orientation.

Therefore, the modern education system is faced with the task of modernization in accordance with the requirements of the time for the transition to an effective and dynamic education system based on innovative technologies, where the quality of human capital influencing on the economic growth plays a key role.

Educational achievements of the country are a key factor of the economic growth. The need for investment in education is one of the social conditions for the growth of the intellectual potential of the nation and the competitiveness of the country. Developed countries invest huge amounts of money in the development of the intellectual potential of the nation, which will be paid off by new discoveries in science, new technologies in industry, and an increase in the country's GDP.

In Kazakhstan, the approach to this direction is insufficiently developed; there is no systematic and scientific validity in the management of the country's human resources. Conducting scientific research will allow working out the mechanisms and technologies for managing the human capital of Kazakhstan, which makes this work relevant and in demand.

Thus, currently, for Kazakhstan there is an urgent need for a scientific study of human capital, as a decisive factor in economic growth.

The article considers trends and problems of education system development, factors influencing on the human capital development in Kazakhstan and their interaction with economic growth.

As a hypothesis of the study we put forward the scientific assumption that the quality of human capital affects the economic growth of the country. To find a link between human capital and economic growth, the study formulated an econometric model based on the endogenous growth model. The endogenous growth model sees human capital as one of the main factors affecting growth rates. On the example of Kazakhstan, the results of regression of time series of dependent (GDP growth rate) and independent variables are given and conclusions are summarized.

Literature Review

An important impetus to the development of the category of intellectual potential was the development of the theory of human capital, which was considered in the early works of Smith and Marshall, its most famous representatives: G. Becker, T. Schultz, J. Mintzer, J. Schumpeter.

Economists, such as Theodore Schultz and Gary Becker, founded a new perspective on the importance of human capital in human development. These scientists published a number of remarkable works that have greatly changed the economic point of view on human resources. T. Schultz emphasized the importance of education. He stated that in the end, investments in education turn into a level of quality of the workforce, as well as technological progress, which leads to improvement and increased productivity. According to T. Schultz, human capital is a unique form of capital. From the perspective of G. Becker, human capital is a stock of knowledge, skills and motivation that people possess. The accumulation of human capital requires huge costs and is determined by a complex investment process, as well as physical capital. In his opinion, investments in the acquisition of knowledge lead to the formation of human capital.

Karginova M.A. and Stewart T.A. studied the influence of the quality of intellectual resources and the degree of their involvement in social production on the level of national wealth in individual countries. At the same time, wealth, in their opinion, is made up of human resources, production assets, and natural resources. Research in this area is actively carried out at the present time (for example, Garafiyeva G., Plis. K., Wilbowo D.H.).

The study used statistical data from the Ministry of Education and Science, the OECD, and the World Bank, the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, and scientific articles by Baktymbet et al. (2021), Tilak (1961), Maximova et al. (2018), Ibraev (2018).

Currently, human capital is becoming the main competitive advantage. In modern conditions, when the process of globalization and economic development is underway, intellectual resources are the main factor in the accumulation of knowledge for the development of technologies and scientific discoveries.

In all across the world, including Kazakhstan, researchers are conducting the studies on issues of human capital. The difference between this study and the previous ones is the influence of the level of education and the development of intellectual potential on economic growth. The study of this issue will allow developing mechanisms for regulating the socio-economic development of the country, effectively using human capital for technological modernization and increasing the competitiveness of the economy.

Methods

General scientific methods were used in the work: methods of dialectics, a systematic approach, analysis and synthesis, typology, generalization and concretization. For empirical research and comparative analysis, general and particular methods of economic research, qualitative and quantitative methods were used: economic and statistical, factor analysis, institutional and cluster analysis.

The main methodology is the methodology of factor analysis. It made it possible to reveal the state and influence of different types of factors on the development of human capital.

The use of qualitative assessment methods in the methodology of factor analysis made it possible to obtain unique data. Such empirical methods as the construction of an econometric model of endogenous growth were used to determine the relationship between human capital and economic growth.

Quantitative methods ensured to conduct a comparative assessment of the level of development of education on economic growth. The results of the analysis enabled to identify strong and weak factors in the development of education, offer acceptable options for the development of intellectual potential.

The methodology of descriptive statistics was used for quantification and the elements analysis of intellectual potential – the level of education. This methodology ensured transparency and comparability of estimates, since it is based on open data from the official statistics of Kazakhstan.

The scientific article used the method of quantitative analysis. The theoretical part included methods of deductive and inductive economic analysis to study factors affecting the formation of human capital. The analysis of the theoretical foundations was based on the neoclassical economic approach, especially on the works of the Chicago School of Economics. The empirical part comprised statistical analysis of data forming factors of influence on the development of human capital.

Discussion

Consider the key trends in the transformation of the education system.

Cultural transformation

Until the beginning of the twenty first century, it was believed that the key figures in the life of universities were teachers, but with the advent of a new era, the vector changed to meet students' needs and stimulate their success. All university activities should be aimed at fulfilling students' potential.

Teaching students practical skills and professional development

Entering the university, students expect that higher education will help them get a decent job by profession and the necessary amount of knowledge for career growth. However, the situation with yesterday's graduates suggests otherwise. According to statistics, unemployment among the youth of the Republic of Kazakhstan with higher and incomplete higher education is 3.3%, among young people with secondary and vocational (special) education – 4.2%, with basic, secondary, general, primary – 4.8% (Bureau of National Statistics of the Agencies for Strategic Planning and Reforms of the Republic of Kazakhstan, 2020).

This is a signal to universities to revise the educational program radically, focus on the development of practical skills and competencies of students, and pay significant attention to the practice of modern technology use.

Cooperation as a key factor in increasing the competitiveness of a university

Serious competition among universities has become the basis for the formation of strategic alliances between several universities from different countries. At present, we are observing how universities cooperate and form alliances that help them occupy winning positions in the global educational services market.

A good example of such a country alliance is the Institutional Collaboration Committee, which includes 12 research universities in the Midwest USA (University of Chicago; University of Illinois; Indiana University; University of Iowa; University of Michigan; Michigan State University; University of Minne-

sota; Northwestern University; Ohio State University; Pennsylvania State University; Purdue University; University of Wisconsin–Madison).

The development of online learning and its effectiveness

Online education is the greatest discovery in higher education. While universities compete for each student, educational platforms are gaining millions of students. According to the results of the Class Central study, in 2016, educational platforms were presented by more than 700 universities, 6850 courses, and 58 million students were trained on them. According to the CollegeData website, the secondary university has between 5,000 and 15,000–200,000 students, the Coursera educational platform – 23 million students, edX – 10 million, XuetangX (the first non-English platform that entered the top 5 leading MEPs in the world) – 6 million, FutureLearn – 5.3 million; Udacity – 4 million (World Bank, 2020).

A key problem throughout the world, including Kazakhstan, is that not all groups of the population have the same access to the Internet and may be limited in their development opportunities. According to the International Telecommunication Union, 47.9% of the world's population uses the Internet.

The largest number of people with Internet access is in developed countries (81 %), in developing countries this number is 40%, in the least developed countries – only 15%. In Kazakhstan, 77% of the population has access to the Internet (13 million people). In rural areas, this figure is 71%, and in cities – 81% (Shmarlovskaya G.A., Baktymbet A.S., Baktymbet S.S., Baktymbet A.S., 2020).

At universities, such advanced technological solutions as online education, blended and mobile learning are a key to the success of the university. If the university does not have an effective strategy for integrating these approaches, we can say that such a university has no future. At the same time, it is necessary to monitor the impact of educational technologies on learning outcomes, which will show the effectiveness of each of them in a specific situation.

The flexibility of educational ecosystems

Effective integration of technologies in the educational process has a positive effect on the dynamics of students' development and stimulates interest in obtaining knowledge. However, the educational environment must be prepared for the introduction of technologies and new teaching methods.

Teachers who use tools and platforms as learning management systems often seek to come up with a new combination of different components of the learning process, such as open content or educational applications. The key problem here is the unpreparedness of the educational system to adopt new teaching methods. One of the possible solutions to this problem is the creation of a flexible educational environment in which there will be a place for the creative start of teaching.

Continuing education and integration of education and business

Countries aspiring to the formation of a knowledge-based society and a competitive economy are more than ever concerned about the need for constant updating of knowledge among the population, and the expansion of professional development opportunities. This is a matter of close cooperation between universities and corporations. One example is Starbucks' collaboration with Arizona State University to develop online courses for its employees.

As for trends in education, one can note the importance of the competencies demanded in the modern world. With the development of innovation and digital technology, new competencies are becoming in demand. For example, the report "The Future of Jobs. Employment, Skills and Work force Strategy for the Fourth International Revolution" by the World Economic Forum notes that in most industries, the most demanded specialties did not exist 10 or even 5 years ago and the rate of obsolescence of specialties is increasing. More than one third of the skills important to the labor market will change in five years. Technology development by 2020 will reduce the number of jobs in the world by 5 million. At the same time, 50% of the content of bachelor's programs will become obsolete in five years due to digital transformation (Bureau of National Statistics of the Agencies for Strategic Planning and Reforms of the Republic of Kazakhstan, 2021).

One of the problems is the inability to adapt to dramatic changes in the requirements of the domestic education system to the demanded knowledge and skills, the lack of understanding of the need to improve one's skills, to constantly develop and learn throughout life (LLL) (Schultz, 1974).

The problem of the content of education meeting the needs of the labor market has always existed. Education, as a more static and conservative sphere, almost always lagged behind rapidly developing technologies and the economy.

The situation is aggravated by the Fourth Industrial Revolution (unmanned vehicles, 3D printing, robotics, new materials, the Internet of things, artificial intelligence, blockchain technology, biological engi-

neering, etc.), which predetermined tectonic shifts and introduced uncertainty into all aspects of the functioning of the human activities. Today, no one can reliably predict its consequences for the economies of countries, business, the labor market, politics, society and for every person.

Parameters of the econometric model

Based on the collected information about human capital and economic growth, paperwork can be done using an econometric model. To find the relationship between human capital and economic growth, an econometric model will be formulated based on an endogenous growth model. The endogenous growth model is consistent with the research goal, since it considers human capital as one of the main factors affecting growth rates. The endogenous growth model has been successfully used to create panel regressions.

Table 1. Panel regression components

Dependent variable	– Real GDP per capita
Independent variables	– GDP per capita – Educational level – Government consumption – Rule of law – Coefficient of openness – Inflation rate – Fertility rate – Investment ratio – Terms of trade
Note – Compiled by the authors based on source (Schultz, 1974)	

According to R. Barro, the main components of the model were the variables listed in Table 1 (Barro, 2001). The variable implying the human capital formation is the level of education. The rest of the explanatory variables, such as government consumption, openness, inflation, fertility, and terms of trade, imply indicators that affect GDP growth. This model of R. Barro can be used to analyze the work ahead.

Using R. Barro's growth model, it is possible to check the ratio score. However, this growth model can be changed by adding components of human capital that can potentially influence growth rates. Thus, an econometric model will be applied to find the impact of human capital across two different sides. The first way to figure out the impact of human capital on economic growth is to put educational achievement as a variable representing human capital. It will cover primary, secondary, and tertiary education. The econometric model will have the following description:

$$EG = \beta 0 + \beta 1\ ED + \beta 2\ EG_i + \beta 3\ GE + \beta 4\ RL + \beta 5\ O + \beta 6\ I + \beta 7\ F + \beta 8\ GFCF + \beta 9\ TT + u \quad (1)$$

where *EG* – real GDP growth rate;

ED – educational level;

EGi – initial GDP per capita;

GE – government consumption;

RL – rule of law indicator;

O – openness ratio;

I – inflation rate;

F – fertility rate;

GFCF – gross capital formation fixed capital;

TT – terms of trade;

R&D – research and development.

The final way to test the model is to examine the effects of education, R&D, and health care on growth. Econometric models will have the following structure:

$$EG = \beta 0 + \beta 1\ ED + \ldots + \beta 10\ IERDH + u \quad (2)$$

where *IERDH* stands for investment in education, R&D, and health.

It should be noted that, for this example of R. Barro, it is impossible to conduct panel regression, since the analysis of the data was made to find evidence of human capital as a factor influencing the economic growth of Kazakhstan. In general, real regression comprises a combination of cross-sectional data

and time series. However, in this case, when only one country is observed looking for the relationship between human capital and economic growth, time series regression can be used.

Time series regression is an actual strategy for predicting future reactions based on the history of reactions (known as autoregressive dynamics) and exchanges of items from meaningful metrics. Time series regression can help in obtaining it and predict the behavior of energy structures based on exploratory or observational information. Time series regression is commonly used to model and define various structures such as economics, finance, and biology.

The two econometric models will be used to search for evidence that human capital affects economic growth. For time series regression, a dataset of dependent (GDP growth rate) and independent variables (rule of law, openness ratio, inflation rate, fertility rate, gross fixed capital formation, terms of trade, and basic variables denoting human capital) for Kazakhstan was collected over the time interval between 2012 and 2019. All data were obtained from the Statistical Committee of the Ministry of National Economy of the Republic of Kazakhstan and the World Bank (Statistics Committee of Ministry of National Economy of the Republic of Kazakhstan, 2020; World Bank, 2020).

Table 2. Time series of regression for primary education

	Coefficient	*St. error*	*t-statistics*	*P-value*	
const	40,8493	24,7368	1,651	0,1426	
l_EG_1	−0,330542	0,210451	−1,571	0,1603	
l_RL	−0,112091	0,0420402	−2,666	0,0322	**
l_O	−0,0322637	0,0536312	−0,6016	0,5664	
l_I	0,248964	0,228411	1,090	0,3118	
l_F	−0,0766748	0,117795	−0,6509	0,5359	
l_GFCF	−9,73202	6,45054	−1,509	0,1751	
sq_l_GFCF	1,03419	0,678903	1,523	0,1715	
l_TT	0,148046	0,0380304	3,893	0,0060	***
l_PR_ED	−2,84783	2,55073	−1,116	0,3011	

Note – Compiled by the authors based on source Estimation of time-series regression made with vector autoregression (Statistics Committee of Ministry of National Economy of the Republic of Kazakhstan, 2020).

According to the theoretical part, the expectations from the econometric model should have a positive effect of human capital variables on economic growth.

The results of the first regression (Table 2) showed that primary education (l_PR_ED) did not affect economic growth, and the ratio of primary education was not statistically significant because the p-value was more than 5%. However, the importance of primary education as a result of regression cannot be denied since primary education has a long-term rather than immediate effect and provides basic knowledge by teaching basic reading, writing, and numeracy skills. Therefore, we can conclude that primary education is not an indicator of human capital that has a direct impact on economic growth, but it is an important detail in the formation of human capital.

Table 3. Regression time series for secondary education

	Coefficient	*St. error*	*t-statistics*	*P-value*	
const	7,93825	16,8254	0,4718	0,6514	
l_EG_1	−0,485580	0,295513	−1,643	0,1443	
l_RL	−0,106724	0,0545790	−1,955	0,0914	*
l_O	−0,0345835	0,0600329	−0,5761	0,5826	
l_I	0,268958	0,198521	1,355	0,2176	
l_F	0,0417509	0,140017	0,2982	0,7742	
l_GFCF	−0,513796	7,74446	−0,06634	0,9490	
sq_l_GFCF	0,0757882	0,814259	0,09308	0,9285	
l_TT	0,146354	0,0391693	3,736	0,0073	***
l_SEC_ED	−0,447384	0,346371	−1,292	0,2375	

Note – Compiled by the authors based on source Estimation of time-series regression made with vector autoregression (Statistics Committee of Ministry of National Economy of the Republic of Kazakhstan, 2020).

Similar results were obtained with regression of secondary education. According to Table 3, it can be seen that secondary education (l_SEC_ED) has no effect on the growth rate of GDP, as well as primary education, where p-value exceeds 5%, which means that secondary education and economic growth are in no way related. However, as with primary education, secondary education has an impact over the long term. Therefore, it is incorrect to point out that secondary education does not affect the country's economy.

Table 4. Time series of regression for tertiary education

	Coefficient	*St. error*	*t-statistics*	*P-value*	
const	22,5843	11,0609	2,042	0,0872	*
l_EG_1	−0,163297	0,155895	−1,047	0,3352	
l_RL	−0,103294	0,0370030	−2,792	0,0315	**
l_O	−0,0453744	0,0463909	−0,9781	0,3658	
l_I	0,236931	0,237358	0,9982	0,3567	
l_F	−0,0639107	0,104935	−0,6091	0,5648	
l_GFCF	−8,12771	4,75207	−1,710	0,1381	
sq_l_GFCF	0,857287	0,496891	1,725	0,1352	
l_TT	0,133149	0,0315959	4,214	0,0056	***
l_HG_ED	0,206481	0,0860470	2,400	0,0533	*

Note – Compiled by the authors based on source. Estimation of time-series regression made with vector autoregression (Statistics Committee of Ministry of National Economy of the Republic of Kazakhstan, 2020).

As for regression for tertiary education, Table 4 demonstrates that higher education (l_HG_ED) has an impact on economic growth and the p-value supports this assumption. The P value for higher education is about 5%, which means that higher education has an impact on Kazakhstan's economic growth. Higher education is the most important economic activity of a country, as it improves people's knowledge and ensures their qualifications. Accoding to the foreign studies, people with higher education are more attractive to employers because they have the ability and knowledge to do their job well. If more people get jobs, it improves the economy.

Table 5. Regression time series for R&D investment

	Coefficient	*St. error*	*t-statistics*	*P-value*	
const	12,9440	14,9750	0,8644	0,4269	
l_EG_1	−0,0972931	0,348068	−0,2795	0,7910	
l_RL	−0,0821094	0,0741439	−1,107	0,3185	
l_O	−0,0345867	0,0760647	−0,4547	0,6684	
l_I	0,208218	0,255859	0,8138	0,4528	
l_F	−0,224194	0,224467	−0,9988	0,3638	
l_GFCF	−3,63782	6,57241	−0,5535	0,6038	
sq_l_GFCF	0,388229	0,702772	0,5524	0,6044	
l_TT	0,143780	0,0653082	2,202	0,0789	*
l_RD	−0,0179334	0,0116684	−1,537	0,1849	

Note – Compiled by the authors based on source. Estimation of time-series regression made with vector autoregression (Statistics Committee of Ministry of National Economy of the Republic of Kazakhstan, 2020).

Table 5 illustrates that investment in R&D (l_RD) has no effect on GDP; p-value from R&D is greater than 5%, which means that there is no correlation between R&D and economic growth in Kazakhstan. These data demonstrate that the level of investment in R&D may be small and should be increased. In developed countries, R&D plays an important role as it brings new technologies to the country, which significantly increases productivity and improves production.

Table 6. Regression time series for investment in education

	Coefficient	*St. error*	*t-statistics*	*P-value*	
const	7,97662	15,6005	0,5113	0,6309	
l_EG_1	−0,137687	0,297228	−0,4632	0,6627	
l_RL	−0,0777333	0,0677789	−1,147	0,3033	
l_O	−0,0165853	0,0701080	−0,2366	0,8224	
l_I	0,318650	0,241969	1,317	0,2450	
l_F	−0,255377	0,246960	−1,034	0,3485	
l_GFCF	−1,57747	6,90186	−0,2286	0,8283	
sq_l_GFCF	0,162590	0,736780	0,2207	0,8341	
l_TT	0,162422	0,0494975	3,281	0,0219	**
l_EDUC	−0,0314599	0,0279989	−1,124	0,3122	

Note – Compiled by the authors based on source. Estimation of time-series regression made with vector autoregression (Statistics Committee of Ministry of National Economy of the Republic of Kazakhstan, 2020).

The regression of investment in education showed no relationship with GDP growth. The P-value is over 5%, which also proves that education has nothing to do with GDP growth (Table 6). This research is critical as sufficient investment in education is one of the main conditions for the development of human capital in Kazakhstan. As it was shown in the analytical part, investments in education in Kazakhstan increased during the year, however, in 2019 it amounted to only 1.8% of the total formation of gross fixed capital formation. This percentage is relatively small, and if in the future Kazakhstan intends to enter the top 30 countries, the issue of investing in education should be at a high level (Baktymbet et al., 2021).

Table 7. Regression Time Series for Health Investment

	Coefficient	*St. error*	*t-statistics*	*P-value*	
const	9,25202	11,8766	0,7790	0,4712	
l_EG_1	0,261259	0,444190	0,5882	0,5820	
l_RL	−0,0551781	0,0603245	−0,9147	0,4023	
l_O	−0,0632520	0,0809938	−0,7809	0,4702	
l_I	0,196254	0,280840	0,6988	0,5158	
l_F	−0,347486	0,234259	−1,483	0,1981	
l_GFCF	−2,55342	5,17604	−0,4933	0,6427	
sq_l_GFCF	0,252651	0,548888	0,4603	0,6646	
l_TT	0,152388	0,0485665	3,138	0,0257	**
l_HEAL	0,0261892	0,0170256	1,538	0,1846	

Note – Compiled by the authors based on source. Estimation of time-series regression made with vector autoregression (Statistics Committee of Ministry of National Economy of the Republic of Kazakhstan, 2020).

The last regression was done for the investment in health care. According to Table 7, investment in health care does not correlate with GDP growth, where the p-value exceeds 5%, indicating that it is insignificant. This result is not surprising, since previous analysis of health investment have shown that it represents only 1% of total gross fixed capital formation (Adilet, 2019).

In addition, it should be noted that some of the independent variables influencing economic growth were found. All regressions indicated that the terms of trade were associated with GDP growth with a p-value of less than 5%. This explains that Kazakhstan has a positive export to import ratio, where export dominates and makes a huge contribution to national GDP. At the beginning of the analytical part, Kazakhstan's dependence on oil was declared, and the regression of economic indicators justifies this concept. Moreover, the rule of law has also been identified as a variable influencing GDP growth in Kazakhstan. As seen from the regressions, the rule of law is negatively associated with GDP growth. This result may explain that Kazakhstan has problems with the effectiveness of laws.

Table 8. Barro panel regression results

Independent variable	Coefficient
Log (per capita GDP)	0.107 (0.025)
Log (per capita GDP) squared	-0.0084 (0.0016)
Male secondary and higher schooling	0.0044 (0.0018)
Govt. consumtion/GDP	-0.157 (0.0025)
Rule-of-law index	0.0138 (0.0056)
Openness ratio	0.0133 (0.0041)
(Openness ratio)*log(GDP)	-0.0142 (0.0048)
Inflation rate	-0.0137 (0.0090)
Log(total fertility rate)	-0.0275 (0.0050)
Investment/GDP	0.033 (0.026)
Growth rate of terms of trade	0.0110 (0.030)
Note – Compiled by the authors based on source. Estimation of time-series regression made with vector autoregression (Statistics Committee of Ministry of National Economy of the Republic of Kazakhstan, 2020).	

In addition, it may be useful to compare the results of the thesis with the results of a similar regression by R. Barro. The study was conducted considering the growth rates in different countries of the world over ten years during 1965–1975, 1975–1985, and 1985–1995. Comparing the results, we can say that R. Barro divided the level of education into two groups: male and female. The division of the level of education by sex is logical, since in those years women were less involved in the labor process. Based on the results of Barro's panel regression, it can be noted that male education is positively associated with economic growth, increasing the economy by 0.44 % per year. In terms of women's educational attainment, the rate was statistically insignificant. Overall, this means that over a period of time, human capital in the form of educational attainment has had a considerable impact on economic performance. In the case of Kazakhstan, only higher education had an impact on GDP growth, while other indicators of educational attainment did not show any significant results (Barro, 1992).

Results

Based on the generalization of existing methods, domestic and world practice for assessing human capital, a model is validated that includes a system of factors and indicators for assessing intellectual potential and the level of education for economic growth.

The directions and measures for ensuring the balanced development of intellectual potential and investment in education for the purpose of sustainable economic growth and increasing the country's competitiveness are determined.

Conclusions

As for empirical data on the relationship between human capital and economic growth, using the proponent of the endogenous model of growth, R. Barro proved that human capital is directly related to economic growth, where the form of human capital was taken as school duration life. Similar results can be found in some economic research articles (Tilak, 1961). The US economy has been boosted by the development of education. Human capital is a factor influencing the economic growth, but the degree of impact varies depending on the initial level of accumulated human capital. For example, it is easier for a state with well-developed human capital to adapt future technologies, which makes productivity higher than before, while a state with poor human capital will take many years to achieve it. Therefore, a hasty investment in physical capital without the inclusion of human capital will be inefficient since no one can produce products more efficient. According to J. Minser, human capital, as well as physical capital, is an asset that requires investment, since both of these factors contribute to production growth. This means that human capital is a necessity for any nation that aims at high economic standards (Maximova et al., 2018).

Considering the empirical analysis, we can say that Kazakhstan has a mediocre human capital. There are several problems in the development of human capital in Kazakhstan. The first problem is insufficient investment in education. According to statistics, only 1.8% of gross fixed capital was invested in education in 2018. This shows that education is not supported by other sectors of the economy besides the public sector. The second problem is insufficient investment in research and development. Only 0.4% of gross fixed capital formation was invested in R&D in 2018. It demonstrates that investment in R&D is not seen as a pri-

ority economic activity for investment. The third problem relates to investment in the health care system. In 2018, only 1.1% of Gross Capital Fixes was earmarked for the development of the health care system in Kazakhstan (Ibraev, 2018). Thus, health care suffers from small investments and is supported only from the state budget. Lastly, overviewing statistics on the educational level, we identified that primary and secondary education is available for the majority of the population of Kazakhstan. However, the situation with higher education is different. Acquisition of higher education evaporates about 51% of the entire population. This means that 49% of the population has no higher education. Summing up the analysis of the criteria for the development of human capital, we can say that all three types of economic activity (education, R&D, and health care) are underinvested, which negatively affects the development of human capital in Kazakhstan. Moreover, due to insufficient investment in education, a huge proportion of the population does not receive higher education.

Time series regression revealed some trends. The results showed that the economic situation in Kazakhstan as a whole depends on other economic variables, and not on human capital. It was revealed that primary and secondary education did not have a significant impact on economic development, while the effect was found in tertiary education. Other indicators of human capital, such as investment in education, R&D, and health care, do not indicate any relationship with GDP growth.

In recent years, there has been widespread discussion about the "professions of the future". The rate of change in the labor market will only increase and it is becoming difficult to make accurate forecasts in this area. An understanding of some universal skills of the future is much more important. In the report of the World Economic Forum, it was noted that by 2020, in the coming years, 35% of key competencies in demand will change. Therefore, an ideal employee of the future should have following skills:

The ability to solve complex problems (Complex Problem Solving). The need for owners of such competency will increase by 52% (The Global Competitiveness Report, 2020).

Critical thinking. This competency is among the key ones in the forecasts for 10–15 years. Almost any information can be found in the public domain. Moreover, information of various content and quality "falls out" on us in the media, social networks, etc. To understand what is truly valuable and credible in this stream, selection skills are needed.

Creativity. The ability to find a custom approach is now valued in many professions. This skill will become necessary due to the complexity of the processes as a whole. How to solve a standard problem can be found on the Internet, one just has to correctly formulate a request for a search engine. Valued will be people who can "give out" something that the search engine does not know.

Managing people. Many companies will go along the paths of merging human and artificial intelligence, combining the efforts of people and robots, so the environment will become more complex. The ability to work with people, especially considering the fact that many of them will be even more highly developed than today, will continue to remain an important task (according to the curve of Author, either the cheapest employees (whose labor is cheaper than robots) or highly professional will remain in demand).

Skills of coordination, interaction. The fifth place in the ranking of the World Economic Forum. According to forecasts, the importance of this competency will grow.

Emotional intelligence. Today, many companies invest in empathy for their employees. It is one of the areas of development that is popular in many large organizations.

Judgment and speed of decision making. In an increasingly complex world, decisions will need to be made quickly. German Gref, head of Sberbank of Russia, following a trip to Silicon Valley says: "Uber told us one phrase that the competition from the Chinese has reached such an extent that it seems to us: if we woke up in the morning with a very interesting new idea about new products, then at lunch, when we are going to a meeting to discuss this, the Chinese are already reproducing it". Not only the quality but also the speed of decision-making will be important.

Client orientation (service orientation, Service orientation). It directly depends on the development of emotional intelligence.

The ability to negotiate. Maybe after some time robots will replace this person, but certainly not in the next five years.

Cognitive flexibility. In an open, large, multi-variant world, this ability is important. Owning it, we can apply our creativity and solve complex problems.

Active listening and quality control completely disappeared from the 2015 list, giving way to emotional intelligence and cognitive flexibility.

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Адами капиталдың дамуына әсер ететін факторлар

Аңдатпа

Мақсаты: Экономиканың қозғаушы күші ретінде адами капиталдың дамуына әсер ететін факторларды қарау және талдау, адами капиталдың Қазақстанның экономикалық дамуына әсер ететін қатынастардағы, динамикадағы, перспективалардағы және нәтижелердегі үрдістерді анықтау.

Әдісі: Жалпы ғылыми принциптер мен әдістер қолданылды: талдау және синтез, индукция және дедукция, жүйелі тәсіл, тарихи және логикалық.

Қорытынды: Эмпирикалық дәлелдер негізінде жүргізілген нәтижелер адами капитал мен экономикалық өсу арасындағы байланысты көрсетті, ал Д.Вейл мен эндогендік өсу моделінің жақтаушысы Р. Барро жеке өсу моделін қолдану адами капиталдың экономикалық өсумен тікелей байланысты екенін дәлелдеді. Адам капиталы өсуге әсер ететін фактор екендігінде күмән жоқ, бірақ әсер ету деңгейі жинақталған адами капиталдың бастапқы деңгейіне байланысты өзгереді. Мысалы, адами капиталы жақсы дамыған мемлекетке болашақ технологияларды бейімдеу оңайырақ болады, бұл өнімділікті бұрынғыға қарағанда жоғары етеді, ал адами капиталы аз мемлекет бұған жету үшін көптеген жылдар қажет болады.

Тұжырымдама: Регрессиялық талдау нәтижелері мен адами капиталдың өлшемдеріне сүйене отырып, бастауыш және орта білімнен алынған білім артта қалады және жалпы нәтиже жоғары білім алғаннан кейін пайда болады деген адами капиталды дамыту туралы келесі болжамдар алынды. Жоғары білім ЖІӨ-нің өсуіне әсер ететін өзгермелі адами капитал болып табылады және елде адам капиталының жиналуына әкелетін білім беру, ғылыми зерттеулер мен әзірлемелер мен денсаулық сақтау саласына инвестициялар қажет. Статистика көрсетіп отырғандай, бастауыш және орта білім беру Қазақстан халқының көпшілігіне қолжетімді. Жоғары біліммен жағдай басқаша. Жоғары білім алғаннан кейін жалпы халықтың шамамен 51% жоғалады. Бұл халықтың 49 пайызының жоғары білімі жоқ дегенді білдіреді. Адами капиталды дамыту критерийлерін талдауды қорытындылай келе, адами капиталдың барлық үш түрі (білім беру, ҒЗТКЖ және денсаулық сақтау) жеткіліксіз инвестицияланған деп айтуға болады, бұл Қазақстандағы адами капиталдың дамуына теріс әсер етеді.

Кілт сөздер:. білім беру жүйесі, білім беру үрдістері, адами капитал, болашақтың білімі, дағдылар, құзыреттер, еңбек нарығы.

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Факторы, влияющие на развитие человеческого капитала

Аннотация

Цель: Рассмотреть и проанализировать факторы, влияющие на развитие человеческого капитала как движущей силы экономики, выявление тенденции в отношениях, динамике, перспективы и результаты, в которых человеческий капитал влияет на экономическое развитие Казахстана.

Методы: Применялись общенаучные принципы и методы: анализ и синтез, индукция и дедукция, системный подход, исторический и логический.

Результаты: Результаты, проведенные на основе эмпирических данных, показали взаимосвязь между человеческим капиталом и экономическим ростом, а использование модели индивидуального роста Д. Вейля и сторонника модели эндогенного роста Р. Барро доказало, что человеческий капитал напрямую связан с экономическим ростом. Нет сомнений в том, что человеческий капитал является фактором, влияющим на рост, но степень воздействия варьируется в зависимости от начального уровня накопленного человеческого капитала. Например, государству с хорошо развитым человеческим капиталом будет легче адаптировать будущие технологии, что сделает производительность выше, чем раньше, в то время как государству с низким человеческим капиталом потребуется много лет, чтобы достичь этого.

Выводы: Основываясь на результатах регрессионного анализа и критериях человеческого капитала, получены следующие предположения о развитии человеческого капитала, что знания, полученные в результате начального и среднего образования, отстают, а общий эффект проявляется после получения высшего образования. Высшее образование является переменной человеческого капитала, которая влияет на рост ВВП, и необходимы инвестиции в образование, научные исследования и разработки и здравоохранение, которые приводят к накоплению человеческого капитала в стране. Статистика показывает, что начальное и среднее образование доступно большинству населения Казахстана. С высшим образованием ситуация иная. С получением высшего образования исчезает около 51 % от общей численности населения. Это означает, что 49 % населения не имеют высшего образования. Подводя итог анализу критериев развития человеческого капитала, можно сказать, что все три вида человеческого капитала (образование, НИОКР и здравоохранение) недостаточно инвестированы, что негативно сказывается на развитии человеческого капитала в Казахстане.

Ключевые слова: система образования, тенденции в образовании, человеческий капитал, образование будущего, навыки, компетенции, рынок труда.

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