

IMPACT OF EXPENSES ON HUMAN CAPITAL ON THE ECONOMIC GROWTH OF THE COUNTRY: CASE STUDY OF THE REPUBLIC OF KAZAKHSTAN

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Cite this article: Kussaiynov, T.A., Mussina, G.S., Bulkhairova, Z.S., Saimagambetova, G.A. (2020). Impact of expenses on human capital on the economic growth of the country: case study of the Republic of Kazakhstan. *Deturope*. 12(2), 56-70

Abstract

Analysis of the impact of human capital on the efficiency of the economy of Kazakhstan was based on regression models with the use of statistical data on the volume of investments in professional and higher education, health care, and income per capita, life expectancy, and GDP per capita in 2005-2017. In the current conditions of Kazakhstan, it is found that investments in secondary and higher education and health care have no statistically significant link with the efficiency of the national economy, as well as life expectancy, while income per capita has an impact on economic growth. The low economic effect of expenditures in education and health care may evidence the ineffectiveness of such investments. Spending on higher education does not yet have a significant impact on the change of GDP. This fact indicates that the economy of Kazakhstan has not yet adopted an innovative character. It is necessary to focus on the training of qualified professional personnel at the lower and middle levels, especially on technical specialties.

Keywords: efficiency of the economy, life expectancy, income per capita, expenses on health care, expenses on professional education, gross domestic product, human capital, regression model.

INTRODUCTION

According to Shultz (1968), the valuable qualities acquired by a person, which can be strengthened by appropriate investments, are called human capital. Shultz considered human capital as the accumulated cost of reproduction of labour regardless of the source of its coverage. The results of such investments are the accumulation of people's abilities to work, their creative activity in society, the maintenance of people's lives, health, etc. According to Becker, human capital (HC) is everyone's stock of knowledge, skills, and motivations. Investments in it can be those in education, accumulation of professional experience, healthcare, geographical mobility, information search (Becker, 1964). Lim et al. (2018) define

HC as the aggregate level of education, training, skills, and health of a population that affects the rate at which technology can be developed, deployed, and used to improve productivity. HC is one of the characteristics of a population that, along with physical capital such as buildings, equipment, and other tangible assets, contribute to economic productivity (Lim et al., 2018). Within each type of capital, yield and efficiency may vary. Stocks of human and physical capital are produced through a set of investment decisions that are used as costly points of view, direct costs, and for human capital investments, in terms of alternative costs of human time (Goldin, 2016).

Modern HC theory essentially revolves around the interpretation of the investments for the qualitative improvement of HC. The stock of abilities, knowledge, skills, motivation accumulated in the process of education and labour activity, that is, individual human capital, is able to bring returns, being realized in higher labour productivity, in a higher standard of living (Andrade, Duarte, & Simões, 2018; Annabi, 2017; Bilan, Mishchuk, & Dzhyhar, 2017; López Castellano, García-Quero, & García-Carmona, 2018). Directly and positively affecting productivity, human capital is one of the key factors that determine the economic growth and technological progress of the country (Teixeira & Queirós, 2016). At the same time, the impact of human capital on economic growth depends on the demand for education and skills in the labour market. The demand for human capital, in turn, is largely determined by the institutional environment, which determines the basic conditions for economic activity (Gimpelson, 2016).

Human capital can be divided into three key components: health, education, and experience/training; and its supply can be increased by better education, better health, and new knowledge (Ogundari & Awokuse, 2018). Siddiqui and Rehman (2017) argue that education, whether primary, secondary, higher, or vocational, positively impact the economic growth of a country, and governmental spending on education also has a positive effect on the national economy. Therefore, countries that have consistently oriented human capital towards economic growth can better match their investments in growth patterns. Historical data provide irrefutable evidence that public investment in education is economically beneficial and that conditions that inhibit the acquisition of human capital (institutional and public policy, pedagogical prerequisites, financial infrastructure, etc.) are economically destructive (Warburton, 2020). Fatima, Chen, Ramzan, and Abbas (2020) found that human capital accumulation and trade effects are complementary in terms of impacting the economic growth of the country: the higher the level of human capital accumulation, the greater the impact of trade openness on GDP growth.

In a study based on panel data from 52 African countries from the World Bank's World Development Indicators (WDI) for the period 1985-2015, Bane (2018) concluded that investments in education and health positively and significantly affect economic growth in all African countries, and health investments in human capital have a stronger impact than investment in education. At the same time, the research revealed that education stock as human capital does not influence economic growth in all African countries (Bane, 2018).

Using data from 132 countries for 15 years, the research of Ali et al. (2018) concluded that human capital plays a positive role in GDP growth provided there are high-quality legal institutions and better economic opportunities. Better economic opportunities enhance the impact of human capital on growth: the easier it is to do business and trade in the domestic or international market, the stronger the impact of human capital on growth is (Ali, Egbetokun, & Memon, 2018).

Applying nonparametric and semi-parametric analyses for a sample of 100 countries from 1970 to 2014, Matousek and Tzeremes (2019) examined the nonlinear effects of two human capital indices (identifying whether there is perfect or imperfect substitutability of skilled and unskilled workers) on economic growth. Empirical research results for both indices showed a positive and statistically significant impact of human capital on the levels of economic growth of countries is. At the same time, the identified asymmetric models of human capital showed complete interchangeability of skilled and unskilled workers (Matousek & Tzeremes, 2019).

To analyse the socio-economic development of 20 European countries with varied social policies, Biernacki and Guzek (2019) used a modified Human Development Index (HDI) based on several sources (including EHCI (Euro Health Consumer Index) and PISA (Program for International Student Assessment), and GDP for 2006–2015. The results of the study showed that the dynamics of HDI of countries corresponds to the dynamics of GDP: the more rapid is the dynamics of HDI growth of a country, the more rapid is the dynamics of GDP growth (Biernacki & Guzek, 2019). The research of Roopchund (2017) also found a direct link and correlation between the HDI and the economic growth of a country. According to the research by Zhang (2019), countries with the best human development index and mobile phone use contribute to national economic growth, and the HDI itself is a critical factor facilitating GDP growth in Asia. Examining the correlation and causal relationship between the HDI and its sub-indices and economic, water and energy indicators, Sušnik and van der Zaag (2017) concluded

that just as the (sub) index can influence the dynamics of GDP, so the GDP itself can influence a certain HDI parameter.

Human Development Index is a statistical indicator periodically composed by the United Nations and published in Human Development Report. HDI is designed to measure human capital formation and development in various nations of the world (United Nations Development Programme, 2019). It is the combination of “Life Expectancy Index”, “Education Index” and “Income Index”. The life expectancy index reveals the standard of health of the population in the country; the education index reveals the educational standard and the literacy ratio of the population, and the income index reveals the standard of living of the population. In other words, human capital is measured by health, education, and quality of standard of living (Škare & Lacmanovic, 2016). Therefore, the components of HDI, that is, life expectancy index, education index, and income index, are directly related to human capital formation within the nation. It follows then, that the most important qualitative characteristics of human capital in the economic sense are the professional qualifications, health, and wealth of individuals (Korotovskih, 2019). And it is most convenient to quantify the influence of the level of human capital on the economic performance indirectly through the volume of expenditures on education, professional in particular, including the costs of retraining and advanced training, health care, and income level of the population (Kpolovie, Ewansiha, & Esara, 2017).

MATERIAL AND METHODS

In the study of the impact of human capital on economic growth five socio-economic parameters related to human capital in Kazakhstan for the period from 2005 to 2017 as independent variables were analysed:

- 1) expenditures on secondary professional education per capita;
- 2) expenditures on higher professional education per capita;
- 3) expenditures on health per capita;
- 4) nominal monetary income of population per capita;
- 5) life expectancy.

As the dependent variable reflecting the level of economic growth GDP per capita of Kazakhstan in 2005-2017 was selected.

Tab. 1 presents data on the dependent variable (GDP) and independents variables used for the study (Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan, 2020).

Table 1 Variables of the study

Year	Dependent variable	Independent variables				
	GDP per capita, mln.tenge	Expenditures on secondary professional education (per capita), mln.tenge	Expenditures on higher professional education (per capita), mln.tenge	Expenditures on Health-care (per capita), mln.tenge	Nominal monetary income of population (per capita), mln.tenge	Life expectancy, years
2005	0.5011	0.0019	0.0047	0.0107	0.0158	65.86
2006	0.6672	0.0023	0.0059	0.0126	0.0192	66.15
2007	0.8299	0.0030	0.0071	0.0166	0.0252	66.34
2008	1.0242	0.0036	0.0069	0.0194	0.0330	67.11
2009	1.0569	0.0044	0.0079	0.0240	0.0343	68.39
2010	1.3366	0.0049	0.0089	0.0252	0.0390	68.45
2011	1.7058	0.0059	0.0109	0.0314	0.0459	68.69
2012	1.8471	0.0068	0.0124	0.0371	0.0519	69.52
2013	2.1132	0.0121	0.0223	0.0420	0.0565	70.62
2014	2.2948	0.0079	0.0128	0.0464	0.0623	71.44
2015	2.3304	0.0076	0.0132	0.0505	0.0673	71.97
2016	2.6397	0.0087	0.0145	0.0604	0.0766	72.41
2017	3.0147	0.0093	0.0154	0.0642	0.0837	72.95

Descriptive analysis, correlation analysis, multiple linear regression, and factor analysis, including calculations, were used to systematize and analyse the collected data.

To analyse the impact of human capital on economic efficiency, the multiple linear regression model using the dependent variable (y) and multiple independent variables (x) was applied for the study:

$$y = \beta_0 + \sum_{i=1}^7 \beta_i x_i + \epsilon$$

Where:

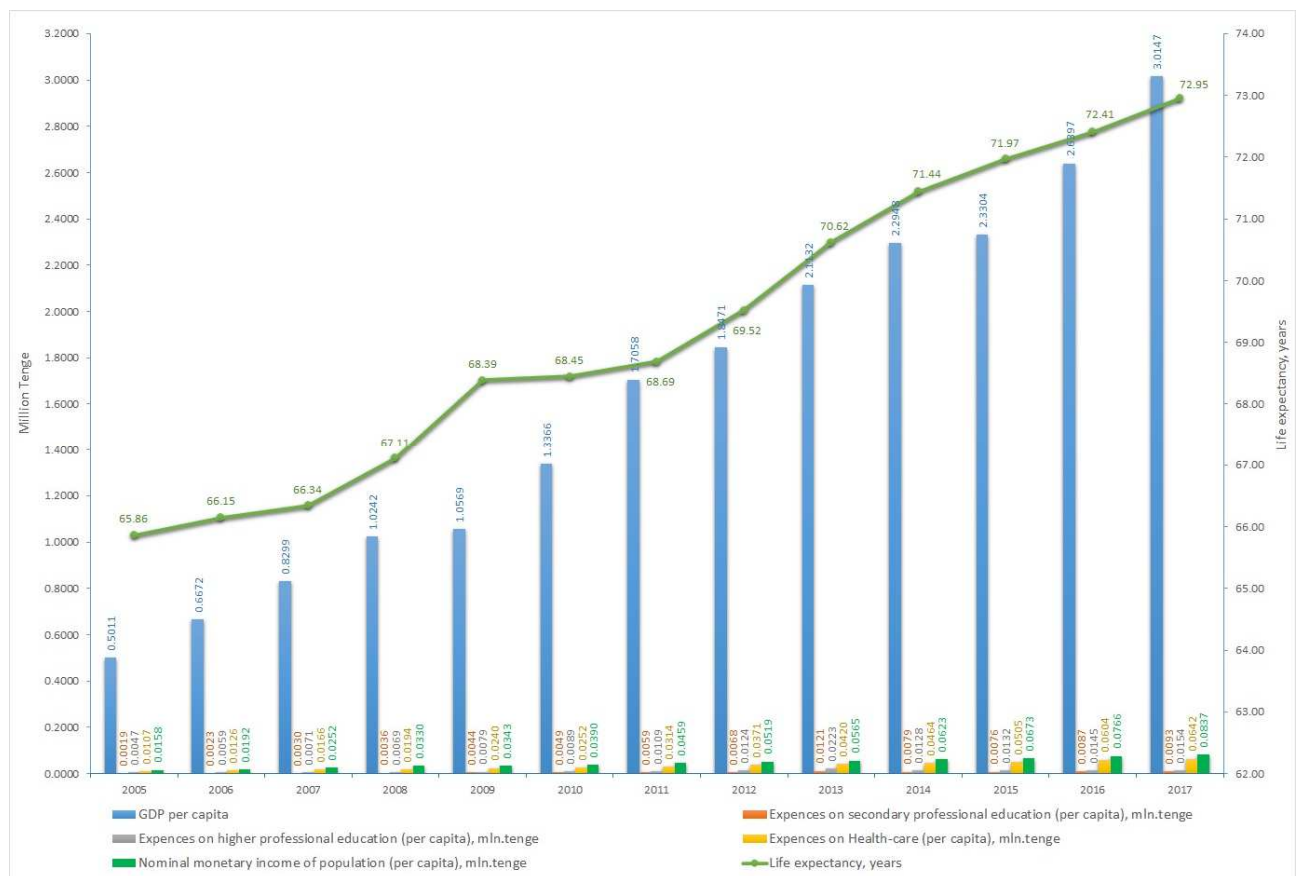
- y is GDP per capita;

- β_0 is a constant;
- β_i are slope coefficients;
- x_1 is expenditures on secondary professional education per capita (SPE);
- x_2 is expenditures on higher professional education per capita (HPE);
- x_3 is expenditures on health per capita (HC);
- x_4 is nominal monetary income of population per capita (PI);
- x_5 is life expectancy (LE).

RESULTS

As shown on Fig. 1, all socio-economic parameters of the Republic of Kazakhstan analysed in the study had positive dynamics in 2005-2017.

Figure 1 Dynamics of socio-economic parameters of the Republic of Kazakhstan in 2005-2017.



Source: developed by the authors based on data of Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan (2020).

The state's investments in professional education in 2005-2017 grew steadily both in absolute and relative terms. The share of state expenditures in secondary professional education increased from 59.9% in 2005 to 79.6% in 2017 (Fig. 2)

Figure 2 Share of Financing of secondary professional education (%)



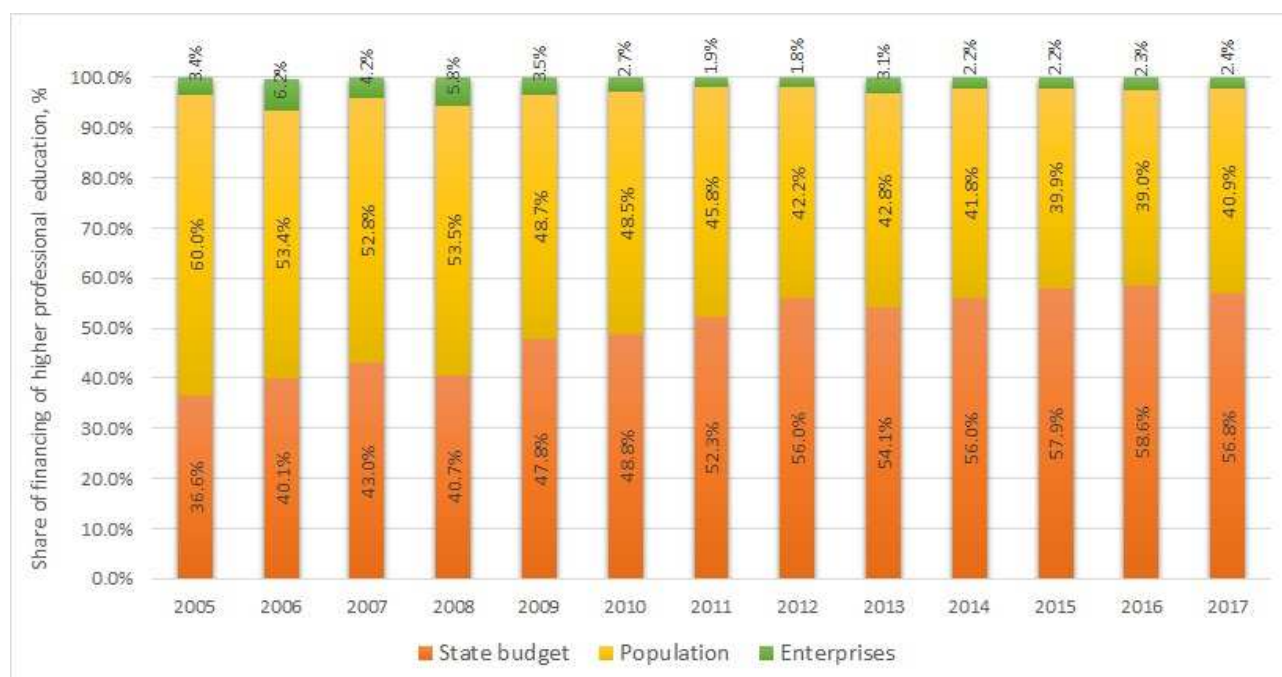
Source: developed by the authors based on data of Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan (2020).

As shown in Fig. 2, in financing the development of secondary professional education in the period under review, the share of the population has almost halved and amounted to 19.2% in 2017, while the share of expenditures of enterprises has not changed and is in the range of 1.3-1.4%.

In higher professional education the share of governmental expenditures grew from 36.6% in 2005 up to 56.8% in 2017 (Fig. 3).

According to Fig. 3, the share of the population in financing higher professional education has also decreased significantly: from 60.0% in 2005 to 40.9% in 2017. Despite its notable volatility, the share of enterprises in spending on higher professional education also tended to decrease, from a peak of 6.2% in 2006 to 2.4% in 2017.

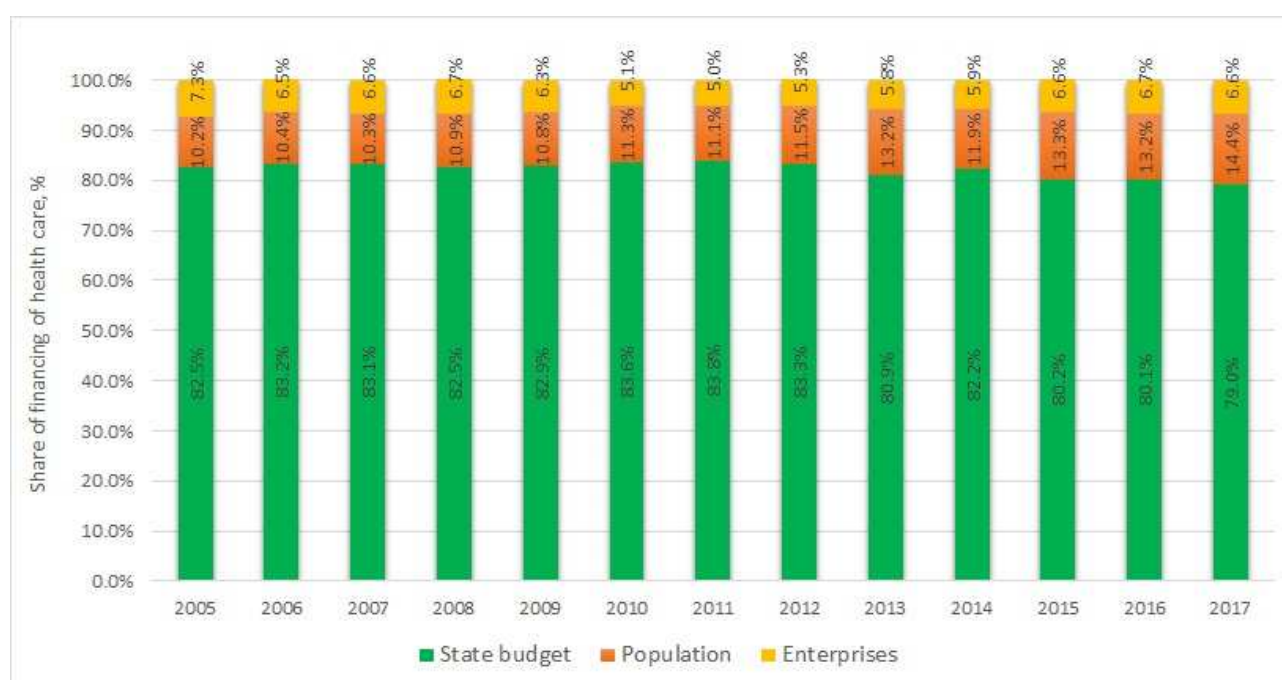
Figure 3 Share of financing of higher professional education (%)



Source: developed by the authors based on data of Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan (2020).

In the health-care government financial participation remains virtually unchanged, with a slight decline of 3-4 percentage points by 2017 (Fig. 4).

Figure 4 Share of financing of health care (%)



Source: developed by the authors based on data of Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan (2020).

As shown in Fig. 4, the population's participation in health-care financing tends to grow: from 10.2% in 2005 to 14.4% in 2017. The share of enterprises in expenditures for health-care had a steady downward trend from 2005 to 2011 (from 7.3% to 5.0%); then the trend changed in the opposite direction: from 2012 to 2017. the share of enterprises grew steadily and amounted to 6.6% in 2017.

Descriptive statistics for the dependent variable (GDP) and independent variables (SPE, HPE, HC, PI, and LE) allowing to understand the research data is given in Tab. 2.

Table 2 Descriptive statistics of variables of the research

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP	13	1.6432	0.8050146	0.5011	3.0147
SPE	13	0.006031	0.0030445	0.0019	0.0121
HPE	13	0.010992	0.0048398	0.0047	0.0223
HC	13	0.033885	0.0178172	0.0107	0.0642
PI	13	0.046977	0.0216555	0.0158	0.0837
LE	13	69.22308	2.477457	65.86	72.95

Source: calculated by the authors based on data of Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan (2020).

Tab. 3 shows the results of calculations of correlation coefficients between variables in relation to the GDP per capita.

Table 3 Correlation coefficients between variables.

Variable	GDP	SPE	HPE	HC	PI	LE
GDP	1					
SPE	0.8865	1				
HPE	0.8158	0.9868	1			
HC	0.9913	0.8605	0.7847	1		
PI	0.9953	0.8639	0.786	0.996	1	
LE	0.9828	0.8771	0.798	0.9878	0.9874	1

Source: calculated by the authors based on data of Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan (2020).

According to the correlation analysis (Tab. 3), all variables have a positive influence on each other.

To check data adequacy, including normal data distribution, absence of autocorrelation, heteroscedasticity, the effect of multicollinearity, etc., relevant tests were performed. The Skewness-Kurtosis (Jarque-Bera) test for normality showed that as soon as the p-value is greater than 0.05, the data follows a normal distribution (Tab. 4).

Table 4 The Skewness-Kurtosis (Jarque-Bera) Test for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj	chi2(2)	Prob>chi2
residuals	13	0.9435	0.5827		0.31	0.8577

Source: calculated by the authors based on data of Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan (2020).

The Durbin-Watson test scored 1.768306 showed no autocorrelation in analysed data. The results of Breusch-Pagan / Cook-Weisberg test for heteroscedasticity ($\chi^2(5) = 3.31$ Prob > $\chi^2 = 0.6523$) showed that heteroscedasticity is absent at the 5% level of significance since p-value is greater than 0.05. The results of Multicollinearity test using variance inflation factors (VIF) are given in Tab. 5.

Table 5 Results of Multicollinearity test

Variable	VIF	1/VIF
SPE	319.41	0.003131
HPE	200.94	0.004977
HC	181.35	0.005514
PI	157.33	0.006356
LE	82.94	0.012057
Mean VIF	188.4	

Source: calculated by the authors based on data of Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan (2020).

Bartlett test of sphericity revealed that independent variables are not intercorrelated: chi-square = 146.248, degrees of freedom = 10, p-value = 0.000. Kaiser-Meyer-Olkin Measure of Sampling Adequacy valued 0.689 showing that the data can be appropriate. Multiple linear regression (Fig. 5) revealed that R-squared for the regression model is 0.9937 meaning that the research model explains 99.37% of the total variability in GDP per capita score while the remaining 0.63% of the variation in the GDP per capita is explained by other variables not included in the model in this study. F value equal to 219.7 and p-value of F equal to 0.000 shows that the study model is well fitted at the 1% level of significance.

Figure 5 Multiple linear regression

Source	SS	df	MS	Number of obs	=	13
Model	7.72733995	5	1.54546799	F(5, 7)	=	219.70
Residual	.049242122	7	.007034589	Prob > F	=	0.0000
				R-squared	=	0.9937
				Adj R-squared	=	0.9891
Total	7.77658207	12	.648048506	Root MSE	=	.08387

GDP	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
SPE	22.30004	142.1313	0.16	0.880	-313.7871	358.3872
HPE	4.275886	70.91423	0.06	0.954	-163.4096	171.9614
HC	2.633984	18.29982	0.14	0.890	-40.6382	45.90617
PI	35.34057	14.02397	2.52	0.040	2.179157	68.50198
LE	-.0350618	.0890024	-0.39	0.705	-.2455191	.1753955
_cons	2.139356	5.828926	0.37	0.724	-11.64386	15.92257

Source: calculated by the authors based on data of Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan (2020).

The results of multiple linear regression allow concluding that the PI variable is influencing the GDP per capita variable, while other variables have no statistical impact on GDP per capita.

DISCUSSION

In Kazakhstan, during the period under review, the financing of human capital development has steadily increased, which is associated primarily with a significant increase in the country's income, primarily due to raw materials industries. At the same time, every year the state was assuming an increasing share of expenses in financing professional education. In conditions when GDP growth is provided mainly at the expense of the raw materials sector (namely energy resources) it is very doubtful to connect the growth of GDP with changes in the financing of the human capital development. On the contrary, the increase in revenues from the commodity sector due to favourable conditions in the commodity markets has led to a significant increase in the participation of the state (both in absolute and relative terms) in the financing of education and health-care (Bilan et al., 2017).

In Kazakhstan the main sources of funding for education and health systems include funds from the state budget, the population, and enterprises, financing from the state budget accounts for the lion's share of all investments in human capital. At the same time, the costs of health-care from the state budget have a stable positive dynamic throughout the analysed period, while

the costs of professional education from the state budget are characterized by certain fluctuations (Korotovskih, 2019).

According to the results of the research, investments in education have no statistically significant impact on changes in the size of GDP per capita. This does not support the findings of the studies of Warburton (2020) and Bane (2018), where the positive influence of investment in education on the economy was revealed. The absence of influence of education financing on economic parameters can serve as confirmation of the idea that the economy of Kazakhstan has not yet adopted an innovative character. The structure of the economy with a bias towards the commodity sectors objectively does not imply its accelerated transition to the innovation path. And this circumstance limits the need of the economy for highly qualified personnel, especially from the sphere of high technologies. It should be emphasized that these features do not indicate that the Kazakh economy does not need highly qualified personnel. They just indicate that the structure of expenditures in the context of training areas should be brought into line with real trends in the economy (Gimpelson, 2016).

One of the papers concerning issues of human capital development in countries in transition examines the relationship between the quality of human capital and the international competitiveness of European countries with an emphasis on Eastern European countries (EECs) (Mulliqi, Adnett, Hisarciklilar, & Rizvanolli, 2018). In line with orthodox theory, a positive relationship was found between the labour force's level of educational attainment and competitiveness. While in the European Economic Area (EEA17), tertiary education is the only significant education-based determinant of the export market share, in EECs both the shares of the workforce with secondary and tertiary education are significant with the former having a greater impact (Biernacki & Guzek, 2019; Fomina, Sizikova, Shimanovskaya, Kozlovskaya, & Karpunina, 2019). This conclusion regarding the Eastern European countries is not consistent with our finding that in Kazakhstan no relationship is found between the economic growth and the expenditures on secondary and higher professional education.

The choice of factors to explain the behaviour of the response variable largely determines the quality of the forecast. The costs of professional education, as well as health-care, seem to be the most important indirect characteristics of the state of human capital in society. A more accurate assessment of the relationship between expenses on human capital development and economic performance can be obtained if we consider the problem in the sectoral context (López Castellano et al., 2018).

In contrast to the results of Ogundari and Awokuse (2018) and Bane (2018), investments in health in Kazakhstan do not directly impact the level of economic development of the country.

At the same time, it should be noted that the research did not study the influence of the level of education or health care on the economic parameters of the country. The absence of a direct correlation between investments in these spheres may indicate that such investments are ineffective in terms of impacting economic growth. Therefore, research of the influence of quantitative parameters of secondary and higher education, health care on GDP would supplement this research and provide the understanding of the effectiveness of the above investments (Ali et al., 2018).

However, such studies, as a rule, encounter the intractable problem of obtaining and forming a database of reliable and complete data on the analysed economic variables. Any progress in this direction will certainly be very useful both in practical and theoretical terms. For a more informative and adequate assessment of the impact of the quality of human capital on economic efficiency, the analysis should take into account the gender and age distribution of the working population.

CONCLUSIONS

Acknowledgement

The paper is based on the results of research conducted at Seifullin Kazakh Agrotechnical University in the framework of the project “The System Assessment of the Impact of Qualitative Characteristics of Human Capital on Business Performance and Optimization of the Policy of Training and Retraining of Professional Staff” funded by the Ministry of Education and Science of the Republic of Kazakhstan in 2018-2020. The authors thank the project team for their comprehensive assistance and support in collecting data and preparing the paper.

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