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THE IMPACT OF QUALITY OF EDUCATION ON SOCIOECONOMIC DEVELOPMENT OF THE KYRGYZ REPUBLIC IN A DIGITAL ECONOMY

Abstract: *The goal of this paper is to determine the impact of quality of education on socioeconomic development of the Kyrgyz Republic in a digital economy and to identify the prospects for enhancing this role in order to assist in the implementation of the Digital Transformation Concept "Digital Kyrgyzstan 2019-2023" and the Digital Agenda of the EEU for 2016-2019-2025. The methodology of regression analysis and forecasting based on the theory of probability using the Monte Carlo method was used to prove that the globalization of education in the Kyrgyz Republic in 2013-2019 hampered the social and economic development of the Kyrgyz Republic, and it is very likely that it will slow down the innovative development and economic growth of this country in 2020. This problem stems from the fact that the digital economy of the Kyrgyz Republic is in a formative stage thus far, and the significance of quality of education in it is contradictory. On the one hand, there is a growing demand for the teaching of digital competencies among the emerging information society, which cannot be met due to the retaining of traditional educational programs. On the other hand, the regulatory framework for digital business is still under development, which reduces the demand for training of digital personnel. In order to address the identified problem, it is recommended to develop an institutional environment and to promote business digitalization in the Kyrgyz Republic. This will make it possible to create a consistent demand for training of digital personnel from society, the State and business, and to promote the key role of quality of education in the digital economy of the Kyrgyz Republic.*

Keywords: *Economic Empowerment, Economic Transformation, Human Settlements (Regions), Economic Growth, Educational Environment, Educational Governance, Inclusive Innovation, Higher Education, Kyrgyz Republic, Quality of Education, Management of Quality in Education.*

1. Introduction

The role of quality of education as a source of digital personnel and high technologies is becoming increasingly important in a digital economy all over the world. However, according to the IMD (2020) Digital Competitiveness Rating, it still includes only 63 countries among many countries in the

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world. This means that most countries are still early in building their digital economies; they are characterized by low digital competitiveness and are unable to provide data on the necessary statistical indicators, either due to the lack of efficiency for them, or due to the lack of statistics for the digital economy.

The Kyrgyz Republic, which has adopted and is implementing the Digital Transformation Concept "Digital Kyrgyzstan 2019-2023", approved pursuant to the Resolution No. 2 of the Security Council of the Kyrgyz Republic on December 14, 2018 (Ministry of Justice of the Kyrgyz Republic, 2020), is one of the countries that are not included in the IMD rating (2020). Provision of a high level of digital competitiveness is a strategic step for the Kyrgyz Republic, which is supported and promoted by the Digital Agenda of the EEU for 2016-2019-2025 (Eurasian Economic Commission, 2020).

In this regard, the problem of identifying the impact of quality of education on socioeconomic development of the Kyrgyz Republic in a digital economy is becoming increasingly topical. Taking into account the poor performance in the field of digital competitiveness, the authors of this research have made a working hypothesis that quality of education plays a restrained role in socioeconomic development of the Kyrgyz Republic in a digital economy and contributes poorly to its progress.

The goal of this paper is to determine the impact of quality of education on socioeconomic development of the Kyrgyz Republic in a digital economy and to identify the prospects for enhancing this role in order to assist in the implementation of the Digital Transformation Concept "Digital Kyrgyzstan 2019-2023" and the Digital Agenda of the EEU for 2016-2019-2025.

2. Literature Review

The literature review has shown that consideration to the issues of the impact of quality of education on the growth and development of the modern economy has been given in papers of such scholars as Chashchin et al. (2013), Kohoutek et al. (2017), Novo-Corti et al. (2018), Popkova (2019), Popkova et al. (2019), Popović et al. (2019), Ragulina (2019a), Ragulina (2019b), Zhu et al. (2018).

The international experience of the impact of education on socioeconomic development in a digital economy has been discussed in the writings by Bogoviz et al. (2019), Dewi et al. (2021), Elayan and Sleimi (2021), Fahrurrozi et al. (2021), Fischer et al. (2020),Kamberi et al. (2020), Kuklin et al. (2021), Linzalone et al. (2020), Martens et al. (2020), Morozova et al. (2020), Vanchukhina et al. (2019), Yankovskaya et al. (2021).

Nonetheless, despite a reasonably large number of studies on the topic under consideration, the evidence base on the impact of quality of education on socioeconomic development in a digital economy is fairly weak and is limited by a number of hypotheses that need to be tested.

3. Materials and methods

For empirical goals of our research, we shall assess the impact of quality of education on the social and economic development of the Kyrgyz Republic. We shall use the regression analysis method to assess the dependence of the innovative development level (12th pillar indicator: Innovation capability, calculated by the World Economic Forum) and the annual rate of economic growth (according to the World Bank) from quality of educational (6th pillar indicator: Skills, calculated by the World Economic Forum) in the Kyrgyz Republic in 2013-2019. Original statistical data are presented in Table 1.

Table 1. Figures of education and social and economic development of the Kyrgyz Republic in 2013-2019.

Year	Quality of education, points 0–100	Innovative development level, points 0–100	Annual rate of economic growth, %
	x	y_1	y_2
2013	36.0	22.0	-0.2
2014	39.0	25.0	10.9
2015	41.0	27.0	4.0
2016	40.0	27.0	3.9
2017	40,0	27.0	4.3
2018	58.8	26.7	4.7
2019	58.6	26.2	3.5

Source: Compiled by the authors using the information from the World Bank (2020), World Economic Forum (2020).

4. Results

The data from Table 1 were used to calculate the arithmetic average of quality of education in the Kyrgyz Republic in 2013-2019, which amounted to 44.7714 points, and to calculate the standard deviation, which amounted to 9.6439 points. In addition, regression curves were plotted; they are shown in Figure 1.

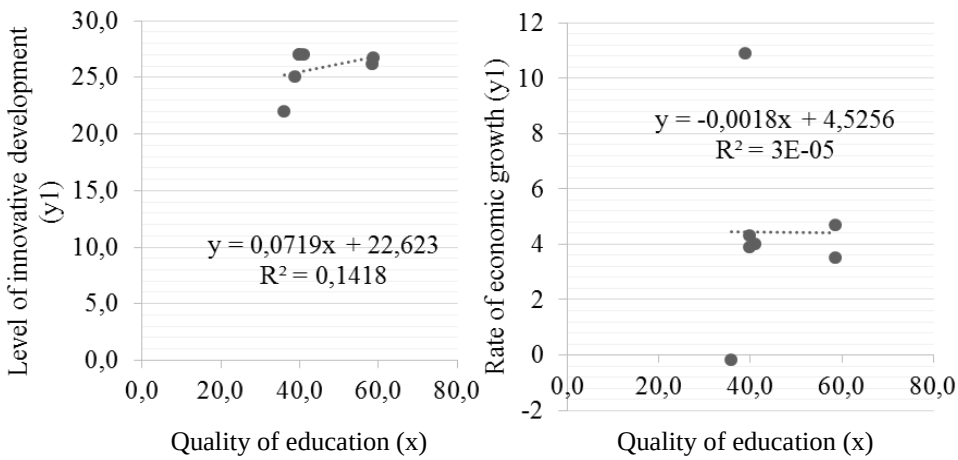

Figure 1. Regression curves which are reflective of the impact of quality of education on the social and economic development of the Kyrgyz Republic in 2013-2019

Source: Calculated and plotted by the authors.

As can be seen in Figure 1, when quality of education increases by 1 point, the innovative development level of the Kyrgyz Republic in 2013-2019 increases by 0.0719 points (a negligible correlation of 14.18%), and the rate of economic growth slows down by 0.0018% (correlation tends to zero). We shall determine the prospects for the social and economic development of the Kyrgyz Republic for 2020 by means of forecasting based on the theory of probability using the Monte Carlo method. In accordance with the deduced arithmetic average and standard deviation, we have generated 100 random numbers that are reflective of the prospects for changes in quality of education in the Kyrgyz Republic in 2020, and their probability distribution was made (Table 2).

Based on data from Table 2, a histogram of the probability distribution of projected values of quality of education in the Kyrgyz Republic in 2020 was plotted (Figure 2).

The probabilistic analysis of the impact of changes in quality of education on the social and economic development of the Kyrgyz Republic in 2020 was carried out in accordance with Figure 1, Table 3 and Figure 2 (Table 3).

Table 2. Probability distribution of 100 random numbers that are reflective of the prospects for changes in quality of education in the Kyrgyz Republic in 2020.

Integral (x)	Frequency (p)	Integral %
16.14106	1	1.01%
21.8385	4	5.05%
27.53595	4	9.09%
33.2334	3	12.12%
38.93085	21	33.33%
44.62829	21	54.55%
50.32574	21	75.76%
56.02319	17	92.93%
61.72064	6	98.99%
More	1	100.00%

Source: Calculated and compiled by the authors

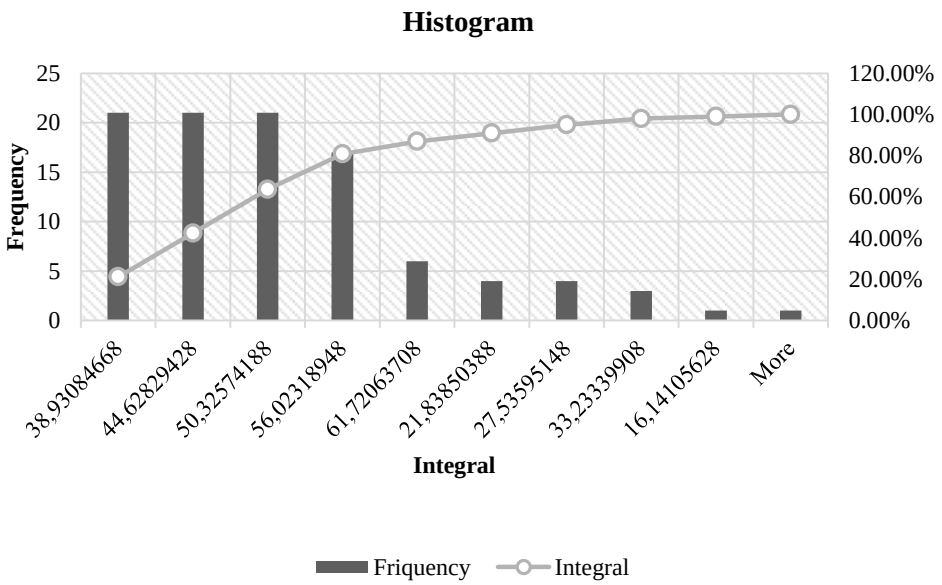

Figure 2. Histogram of the probability distribution of projected values of quality of education in the Kyrgyz Republic in 2020.
Source: Calculated and plotted by the authors.

Table 3. Probabilistic analysis of the impact of changes in quality of education on the social and economic development of the Kyrgyz Republic in 2020

Proba-bility p, %	Educational level (x)		Innovative development level (y1)		Rate of economic growth (y2)	
	Value, points 1-100	Increase compared to 2019, %	Value, points 1-100	Increase compared to 2019, %	Value, points 1-100	Increase compared to 2019, %
1	16.14	-63.95	23.78	-7.97	4.50	1.21
4	27.54	-38.50	24.60	-4.80	4.48	0.75
11	33.23	-25.77	25.01	-3.21	4.47	0.52
13	38.93	-13.05	25.42	-1.63	4.46	0.29
26	44.63	-0.32	25.83	-0.04	4.45	0.05
21	50.33	12.41	26.24	1.54	4.44	-0.18
12	56.02	25.13	26.65	3.13	4.42	-0.41
9	61.72	37.86	27.06	4.71	4.41	-0.64

Source: Calculated and compiled by the authors.

In Table 3, the probability value was taken from column "Frequency (p)", and probable values of quality of education from column "Integral (x)" in Table 2. The identified regression curves that are shown in Figure 1 were used to determine the values of the innovative development level (y1) and the rate of economic growth (y2) at predetermined values of independent variable (x). For example, when x=16.14 y1=0.0719*16.14+22.623=23.78, y2=-0.0018*16.14+4.5256=4.50.

The analysis has shown that the innovative development level of the Kyrgyz Republic in 2020 will decrease compared to 2019 to a value ranging from 0.04% to 7.97% under the influence of changes in quality of education with a probability of 55% (1+4+11+13+26). The rate of economic growth of the Kyrgyz Republic in 2020 will decrease compared to 2019 to a value ranging from 0.18% to 0.64% under the influence of changes in quality of education with a probability of 42% (21+12+9).

Therefore, it has been found that currently the impact of quality of education on the social and economic development in the Kyrgyz Republic is specific – an increase in quality of education slightly contributes to the acceleration of the innovative development and is a negligible factor which slows down the economic growth. If the existing trend is preserved in 2020, a decrease in quality of education in the Kyrgyz Republic will limit the innovative development and slow down the economic growth.

This brings us to the conclusion that quality of education contributes poorly to the implementation of the Digital Transformation Concept "Digital Kyrgyzstan 2019-2023" and the Digital Agenda of the EEU for 2016-2019-2025. This necessitates a qualitative transformation of the educational system in the Kyrgyz Republic. The digitalization of society and the economy is of key importance in this process. Successful experience of other developing countries has shown that the impact of quality of education on socioeconomic development in a digital economy can fundamentally change in case of acceleration of the pace of digital transformation. Education can become an important source of economic growth and innovative development of the economy of the Kyrgyz Republic due to its contribution to the digital transformation of society and the economy.

Education is an underlying determinant of the wide-scale adoption of digital competencies necessary for the development of the information society. According to the materials of the World Economic Forum (2020), Digital skills among active population in the Kyrgyz Republic have been estimated at 47,6 points out of a possible 100 (91st position out of 141). The level of E-Participation is also moderate, and has been estimated at 68.5 points (72nd position). Consequently, it will be necessary to modernize the educational programs of the Kyrgyz Republic in the years to come (2020-2025) with a view to training digital personnel and enhancing the digital literacy of the population.

That said, the Legal Framework's adaptability to digital business models is at a low level and has been estimated at 33.8 points (110th position). Hence, entrepreneurship in the Kyrgyz Republic functions in a business environment that is not prepared for digital transformations and impedes their implementation. This provides an opportunity to predict low demand for services involving training of digital personnel by businesses. In order to address this problem and support the new core role of education in socioeconomic development of the Kyrgyz Republic in a digital economy, it is recommended that the institutional environment and infrastructure of digital business be improved which will contribute to growth in demand for digital personnel.

5. Conclusion

The research has made it possible to confirm the hypothesis: quality of education in the Kyrgyz Republic is poorly contributing to the implementation of the Digital Transformation Concept "Digital Kyrgyzstan 2019-2023" and the Digital Agenda of the EEU for 2016-2019-2025. It has been proved that quality of education has a slight impact on socioeconomic development in the Kyrgyz Republic. In 2013-2019, the function of education in promoting socioeconomic development of the Kyrgyz Republic has not been fulfilled, and it is highly likely that quality of education will impede the innovative development and economic growth of this country instead of supporting it in 2020.

This problem stems from the fact that the digital economy of the Kyrgyz Republic is in a formative stage thus far, and the significance of quality of education in it is contradictory. On the one hand, there is a growing demand for the teaching of digital competencies among the emerging information society, which cannot be met due to the retaining of traditional educational programs. On the other hand, the regulatory framework for digital business is still under development, which reduces the demand for training of digital personnel.

In order to address the identified problem, it is recommended to develop an institutional environment and to promote business digitalization in the Kyrgyz Republic. This will make it possible to create a consistent demand for training of digital personnel from society, the State and business, and to promote the key role of quality of education in the digital economy of the Kyrgyz Republic.

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