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The Evolutionary Role of Higher Education in Sustainable Development: Pandemic 2020–2021

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Abstract

This article investigates the role of higher education in the economic development of the country. The research aims to investigate the theoretical and methodological basis of the role of higher education and human capital in economic growth, evaluate the current state of higher education within pandemic COVID-19, and develop scientifically and applied recommendations to strengthen capacity and improve the competitiveness of human capital in the developing countries.

An analysis of the existing researches and debates is made. We defined the state of higher education in Kazakhstan and considered the changes in education within the context of COVID-19. We made multiple correlations and regression analysis based on the education coverage index and GDP(mln KZT), where defined the moderate correlation between two variables. Statistical data is studied in a period from 2000 to 2019.

This paper contributes to the literature by fulfilling a theory of human capital development in the knowledge economy, revealing the relational mechanism between higher education, sustainable development, and the economic boundary of this relationship. It also contributes to the further understanding of the role of higher education in economic development. This study result implies to strengthen

capacity and improve the competitiveness of human capital, draft human capital development policy.

Keywords: SDG, COVID-19, human capital, higher education

Introduction

United Nations Member States approved the 2030 Agenda for Sustainable Development in 2015, where 17 sustainable development goals (hereafter - SDGs) were introduced. The aims of SDGs are ending poverty, improving health and education, reduce inequality, and spur economic growth.

In the past several decades, tertiary education has played a significant role in SDGs, was counted as an investment for the future (Nafukho, F. M., Hairston, N. R., Brooks, K., 2014). Extensively growth of the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship are impossible without the high quality of education. Especially, it is significant to provide high-quality education for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations. Investments in education lead to economic growth and allow achieving sustainable growth. This phenomenon has been widely observed by T. Schultz (1961) and G. Becker (1964).

The overall goal of this paper was to pursue the role of HEIs in sustainable development in the context of the COVID-19 pandemic. This paper has made some significant contributions to the field of education studies, economics and sociology. This paper contributes to three strands of the literature and evidence on the evolutionary role of Higher Educational Institutions and their response to COVID-19. These point out the role of HEIs in SDGs.

There are two hypothesis: 1) Output of education impacts on economic sustainability of country; 2) Pandemic will impact on human capital negatively.

The paper consisted of six parts: 1) literature review, where we had considered the role of education in sustainable development. 2) Methodology of research. 3) State of HEI before COVID-19. 4) The impact of COVID-19. 5) Economic modelling. 6) Discussions and conclusion.

Literature review

The first attempts to quantify human capital began to be accepted from the beginning of the XX century. Economists tried to calculate the cost of human capital, the impact of education on economic growth, and government spending on education and the upbringing of the population using economic, mathematical, and statistical research methods. I. Fischer (1906), S. Forsyth (1914), L. Dublin (1930) made a great contribution to these studies.

Forsyth investigated the cost of human capital based on financial losses. He considered financial losses as a result of average life expectancy, life expectancy, and age-related mortality rates.

Dublin and Lotka (1930) published the work 'The Monetary value of a person, in which they estimated the age and annual earnings of a person until the end of life by subtracting the number of living expenses.

Stehle (1943) investigated how a person's abilities affect earnings.

The term "Human capital" was first introduced by J. Mincer in 1958. Mincer (1958) created the first models of the income distribution of individuals by the level of professional education.

Becker popularized the concept of human capital in the late 50s of the 20th century. Initially, Becker (1964) wanted to evaluate returns of secondary and higher education, however, the gap of investment of human capital was defined. It was clear that wages were increased by age of a person, and the pace of rising was connected with the education of human. It was found that unemployment is related to the level of education, as well as the phenomenon of private job changes

by young people. Becker has investigated how expenditure on job training impact human capital's income. Employees had to invest in human capital for the maximization of future profit. However, labour turnover was one of the main problems of employers at the time. It was important for an employee to define returns of investment in human capital, therefore, the initial age of employers might be lower than in other companies.

In the 60s of the last century, Becker claimed that if earlier the main motivating factor was the growth of physical labour, now it is necessary to focus on the quality of labour resources, increasing the level of education and skills. Namely, the development of human resources was the result of the development of the economies of the USA and the USSR in the 60s. Subsequently Becker (1992) continued to deepen his research without changing the initial setting with some further reference to emergency situations and the investment in the staff development as a way to improve the resilience of organizations.

R. Reich (1991) noted the need to develop public schools to form the human capital of the future and indicate three new fundamental work categories for the development of economies as: routine production services, in-person services, and symbolic analytical services.

This insight paved the way for the considerations of L. Turow (1996) who argues that human capital will replace physical capital. Thereby confirming that for the development of countries it is necessary to accumulate and increase human capital. Many countries have begun to struggle for a strategically important non-renewable resource.

The Organization for Economic Co-operation and Development will focus its attention (Bassanini Scarpetta, 2000) in the long-run elasticity of output to human capital connected to the returns to schooling.

E. Tan (2014) noted that the concept of human capital is widely used as a tool for shaping the political course of education. However, it should be noted that the concept covers not only the field of education and training but also many other

areas such as health and migration of citizens and consequent emergencies which require an adequate feedback from the human resources.

According to neoclassical Economics, individuals invest in their education to earn higher incomes in the future. Tan considered the theory of human capital from the point of view of methodology, empirics, applied nature, and moral perspectives. The study revealed that the current theory of human capital has its limitations and contradictions.

In last years the multidisciplinary approach will confirm the role of human capital in the increasing of resilience capacities of organizations (Bianchi 2016; 2019) and their impact on how societies in emergency situations (Pereira, Temouri, Patel 2020) and the pandemic crisis triggered by COVID-19.

As a result of school closures insufficient level of communication affect on students' welfare and their soft skills and thereby their long-term wages. (Fuchs-Schündeln, et. al., 2020)

At the moment no theory can replace the current theory of human development but it seems that the analysis of quantitative statistics can allow to face the challenge of understanding if and how culture and organisations play a role in processes affecting the human capital and the impact on it of widespread and prolonged emergencies.

Methodology

The qualitative analysis is made on the state of HEI based on secondary data of governmental statistics and evidence.

Calculation of education coverage index based on OECD method. The education covered index is calculated taking into account that the required length of education and the average length of training are replaced by the net primary education coverage rate (children aged 7-10 years), the gross secondary education

coverage rate, and the gross higher education coverage rate(governmental statistics, 2021)

$$\text{Dimension index} = \frac{\text{Actual value} - \text{minimum}}{\text{Maximum} - \text{minimum}} = \frac{Actual\ value - 0}{100 - 0} \quad (1)$$

$$\text{Education coverage index} = \frac{\sum index\ of\ enrollment\ ratio\ in\ primary,sec.,higher\ edu}{3} \quad (2)$$

We made correlation and quadratic regression analysis based on the education coverage index and GDP (mln KZT). Statistical data is studied in a period from 2000 to 2019.

Findings and Discussion

State of HEI before COVID-19

Before the pandemic COVID-19, Kazakhstan was aimed to provide high-quality education to whole students. According to 17 goals for sustainable development, youth is the main driver of economic growth. However, economic growth occurs if youth get skills and opportunities to reveal their capacity. 2019 was announced the year of youth in Kazakhstan, that youth could enlarge their knowledge and skills to adapt to the modern labour market and conditions of changing world. Human capital is one of the main factors of sustainable growth and decreases poverty.

The growth of the middle class and youth stimulate the massification of higher education in the world. World Access to Higher Education Day (hereafter-WAHED) (2018) decided to decrease inequality in access to higher education at the local, national, and global level. Jamil Salmi, the expert of WAHED, offered an analysis of state politics of equality that based on 2 ways of stimulation access to higher education: financial and non-financial. (HSE, 2011). Kazakhstan, like other East European and Central Asia countries, mostly used merit-based entrance exam, which is known as National test for school graduates. The state provides grants to one-third of students. The majority of grants are given to education and technical majors (Informburo, 2018). Over 40% of grant holders are from the vulnerable community.

N.Nazarbayev (2018), former president of Kazakhstan, said that number of universities should be reduced, and we should improve the quality of education. Majority believe that decreasing the number of universities will help the education system.

On the other hand, According to the National Bureau of Economic Research (2016), increases in university presence are positively associated with faster subsequent economic growth. However, the correlation of GDP and quantity of universities is negative (-0,099) in the period of 1991-2020.

Currently, 125 HEIs (Figure 1) and 38470 teaching staff (Figure 2) are in Kazakhstan. The majority of HEIs are concentrated in Almaty city.

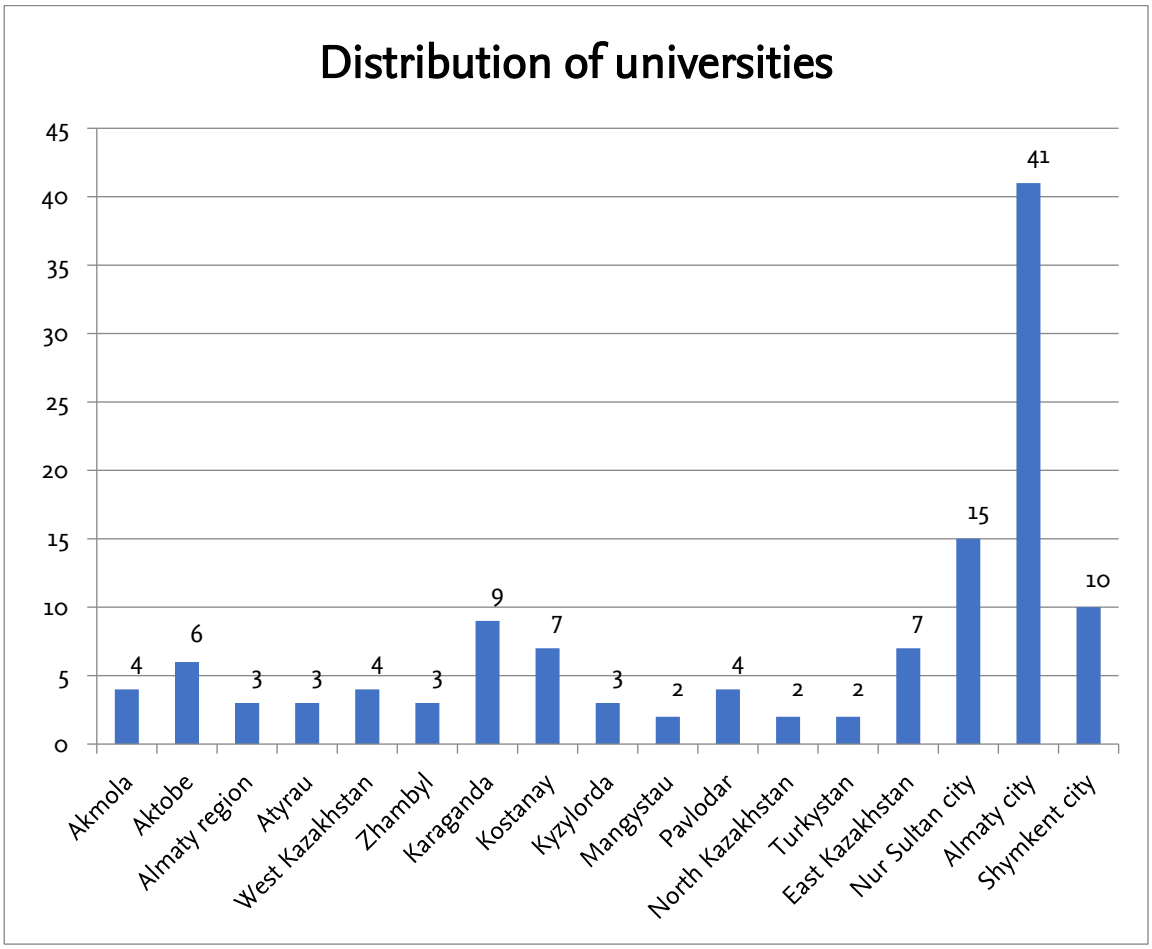

Figure 1 – Distribution of universities-2020

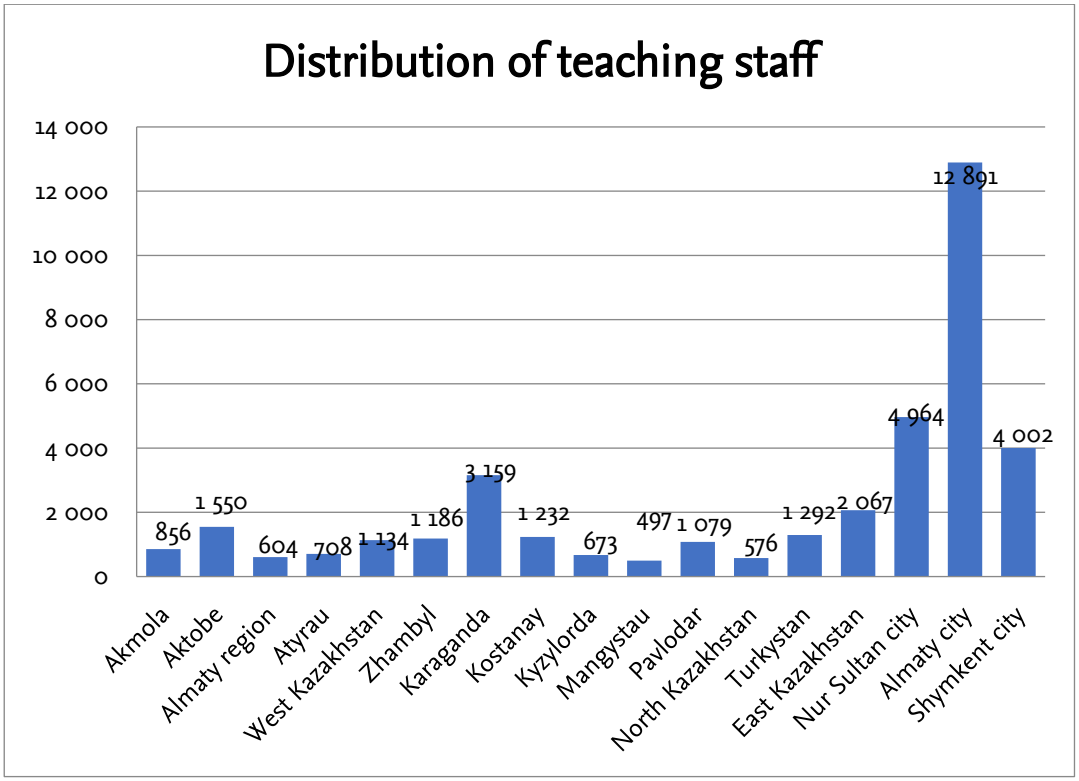

Figure 2 – Distribution of teaching staff -2020

Quality of HEIs could be assessed by employers. According to BCG research (2019), applicants have academic achievement and diligence, but lack of creativity, the ability to structure, synthesize information, presenting themselves, capability to comprehend and network.

For better or for worse, science and technology are powerful agents of change, depending on how they are steered (Global sustainable development report, 2019, p.30). R&D impacts many aspects of social life and changes lifestyle and habits. Innovations influence demand for human resources and lead to structural change. However, only 8542 (22%) of teaching staff are doing researches at HEIs. Expenditure on R&D in 2019 is approximately $195,7 mln, which is 0.13% of GDP. Innovations in computer sciences, artificial intelligence and biotechnologies might provide solutions to the majority of the challenges facing the Sustainable Development Goals.

386 organizations (104 state, 269 private, 13 foreign) 21 843 scientists involved in R&D in Kazakhstan. The quantity of scientists is 852 per million people while in developed countries this indicator varies from 3000 to 7700 per million. However, the quantities of scientists are decreasing each year. Expense on salary in 2017 is approximately $74,9 mln, which indicates $282 as the average wage (Science and innovation of Kazakhstan 2013-2017, 2018).

Expenditure on education is 4-6% less than the recommended budget, which is required to achieve the 4th sustainable development goal. Kazakhstan spent 20% of the general budget of education on higher education. However, according to government statistics (Dynamics of basic socio-economic indicators, 2020), expenditure on education in Kazakhstan is approximately $5,54 bln, ie 3.35% of GDP respectively. In developed countries as the USA (4.99%, 2014), Germany (4.93%-2014), Canada (5.27%, 2011) this indicator is higher (Total government expenditure on education, n.d.).

A challenging problem that arises in this domain is how the education system could handle the Pandemic. To our knowledge, no study has yielded in the discourse of pandemic. To overcome this problem, in the next section we analyse the pieces of evidence of the COVID-19 outbreak, economic and social consequences of closing schools.

Impact of COVID-19 pandemic

Many countries closed schools and universities and transferred students to distance learning as a response to COVID-19. The pandemic changed the ordinary life cycle and produced many challenges and some opportunities, namely, lower quality of education, inequality, technical unreadiness, migration limitations, and economic instability.

94% of students will feel the effect of closing schools (UN,2020). Moreover, as a result of the gap term at school, that caused by quarantine, the average final national test outcomes of graduates in Kazakhstan decreased by 1.1 points (64.6

points-2020, 65.5 points-2020) in comparison with 2019. It means that the level of first-year students is lower than a year ago. First-year students are studying online because of restrictions, that might impact on students' grade or knowledge. Any gap in human capital accumulation that arises today because of the pandemic may have long-lasting effects, not only for countries but also for individuals, as shown by the long-term effects on education and health of children born during the 1918 flu pandemic (World bank, 2020, p. 41).

Tejedor, S., et al. (2021) considered COVID-19 crisis as a possibility to assess ICT skills of teachers and students, as well as, university tools. During Pandemic kazakhstani universities used MS Teams, ZOOM, google classroom, hangout meet, skype, and their platforms as Moodle, Platonus.

UN (2020) has reported that decreasing the level of education as the result of COVID-19 would lead to a lower quality of human capital, and increase inequality among population. The increasing level of inequality in access to high-quality education has risen that increase the gap among students. Probably distant learning would be less effective to all students, although students from the vulnerable population would be even less effective. Only students who have a good connection and the required number of computers and other devices could use the opportunities of online learning. Students from countryside mostly had bad or low-speed Internet. Many lecturers struggled because of lack of ICT skills. (Bokayev, et al. 2021). A. Zhumagaliev(2019), Minister of Digital Development, Innovations and Aerospace Industry of the Republic of Kazakhstan, has announced that 81,3% of the population has access to the internet within the program Digital Kazakhstan, while students complain about the speed and quality of the internet.

Always in Kazakhstan, distance learning makes a challenge for teachers and lecturers, who do not have the required qualification in online teaching, and for students, who don't have access to the internet and computers. Real coverage of education is decreasing because of poor internet connection in the distant country-side. Moreover, students and teaching staff faced cyberattacks, low speed of internet, and freezing of study platforms. Above mentioned issues lead to

insufficient level of education. In addition, distance learning effects on quality of education, because of an insufficient level of education, which lead to economic losses in the future (World Bank,2020).

Education plays a significant role in preparing human for the economically active population of the nation, to improve transfer educational system aims to learn people the required skills. As a result of the pandemic, the negative effect of education might lead to the growing quantity of functionally illiterate students. The skills of graduates will be lower, which might effect their future employment. Negative impact on education and reducing years of learning, lead to diminishing expected income on 2.9%. Economic losses would be up to $1.9 bln. in Kazakhstan (World Bank,2020).

Migration from region to region is complicated because of many restrictions on travel. In Kazakhstan, 604345 students (full-time, part-time, and external) studied at the universities in the years 2019-2020. 564 787 are local, 32 333 from CIS countries, and 7 225 non-CIS countries (304 Afghanistan, 807 China, 4450 India, 228 Jordan, 888 Mongolia, 279 Turkey). 142 762 students graduated from the university in 2019-2020, including 1590 international students. However, most students couldn't continue their studies because of closed borders. According to BridgeU (2020), COVID-19 will impact worldwide student mobility.

COVID-19 outbreak impacts the financial stability of the population. According to the forecast of World Bank(2020) GDP in Kazakhstan will decrease 3% in 2020 and increase 2.5% in 2021. Many people have lost their income because of strict quarantine. The unemployment rate in Kazakhstan has risen and reached 5%, that effect purchasing ability. As a result, 12 360 students took a withdrawal from universities because of financial issues(Higher Educational Institutions of the Republic of Kazakhstan,2020). According to the World Bank evaluation, the level of poverty worldwide might grow from a forecasted 8.3% to 12.7%. It is expected an economic shock for the labour market of Kazakhstan.

Youth unemployment is decreasing from 2001 to 2019, from 16.6% to 3.7% respectively (Figure 3). In the third quarter of 2020 youth employment reached

3.9%. The employment of graduates is 74%, while the average salary is 103285 KZT(approx. $250). As a result of pandemic and lockdown, many universities didn't hold job fair for graduates.

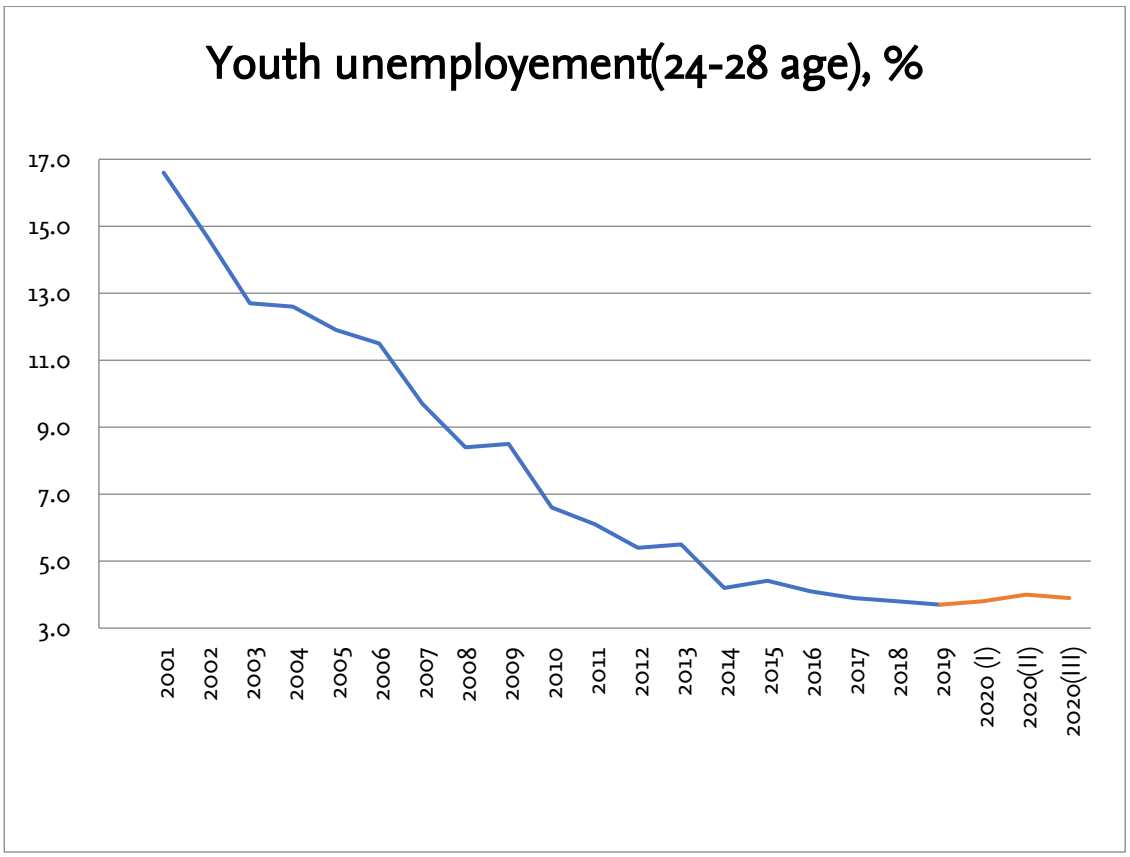

Figure 3 – Youth unemployment (24-28 age), %

Controversially, the opportunities in the digital world appeared as a result of the coronavirus pandemic. COVID-19 opens access to a new perspective for scientists, i.e. ability to participate in online conferences from leading researchers. Also, many universities provide open access to their library sources. The school closures have required students to become more independent in their learning and enhanced teachers' digital skills (Deslandes-Martineau, M., etc., 2020)

In the post-pandemic era, accessibility to education will be easier and education will be cheaper.

Regression modelling

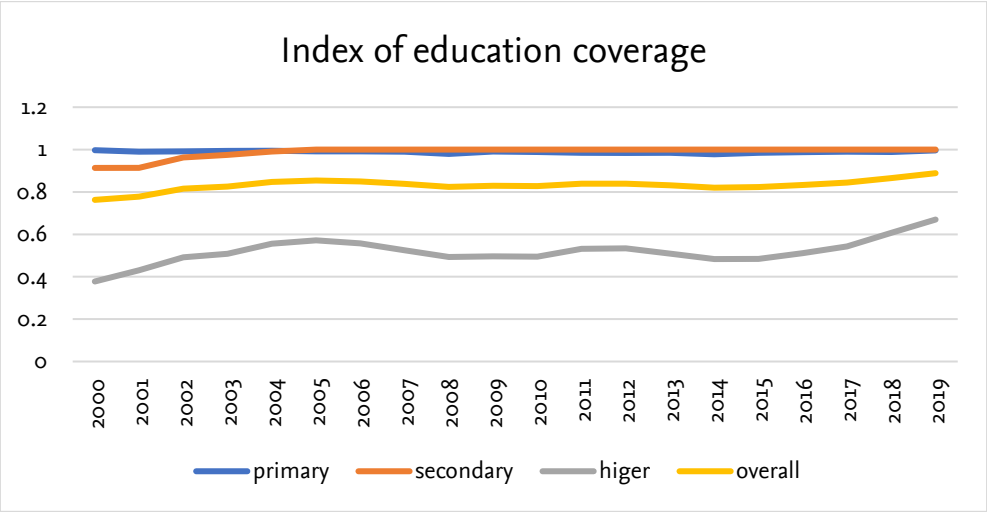

Figure 4 – Index of educational coverage in Kazakhstan

The index of coverage in primary education is almost 1, secondary education is 1, while the higher education index is rising and reached 0,66 in 2019 (Figure 4). An increase in involvement in higher education leads to a growing skilled working force in the future.

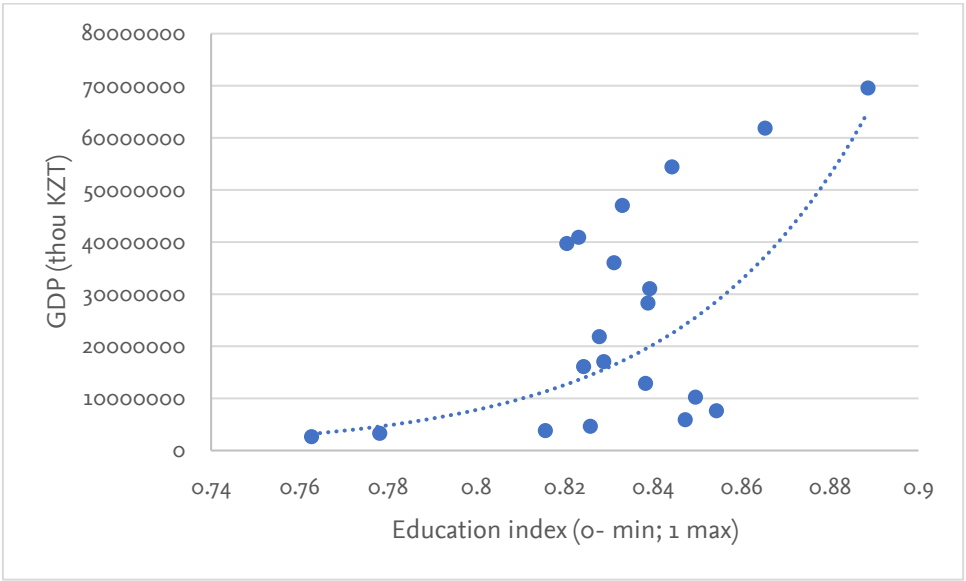

Figure 5 – Scattered plot: correlation of GDP and Index of education coverage in Kazakhstan 2000-2019

According to Figure 5 and table 1, GDP and index of education coverage correlated moderately positively.

Table 1. Correlations

		GDP	IEd
Pearson Correlation	GDP	1.000	.664
	IEd	.664	1.000
Sig. (1-tailed)	GDP	.	.001
	IEd	.001	.
N	GDP	20	20
	IEd	20	20

According to Table 1, analysis indicates strong correlation between GDP and index of education.

Table 2. Model Description

Model Name		MOD_12
Dependent Variable	1	GDP
Equation	1	Quadratic
Independent Variable		IEd
Constant		Included
Variable Whose Values Label Observations in Plots		Unspecified
Tolerance for Entering Terms in Equations		.0001

We made quadratic regression analysis based on the education coverage index and GDP (mln KZT). Statistical data is studied in a period from 2000 to 2019, with 20 total cases. Index of education is considered as independent variable, while GDP is dependent (Table 2).

Table 3. Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.719	.517	.460	15395237.155

The independent variable is IEd.

51,7% of our values fit the regression analysis model. In other words, 51,7% of the dependent variables (GDP) are explained by the independent variables (index of education coverage) (Table 3). And 48.3% of the variation is caused by factors other than the predictors included in this model.

Table 4. ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	431108469000 8971.500	2	2155542345004485.800	9.095	.002
Residual	4029226559914684.500	17	237013327053804.970		
Total	8340311249923656.000	19			

The independent variable is IEd.

The ANOVA Table 4 reports p-value is .002, that is less than .05 or 5% therefore the overall model is a statistically significant.

Conclusion

COVID-19 has changed the life routine of ordinal students and universities. The lessons of the pandemic should teach how to overcome future pandemic. According to Merkus and Schafmeister (2021) there is no evidence that the outcome of online tutoring is worse than face-to-face education. However, lack of IT technologies, internet and ability to study at home may affect on results of studies. The results of gap years during the pandemic will impact future losses because of the low level of literacy of students. GDP and education coverage correlated strongly (0,664). 51,7%

of the GDP are explained by the index of education coverage. Output of education impacts on economic sustainability of country. Higher education enrollment may decrease as a result of the absence of personal computers, laptops, which means that a more illiterate population. Pandemic will impact on human capital negatively.

HEIs should be ready for any external shocks that may interrupt traditional tutoring. Therefore, universities didactic portals and ICT skills of teaching staff and students must be at a high level to overwhelm external shocks that may affect on education system. Some HEIs were not ready to transfer tutoring from traditional to the online format, students don't get high-quality education. Distance learning may become a key to solve issues of transferring from offline to online tutoring.

It is known that youngsters communicate a lot with their peers, that is why there should be taken some measures to reduce infection transition as routine immunisation, high standards of personal hygiene and practice, particularly handwashing, and maintaining a clean environment. Pandemics may be extremely contagious thereby physical distancing should become a daily routine and part of the culture. Good ventilation and sanitization of university facilities should be also one of the priorities to reduce cases of infections among youngsters. Introducing 'Ashyk' application to enter the building of the university is one of the ways to reduce infection among students.

However, coronavirus opened opportunities to scientists and universities. Researchers can participate in the conferences and workshops distantly. The digital skills of students, teachers, researchers are expanding. The closure of universities led to the development of online teaching, so in the post-pandemic era, accessibility to education will be easier and education will be cheaper.

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