Статистика, учет и аудит, 2(93)2024. стр. 76-88
DOI: https://www.doi.org/10.51579/1563-2415.2024.-2.06

Economics and Management
UDC 331.5 (574)
SRSTI 06.77.01

THE EMPLOYMENT OF UNIVERSITY GRADUATES IN KAZAKHSTAN: POSSIBLE ECONOMIC EFFECT AND TRIPLE HELIX MODEL

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Abstract. *University graduates are part of the country's intellectual potential and their employment contributes to the socio-economic development of the country. This study aims to analyze the possible economic effect of employment of university graduates in Kazakhstan and define opportunities for Triple Helix Model implementation. To achieve the research aim, an autoregressive distributed lag model of the effect of the number of graduates on GDP per capita was used. Information base of the study was a secondary data of Kazakhstan's Bureau of national statistics from 2000 to 2021. According to the results of the study, an increase in the number of university graduates has influence on the economic progress of Kazakhstan. So, a 1,000-person increase in graduates improved GDP per capita by $55 in the current year, while a 1,000-person increase in graduates three years ago increased the GDP per capita by $58 in the current year. The practical value of the study is to justify the need to apply the Triple Helix approach in managing the employment of university graduates in Kazakhstan.*

Keywords: *Education, Unemployment, Employability, Labor market, Economic development, Youth, Autoregressive model.*

Introduction. Education helps to increase the country's intellectual potential and develop human capital [1, p. 48]. Human capital serves as the fundamental foundation for achieving sustainable development across various levels, including the macro, intermediate, and micro levels [2, p. 1]. The human capital endowment of a nation, referring to the talents and capacities possessed by its population and utilized for productive purposes, can play a more significant role in determining its long-term economic performance than almost any other resource [3, p. 92]. University graduates are important part of the country's human capital, intellectual potential and human resources potential. So, their employment is one of the main directions of public policy. And governments worldwide have, to varying degrees, imposed the employability of graduates on national higher education systems [4, p. 4].

The government of Kazakhstan, represented by the Ministry of science and higher education, implements various measures that contribute to the employment of university graduates. To promote the employment of university graduates, the programs «Mangilik el

Cite this article as: Sekerbayeva A., Tamenova S., Satpayeva Z., Kangalakova D. The employment of university graduates in Kazakhstan: possible economic effect and triple helix model. *Statistics, accounting and audit.* 2024, 2(93), 76-88. DOI: https://www.doi.org/10.51579/1563-2415.2024.-2.06

zhastary – industriaga (The youth of eternal nation – into the industry)!» («Serpin»), «With a diploma – to the village!» and other programs. During the academic year, universities, in collaboration with regional employment departments, and youth public organizations, hold job fairs, forums, and meetings and conclude contracts and memorandums for internships with further guaranteed employment. On the Electronic Labor Exchange portal (https://enbek.kz/kk), the Ministry of labor and social protection of the population of the Republic of Kazakhstan has introduced functionality for the personal distribution of university graduates online. In 2020, more than 19,000 job advertisements from employers were posted on the portal, of which 11,746 were for university graduates.

The government of Kazakhstan made significant measures throughout the pandemic, and all employment-related tasks for graduates were conducted online in Kazakhstan. In that period, a total of 116 job fairs took place, about 200 meetings attended by more than 100,000 third- and fourth-year university students, as well as representatives of more than 2,000 thousand educational institutions, enterprises, and companies. So, based on the published report on the implementation of the strategic plan for 2020–2024 [5], the share of employed graduates studying under the state order in the first year after graduation was 70.2%, which reached the target of the Ministry. But, it should be noted that in Kazakhstan's university graduates are a vulnerable social group: among the registered unemployed with higher education, most are recent graduates of educational institutions or young people aged 22–29 years [6, p. 87].

Main provisions. Solving the problem of unemployment of university graduates will help improve their well-being, since individuals who completed high school and earned a bachelor's degree experienced various economic advantages, such as higher average incomes, increased chances of having health insurance coverage, a reduced likelihood of relying on public assistance, greater job satisfaction, and a more robust perception of the correlation between higher education and employment-related benefits [7, p. 29]. The presence of a positive economic effect from the employment of university graduates will help to justify the importance of this area in public policy and will contribute to increasing the employment of graduates and improving their quality of life. This study aims to analyze the economic effect of employability of university graduates in Kazakhstan. This research answers on following questions: What is the possible economic effect of employing university graduates? How to develop the employment of university graduates in Kazakhstan?

Literature review. Although numerous studies demonstrate a positive association between higher education and economic growth [8, p. 32], only some have demonstrated a negative correlation [9, p. 39] or no significant impact [10, p. 759]. In contrast, a few studies demonstrated no evidence of the relationship between education and economic growth [11, p. 33] or no direct impact, considering the assessment measures were unrelated to economic growth [12, p. 538].

Wherein, these causal/relational evaluations utilize unique methodologies and human capital indica-tors. For instance, in research on ASEAN-5 countries (i.e., Thailand, Indonesia, Malaysia, Singapore, and the Philippines) regarding the impact of higher education on economic growth during 2000–2018, Maneejuk and Yamaka [13, p. 9] used a number of assessment measures, namely, public expenditure on tertiary education per student, enrolment rates at primary, secondary, and tertiary levels, educated workforce, and the correlation coefficient the novelty of unemployment rates with advanced education. Their assessment indicators are among the most objective and comprehensive for analyzing the impact of higher education on economic growth. Macroeconomic data also was used by Bah [14, p. 4] to examine the impact of education on the economic growth in 89 countries across the world.

Grdinić [15, p. 106] states that the growth of GDP is also influenced by the number of researchers and a workforce that has achieved tertiary education. In addition, according to Martin [16, p. 677], universities have a dynamic impact on the size and sources of a country's gross domestic product (GDP) through their graduates and the research of their renowned professors. While most studies examine the number of students enrolled but do not consider the number of graduates, which is essential for assessing the impact of higher education on economic growth. It should be noted that higher education has a direct influence on individuals' human capital and indirect effects on employment rates resulting from increased participation and employability of individuals with higher education qualifications [17, p. 1620]. But holding a bachelor's degree or diploma from a university does not guarantee future employment. Due to an excessive number of university graduates in the labor market, limited job prospects, and intense competition for employment, possessing a diploma merely confer a relative edge over individuals lacking a degree or lower educational qualifications [18, p. 10].

According to the analysis of the available literature, the overwhelming majority of research examining the influence of universities on economic growth considers the enrollment figures of students in these institutions. However, there a few studies that accounted for the number of university graduates in a country and the impact on the country's GDP.

Materials and methods. To assess the possible economic effect of employing university graduates, a linear model of the effect of the number of graduates on GDP per capita was adopted for macro-modeling with using the data of the general population. In addition to the current values of the number of graduates, the possibility of using their lag values, that is, the values of variables with a delay of one or more periods, in this case, years, was considered. So, to assess the possible economic effect of employing university graduates, the ARDL (autoregressive distributed lag) model was applied.

The ARDL model demonstrates that if, at some point in time t, there is a change in the independent variable x, then this change will affect the values of the variable y for several time lags. The time lag is the delay between cause and effect, distributed over time. The reason for the appearance of a delay between cause and effect in economic processes is often the slowness of the reaction of the economic system, which responds to the impact of incentives after a specific time rather than immediately. The ARDL model itself has the following theoretical form:

$$Y_t = \delta + \alpha_0 X_t + \beta_1 Y_{t-1} + \varepsilon_t, \quad (1)$$

where

Y_t is a dependent variable;

X_t is an independent variable;

α_0 is a coefficient characterizing a short-term average absolute change in a variable Y_t when X_t changes by 1 unit of its measurement at a specific fixed time t, without accounting for the impact of the lag values of the X factor. This ratio is called the short-term multiplier;

β_1 is a coefficient characterizing the change in a variable Y_t at the current time t under the influence of its change at the previous time $t + 1$;

ε_t is a random variable/random term (errors).

By the time $t + 1$, the result of y_{t+1} changes under the influence of its fluctuation at the immediately preceding time by β_1 units. The total absolute change in the result at time $t + 1$ is $\alpha_0\beta_1$ units. Likewise, at time $t + 2$, the absolute change in the result will be $\alpha_0\beta_1^2$ units, and so on. The sums obtained in this way are called intermediate multipliers. Therefore, the long-term multiplier in the autoregressive model can be calculated as the sum of the short-term and intermediate multipliers:

$$\alpha = \alpha_0 + \alpha_0\beta_1 + \alpha_0\beta_1^2 + \alpha_0\beta_1^3 + \cdots, \quad (2)$$

where

α is a long-term multiplier, which denotes the absolute change in the long-term period $t + l$ of the result of Y under the influence of a change in the lag values of Y by 1 unit. If the coefficient in the lag regressor demonstrates statistical significance, one can conclude that the response variable is due to the values that the factors took several periods ago.

The initial data for macro-modeling were taken from the Bureau of national statistics of Agency for strategic planning and reforms of the Republic of Kazakhstan website (http://stat.gov.kz) from 2000 to 2021, which is depicted in table 1. In addition to the initial indicators, lag values of the number of graduates were employed to select the model since the number of graduates can affect the volume of GDP not in the same period but with some delay.

Table 1 - Initial variables

Year	GDP per capita (USD)	Number of higher education graduates, people
2000	1,229	64,568
2001	1,491	73,862
2002	1,658	87,138
2003	2,068	102,681
2004	2,874	123,920
2005	3,771	154,193
2006	5,292	165,640
2007	6,772	178,485
2008	8,514	196,685
2009	7,165	176,016
2010	9,071	161,964
2011	11,635	160,934
2012	12,387	171,609
2013	13,891	172,810
2014	12,807	177,678
2015	10,510	147,184
2016	7,715	138,004
2017	9,248	127,084
2018	9,813	130,691
2019	9,813	142,435
2020	9,122	153,627
2021	10,370	151,679

Macro-modeling was performed in the EViews econometric analysis package, which has the necessary built-in tests to check the adequacy of the model. The program allows us to automatically determine the optimal lag length by calculating dozens or hundreds of models. Akaike information criterion (AIC) was used for choosing the optimal model. The smaller the criterion value, the better the corresponding model. The values of the Akaike criterion are demonstrated in figure 1.

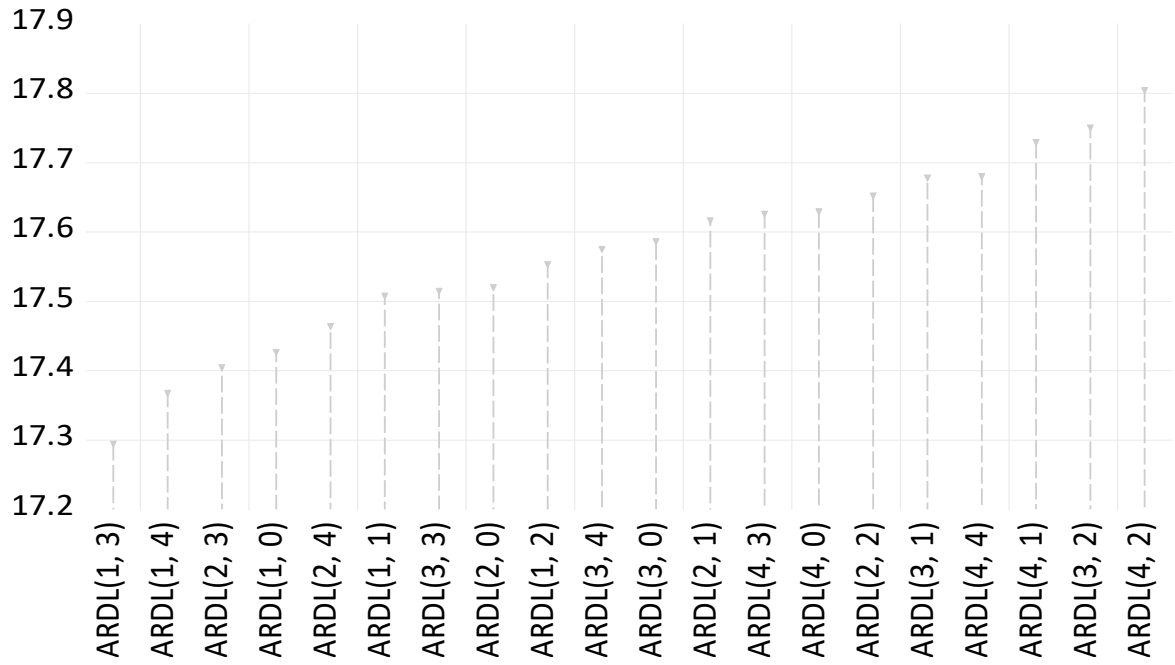

Figure 1 - AIC (top 20 models)
Note - Compiled by the authors by Eviews12

As a result of a search of hundreds of autoregressive distributed lag (ARDL) models, the ARDL (1, 3) model was defined, with one lag of the dependent variable and three lags for the number of university graduates. The coefficient of the number of graduates, which characterizes the influence of the variable in the short term or at the current moment, showed a statistically significant result, as did the coefficients for the lag values of the dependent variable and the variable for the number of university graduates. The final equation sample is larger than the selection sample. So, the ARDL equation of the model is as follows:

$$GDP\_USD = \beta_0 + \beta_1 GDP\_USD_{t-1} + \beta_2 GRADUATES + \beta_3 GRADUATES_{t-1} + \beta_4 GRADUATES_{t-2} + \beta_5 GRADUATES_{t-3} + \varepsilon_t \quad (3)$$

In addition to the direct computation of the parameters of the regression model, it is necessary to check the resulting model for adequacy after their calculation. It is done using specially designed statistical tests that test the residuals of the model, which are the difference between the actual and predicted values of the dependent variable, for autocorrelation (Breusch–Godfrey serial correlation LM test), heteroscedasticity (Breusch–Pagan–Godfrey heteroskedasticity test), and compliance with the normal distribution (Jarque–Bera test). When the tests do not reveal problems with autocorrelation or heteroscedasticity, such a

model can be used for forecasting since the regression coefficients in such a model take consistent, effective, and unbiased estimates of the regression coefficients.

Results. Macro-modeling showed that university graduates and GDP per capita have positive correlation, that is, the more university graduates graduated in the current year, the higher the value of GDP per capita (table 2).

Table 2 - Results of macro-modeling

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP_USD (−1)	0.640134	0.120915	5.294090	0.0001
GRADUATES	0.055403	0.025119	2.205672	0.0460
GRADUATES (−1)	−0.025961	0.036178	−0.717580	0.4857
GRADUATES (−2)	−0.044018	0.036494	−1.206160	0.2492
GRADUATES (−3)	0.057512	0.023829	2.413514	0.0313
C	−3001.116	1962.376	−1.529328	0.1501
R-squared	0.910221	Mean-dependent variable		8570.247
Adjusted R-squared	0.875691	SD-dependent variable		3297.845
Standard error of regression	1162.736	AIC		17.20703
Sum-squared residues	17575406	Schwarz criterion		17.50527
Log-likelihood	−157.4668	Hannan–Quinn criterion		17.25750
F-statistic	26.36016	Durbin–Watson statistics		2.031533
Probability (F-statistic)	0.000002			

*Note - Dependent variable, GDP_USD; sample (adjusted), 2003–2021; included observations, 19 after adjustments; maximum dependent lags, 4 (automatic selection); model selection method: AIC; dynamic regressors (4 lags, automatic), graduates; fixed regressors, C; number of models evaluated, 20; selected model, ARDL (1, 3); *p-values and any subsequent tests do not account for model selection.*

Alternatively, with the calculated values of the coefficients in the following form:

$$GDP\_USD = -3001.116 + 0.640134 * GDP\_USD(-1) + 0.055403 * GRADUATES - 0.025961 * GRADUATES(-1) - 0.044018 * GRADUATES(-2) + 0.057512 * GRADUATES(-3) \quad (4)$$

The lagged value in 1 period of the dependent variable positively affects the current value of GDP. The regression coefficient of the short-term multiplier for the variable with the number of graduates has a positive sign. So, an increase in the number of graduates by one person currently increases GDP per capita by USD 0.055403. The regression coefficient for a variable with a lag of three years is also statistically significant. It has a positive sign, that is, the higher the number of university graduates three years ago, the higher the value of GDP per capita. An increase in the number of graduates by one person increases the GDP per capita by USD 0.057512.

The adjusted R-squared value is 0.875691, which means that the model explains 87.57% of the variation in the dependent variable. Such a high explanatory power of the model is depicted in the following Figure 2, which shows that the actual and forecast values of GDP almost coincide entirely. The residuals of the model fluctuate around zero.

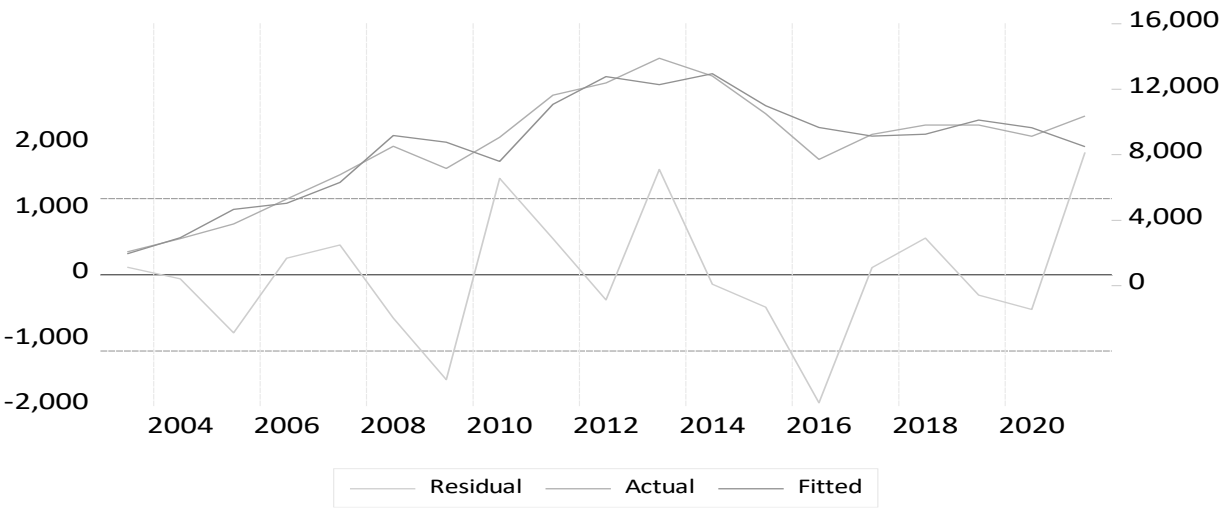

Figure 2 - Actual and predicted values of the dependent variable and residuals of the model
Note - Compiled by the authors

In order to utilize the resultant model, it is imperative to assess the model's appropriateness. The adequacy of the model was checked by statistically testing the model's residuals for the absence of serial correlation and heteroscedasticity effects in them and their compliance with the normal distribution law.

The Breusch–Godfrey statistical test was applied to check for autocorrelation. The test results for autocorrelation are presented in table 3.

Table 3 - Breusch–Godfrey serial correlation LM test results

Variable	Value	Variable	Value
F-statistic	2.640318	Prob. F (4,12)	0.0862
Obs*R-squared	8.426072	Prob. Chi-Square (4)	0.0772
Note - Null hypothesis: no serial correlation at up to four lags			

The value of the F-statistic of the test was 2.64, which corresponds to a probability of 0.086, which means that there is no autocorrelation effect in the distribution of residuals.

The Breusch–Pagan–Godfrey test was applied to examine the presence of heteroscedasticity in the model's residuals. The test results for heteroscedasticity are shown in table 4.

Table 4 - Results of the Breusch–Pagan–Godfrey heteroskedasticity test

Variable	Value	Variable	Value
F-statistic	1.756109	Prob. F (1,16)	0.2037
Obs*R-squared	1.780230	Prob. Chi-Square (1)	0.1821
Scaled explained SS	1.029718	Prob. Chi-Square (1)	0.3102
Note - Null hypothesis: homoskedasticity.			

The value of the F-statistic of the test was 1.76, which corresponds to a probability of 0.2, indicating the absence of heteroscedasticity in the distribution of model residuals.

Next, to check if the residuals fit the normal distribution, the Jarque–Bera test was employed. The value of the statistic was 0.2475, which corresponds to a probability of 0.884.

It suggests that the residuals are normally distributed. The normal distribution test results are illustrated in Figure 3.

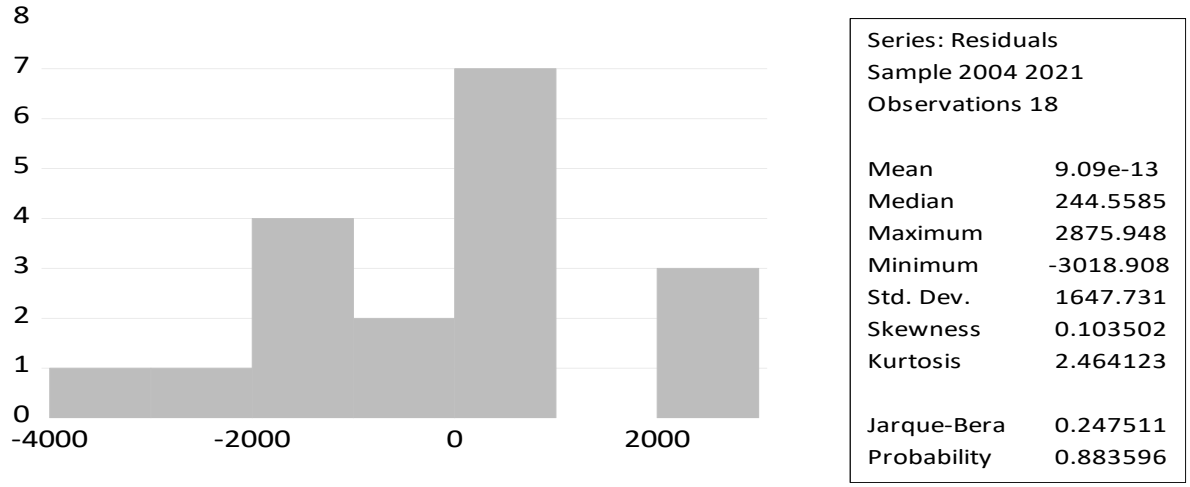

Figure 3 - Normal distribution test results
Note - Compiled by the authors

Thus, macro-model revealed that in Kazakhstan higher education was a factor that positively impacted economic growth. So, the employing university graduates has a positive economic effect. So, a 1,000-person increase in graduates improved GDP per capita by $55 in the current year, while a 1,000-person increase in graduates three years ago increased the GDP per capita by $58 in the current year.

Discussion. According to the ARDL model results, higher education positively influences economic growth. The lagged effect of changes in the number of university graduates on GDP per capita underscores the long-term nature of this relationship. The findings align with existing literature [16-17] that educated youth and higher education contribute to a country's economic prosperity.

So, it is necessary to develop and improve the mechanisms for employing university graduates. One of these mechanisms can be the use of the triple helix model. The Triple Helix Model assumes the university–industry–government interaction as interdependent and considers the three organizations as relatively equal institutional domains that overlap and assume the role of the other. Triple helix collaboration can be implemented in different ways, both trilateral and bilateral. Government programs and their policies assist universities or different cooperation forms of university and industry. So, industry (enterprises) is the main consumer of the labor of university graduates. Universities enhance the employability of graduates ensuring their effective training for industry. When it comes to developing training and research, the industry often performs at the same high level as universities [19, p. 198]. Government programs and their policies assist universities or different cooperation forms of university and industry through financial programs and regulatory adjustments. It can also identify intermediary organizations for fostering collaboration between universities and industries.

But in Kazakhstan old linkages between academia and industry were severed after the fall of the Soviet Union, while new ones have not been forged yet. Furthermore, government, academia, and business interactions have yet to be viable. In most instances, such interactions are unequal, resembling vertical subordination, with the government holding a dominant position and providing minimal feedback. Businesses and academia mostly establish links

indirectly through the government [20, p. 169]. The affected parties in this situation are graduates of universities who find themselves confronted with the issue of unemployment.

Thus, trilateral interactions on employment of university graduates should take place at a high level of model implementation. Universities should train specialists on the order of the state, focusing on the demands of the labor market. Furthermore, universities can be sources of innovation and scientific discoveries. They should commercialize their scientific activities into an attractive product from a market point of view, monetize R&D, create their own companies, and support the population and business. Businesses, in turn, should seek help from universities, apply their developments, and purchase their products and services. Triple Helix model is an effective management tool for implementation of concerted efforts from universities, businesses, and the government on employment of university graduates. In this regard, there arises the need for more prior research on implementation this model in field of employment of university graduates in Kazakhstan. One direction for further research could be to conduct relevant officials for interviews to define the priorities and mechanisms for effective collaboration among stakeholders.

Conclusion. This study aims to analyze the possible economic effect of employment of university graduates in Kazakhstan and define opportunities for management.

Kazakhstan government sets tasks to promote the employment of university graduates and takes measures to achieve them through the development and implementation of various programs. It is essential to acknowledge that this mainly pertains to students enrolled in state-funded educational programs. The importance of employing university graduates is emphasized by the fact that higher education constitutes a pivotal element in a nation's economic progress. So, the number of university graduates have a positive impact on the country's economy.

University graduates represent highly intelligent human resources potential. And in connection with the fact that their participation in the labor market has positive economic impact, it is necessary to build it up and work on its implementation. Although the state is reforming the situation with the graduates' employment, it still needs to be improved. It requires improvement of mechanisms for employing university graduates, including through Triple Helix Model. This collaboration between university (academia), industry, and government will contribute to enhancing students' readiness for the job market, fostering industry-academic partnerships, and aligning curricula with industry needs. So, there is need for additional research and initiatives the government, universities, and industry run to address graduate employability.

Acknowledgments. The article was prepared within the framework of the grant funding project of the Ministry of Science and Higher Education of the Republic of Kazakhstan (AP19680246 «Building up highly intelligent human resources in the conditions of digitalization of the economy of Kazakhstan: problems and prospects»).

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ҚАЗАҚСТАНДА УНИВЕРСИТЕТ ТҮЛЕКТЕРІН ЖҰМЫСПЕН ҚАМТУ: ЭКОНОМИКАЛЫҚ ТИІМДІЛІК МҮМКІНДІГІ МЕН ҮШТІК СПИРАЛЬ МОДЕЛІ

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Түйін. *Жоғары оқу орындарының түлектері елдің интеллектуалды әлеуетінің бір бөлігі болып табылады және оларды жұмысқа орналастыру елдің әлеуметтік-экономикалық дамуына ықпал етеді. Бұл зерттеудің мақсаты Қазақстанда университет түлектерін жұмысқа орналастырудың ықтимал экономикалық әсерін талдау және үштік спираль моделін іске асыру мүмкіндіктерін анықтау болып табылады. Зерттеу мақсатына жету үшін университет түлектер санының жан басына шаққандағы ЖІӨ-ге әсерін бағалау үшін үлестірілген кідірісі бар авторегрессиялық модель қолданылды. Зерттеудің ақпараттық базасы 2000-2021 жылдар аралығындағы Қазақстан Ұлттық статистика бюросының екінші ретті деректері болды. Зерттеу нәтижелеріне сәйкес, университет түлектері санының артуы Қазақстанның экономикалық прогресіне әсер етеді. Мәселен, түлектер санының 1000 адамға артуы жан басына шаққандағы ЖІӨ-ді ағымдағы жылы 55 долларға арттырды, ал үш жыл бұрын 1000 адамға шаққандағы түлектер санының артуы ағымдағы жылы жан басына шаққандағы ЖІӨ-нің 58 долларға өсуіне ықпал етті. Зерттеудің практикалық құндылығы Қазақстанның жоғары оқу орындарының түлектерін жұмысқа орналастыруды басқаруда «үштік спираль» тәсілін қолдану қажеттілігін негіздеу болып табылады.*

Түйін сөздер*: білім, жұмыссыздық, жұмыспен қамту, еңбек нарығы, экономикалық даму, жастар, авторегрессивті модель.*

ISSN: 1563-2415 (Print), ISSN: 2959-0469 (Online)

ТРУДОУСТРОЙСТВО ВЫПУСКНИКОВ ВУЗОВ В КАЗАХСТАНЕ: ВОЗМОЖНЫЙ ЭКОНОМИЧЕСКИЙ ЭФФЕКТ И МОДЕЛЬ ТРОЙНОЙ СПИРАЛИ

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Резюме. *Выпускники вузов являются частью интеллектуального потенциала страны, и их трудоустройство способствует социально-экономическому развитию страны. Целью данного исследования является анализ возможного экономического эффекта от трудоустройства выпускников вузов в Казахстане и определение возможностей реализации модели тройной спирали. Для достижения цели исследования была использована авторегрессионная модель с распределенным лагом для оценки влияния количества выпускников на ВВП на душу населения. Информационной базой исследования послужили вторичные данные Бюро национальной статистики Казахстана за период с 2000 по 2021 год. Согласно результатам исследования, увеличение числа выпускников вузов влияет на экономический прогресс Казахстана. Так, увеличение числа выпускников на 1000 человек увеличило ВВП на душу населения на 55 долларов в текущем году, а увеличение числа выпускников на 1000 человек три года назад способствовало росту ВВП на душу населения в текущем году на 58 долларов. Практическая ценность исследования заключается в обосновании необходимости применения подхода «Тройной спирали» в управлении трудоустройством выпускников вузов Казахстана.*

Ключевые слова: *образование, безработица, трудоустройство, рынок труда, экономическое развитие, молодежь, авторегрессионная модель.*

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Received: 28.05.2024
Accepted: 19.06.2024
Available online: 30.06.2024