"Analysis of employment factors for university graduates in Kazakhstan"

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BUSINESS PERSPECTIVES

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ANALYSIS OF EMPLOYMENT FACTORS FOR UNIVERSITY GRADUATES IN KAZAKHSTAN

Abstract

Having a university degree provides only a slight advantage over those without higher education, making other factors crucial in determining a graduate's employment prospects. This study aims to analyze the factors that affect the employment of university graduates and define opportunities for public administration and university management in Kazakhstan. A logistic regression model based on primary data was used to examine the impact of the availability of practical experience and jobs in their specialty, social connections, technology development, and entrepreneurship on the likelihood of employment. The survey was conducted in 2022 and involved 300 graduates of the 2020–2021 academic year from all regions of Kazakhstan. Findings show that personal connections (F3) and technology and entrepreneurship (F4) positively impact graduates' job prospects. However, lack of experience (F1) and the limited number of job offers (F2) reduce employment likelihood. If a graduate responds with 3 points for F1, 7 for F2, 7 for F3, and 1 for F4, they are less likely to secure a job in their specialty within a year of graduation. The main practical value of this study is that university career centers can use this model to predict the likelihood of graduates being employed. Providing a sophisticated online platform and different analytics-driven career services, open access to administrative data on the labor market, and new programs for students' job experience and entrepreneurship will prepare university graduates for a dynamic labor market and reduce the mismatch between education and employment needs.

Keywords	youth, unemployment, employability, employability factors, labor market, university career center
JEL Classification	E24, I25, J60

INTRODUCTION

The labor market's insecurity and uncertainty affect all employees, regardless of their level of competence. It implies that economic uncertainty and job losses have affected employees of all ages and organizational levels (Boisjoly et al., 1998; Brown et al., 2006; Feldman & Leana, 2000; Polsky, 1999; Smith, 2010; Sullivan & Baruch, 2009; U.S. Department of Labor, 2010). Nevertheless, it has a greater impact on young individuals (CIPD, 2015). Thus, according to the World Bank (2024), the youth unemployment rate has increased from 2000 to 2023, from 13.1% to 14.3%. The global financial crisis and the COVID-19 pandemic had a significant impact on the growth of this indicator. In 2020, youth unemployment rate peaked at 17.2%. The youth unemployment rate varies significantly across different countries and regions. In 2023, the highest youth unemployment rate was in Djibouti (76.9%), and the lowest was in Niger and Qatar (0.6%).

In Kazakhstan, in 2023, it was 3.6%, having decreased significantly compared to 2000 (22.8%). It indicates an improvement in the labor market conditions for the Kazakhstani youth, including the implemented State program for the development of productive employment

and mass entrepreneurship for 2017-2021 "Enbek" (Government Decree, No. 746, as of November 13, 2018). However, a national report issued in 2021 provided information about the employment of university graduates. The data indicate that most registered unemployed individuals with higher education are either recent graduates of educational institutions or young adults between the ages of 22 and 29 (Molchanovskaya, 2021). At the same time, according to the Concept for the development of the labor market of the Republic of Kazakhstan for 2024–2029 (Government Decree, No. 1050, as of November 29, 2023), it is expected that by 2030, the annual influx of youth into the labor market will be over 300 thousand people due to demographic growth at the beginning of 2000th. High demographic pressure on the labor market will lead to increased unemployment, especially among young people. In this regard, one needs measures to develop human capital, stimulate demand for quality jobs, and create conditions for an effective connection between the economy and the human capital development system to match supply and demand.

Youth employment is one of the main directions of the Concept of state youth policy of the Republic of Kazakhstan for 2023–2029 (Government Decree, No. 247, as of March 28, 2023). Thus, the target indicators of this concept are as follows: increasing the number of employed youths to 2.3 million people and increasing the share of young entrepreneurs to 20%. To effectively manage the employment of university graduates, it is necessary to substantiate the importance of this process by identifying the influencing factors.

1. LITERATURE REVIEW AND HYPOTHESES

Holding a bachelor's degree or diploma from a university does not guarantee future employment. Due to an excessive number of university graduates, limited job prospects, and intense competition for employment, possessing a diploma merely confers a relative edge over individuals lacking a degree or lower educational qualifications (Jonbekova, 2020). Therefore, other factors determine graduates' employment, such as a lack of work experience. The shift from academics to the workforce is a crucial stage in a graduate's life, and the availability or lack of practical experience can greatly affect their ability to find employment and their following rates of unemployment (Brown et al., 2004). Work experience is crucial in determining the speed at which graduates can obtain employment. It is essential to cultivate career-related experience in order to secure employment (Pauw et al., 2008; Helyer & Lee, 2014; Reddy, 2019). Therefore, a lack of work experience is a primary cause of unemployment among recent college or university graduates.

Another one is a mismatch between the quality of education and the demands of employers. Sedlan-König et al. (2018) state a moderate level of agreement between graduates and employers regarding the essential abilities and qualities that contribute to employability. Both place a high level of importance on the willingness to learn and problem-solving skills; they agree that practical experience, topic knowledge, and utilization of social networks do not significantly contribute to employability. Employers place a higher value on learning skills, enthusiasm, motivation, and intelligence compared to the level of importance that graduates attribute to these qualities. However, graduates believe that possessing a good attitude toward change, proficient written communication abilities and effective public speaking skills significantly enhance one's prospects in the future labor market. Zhang (2018) shows that the post-graduation outcomes and employability of students are greatly influenced by the duration of their academic program, the average score achieved in their graduate courses, the level of guidance received from their mentors, and the quality of their graduate theses. Othman et al. (2018) have delineated seven determinants that affect the employability of graduates: age, faculty affiliation, field of study, co-curricular involvement, marital status, industrial internship experience, and English proficiency. Various personal factors, such as intellectual potential, personal skills, soft skills, generic skills, self-esteem, adaptability, and motivation, significantly contribute to graduates' employability. These factors encompass an individual's attri-

butes, attitudes, and behaviors, which can exert an influence on their success in the job market (Teijeiro et al., 2013; Suarta et al., 2017; Graham et al., 2019; Pilav-Velic et al., 2020; Halim et al., 2022; Mseleku, 2022; Omar et al., 2022; Thi Quynh Lan, 2022; Hosain et al., 2023; Kangalakova et al., 2023). In addition to personal qualities and professional skills, the employability criteria are influenced by many background characteristics of employers, as well as the nature, size, and ownership structure of the organization, which may be categorized as family-owned, publicly-owned, or government-owned (Al-Mutairi et al., 2014). In addition, it is worth mentioning the availability of jobs and the employment system (Shui, 2018). Another factor of preventing unemployed graduates from entering the labor market is the scarcity of appropriate job opportunities (Jamaludin et al., 2021).

Some studies emphasize the role of entrepreneurship education in improving the comprehensive abilities of students and cultivating innovative entrepreneurship consciousness among students. It is vital to support entrepreneurship as a strategy to decrease graduate unemployment (Olanrewaju et al., 2013; Nwabufo & Mamman, 2015; Chen & Zhang, 2020; Yatich, 2022; Rahaman & Podder, 2023). Entrepreneurship education in itself is insufficient to initiate business ventures or address the issue of unemployment effectively. Nonetheless, it can provide students with skills that enhance their employment (Fosu & Boateng, 2013). The university environment and learning program affect students' entrepreneurial intentions (Sekerbayeva et al., 2023). The development of research, technology, innovation, and entrepreneurship significantly enhances the employment prospects of university graduates by equipping them with the necessary skills and mindsets.

The impact of social networks on the employment of graduates is significant (Adler & Kwon, 2002; Benson et al., 2014; English et al., 2021; Souto-Otero & Białowolski, 2021). Informal networks encompass various interconnected groups such as family, friends, neighbors, and colleagues or professional contacts that serve as significant markers of social capital (Stone et al., 2003; Calvó-Armengol & Jackson, 2004). The size of one's social network, the diversity of connections within the network, and the strength of relationships all have positive impacts on the development of graduate employability (Chen, 2017). Social links are regarded to have a greater favorable impact, and those with no or few social ties experience a disadvantage (Portes, 1998). Social networks are more advantageous for individuals with higher levels of education (Kalfa & Matloob, 2018). Moreover, research demonstrates advantages of utilizing social networks and connections for companies, not just employees. According to Fernandez et al. (2000), the prevalent organizational practice of recruiting new employees through employee referrals offers valuable insights into social capital. Employers who utilize these hiring approaches are exemplary "social capitalists," perceiving workers' social ties as valuable assets that can be leveraged to achieve improved hiring results and economic gains.

According to the available literature analysis, the main factors influencing the employment of university graduates are the availability of practical experience and jobs in their specialty, social connections, as well as the development of technology and entrepreneurship.

This study aims to analyze the factors that affect the employment of university graduates and define opportunities for public administration and university management in Kazakhstan. The following hypotheses were proposed:

H1:   *The lack of experience and a limited number of job offers in the graduate's specialty have a significant negative effect on the likelihood of university graduates being unemployed in their specialty within a year after graduation.*

H2:   *Personal connections, such as friends, relatives, and other personal connections, and the development of research, technology, innovation, and entrepreneurship at the university have a significant positive effect on the likelihood of university graduates finding employment in their specialty within a year after graduation.*

H3:   *Personal connections significantly affect the employment opportunities of university graduates in Kazakhstan.*

2. METHODS

To define the factors that influence the employment of university graduates, the study used a logistic regression model based on primary data to examine the impact of the availability of practical experience and jobs in their specialty, social connections, development of technology, and entrepreneurship on the likelihood of employment.

A direct, step-by-step (conditional) method of variable selection was used to select significant variables. With the help of these coefficients, the paper calculated the probability that a university graduate will be able to secure a job in their specialty within a year after graduation:

$$p = \frac{1}{1+e^{-y}} = \frac{1}{1+e^{-(\beta_0+\beta_1 x_1+\beta_2 x_2+\dots+\beta_n x_n)}}, \quad (1)$$

where p is a probability; y is a dependent variable; β_0 is the intercept term; x_1, x_2, ..., x_n are the independent variables; β_1, β_2, ..., β_n are the coefficients for the independent variables.

The dependent variable was the employment on specialty within a year after graduation. It was a dummy variable that takes a binary value (0 or 1), reflecting two possible responses on question "Did you manage to get a job in your specialty within a year after graduation?" – 0 (No, I have not got a job) and 1 (Yes, I have got a job). Moreover, as independent variables, responses that express the degree of influence of different factors (availability of practical experience, availability of jobs, social connections, development of technology and entrepreneurship) on getting jobs in specialty. The questions are graded from 1 to 7 to measure the degree of agreement with various statements related to the employment of students and the quality of educational services provided by universities, where 1 corresponds to "does not affect: and 7 corresponds to "very strongly affects."

The questionnaire was tested for internal consistency using Cronbach's Alpha (Cronbach, 1951). The actual Cronbach's Alpha was 0.723. Accordingly, it exceeded the minimum critical level of 0.7, which indicates sufficient relevance and consistency of the questionnaire questions.

The sample size was determined according to the formula for calculating the size for estimating the share of a trait in the general population:

$$n = \frac{z^2 \cdot p(1-p)}{e^2} \quad (2)$$

$$= \frac{1.96^2 \cdot 0.25(1-0.25)}{0.05^2} = 289,$$

where n is an estimated sample size; z is a required confidence level (in this case 95%); e is a permissible error of the sample (in this case 0.05); p is a true estimated proportion of the attribute in the general population (in this case 0.25 – this proportion was determined from the working hypothesis that only 25% of students get a job in their specialty during the year).

As a result, the estimated sample size was 300 respondents. The sampling was spontaneous and non-random. The survey was conducted in the spring of 2022 (March, April, and May). It was distributed to graduates throughout all regions of Kazakhstan, utilizing contact information and resources offered by university alumni association centers and leveraging social networks to reach the target demographic effectively. The survey targeted graduates who completed their studies at the university during the 2020–2021 academic year. The objective of the 2022 survey was to achieve representativeness by considering the survey distribution among university graduates in various areas of Kazakhstan one year after graduation. Both employed and unemployed university graduates participated in the survey. Employed university graduates indicated how they found their jobs, while unemployed university graduates specified the reasons for their unemployment.

An online survey was conducted employing a questionnaire designed using Google Forms, followed by posting it on social networks and sending it to email addresses and messengers. Analysis and data processing were carried out using IBM SPSS Statistics 23 (Statistical Package for Social Sciences).

3. RESULTS

The algorithm for selecting statistically significant variables was based on a four-factor model: availability of practical experience, availability of jobs

Table 1. Logistic regression model

Variable (Factor)	B	S.E.	Wald	Sig.	Exp (B)
F1. Lack of experience	−1.341	0.317	17.874	.000	3.823
F2. Few places were offered in my specialty	−1.745	0.394	19.641	.000	5.725
F3. Friends, relatives, personal connections	5.908	1.094	29.139	.000	0.003
F4. Development of research, technology, innovation, and entrepreneurship	1.361	0.277	24.146	.000	0.256
Constant	−26.838	5.228	26.353	.000	5E+11

according to specialty, social connections, and development of research, technology, innovation, and entrepreneurship (Table 1).

Alternatively, the values of the coefficients were calculated as:

$$Y = -26.838 - 1.341 \cdot F1 - 1.745 \cdot F2 \atop + 5.908 \cdot F3 + 1.361 \cdot F4. \qquad (3)$$

Positive signs of regression coefficients indicate a directly proportional relationship between these variables and the likelihood of students finding employment; that is, the more survey participants agree with these statements, the less likely they are to get a job.

All coefficients are statistically significant. Variables "Lack of experience" and "Few places were offered in my specialty" have negative signs of regression coefficients, which indicates an inversely proportional relationship between these variables and the likelihood of student employment; that is, the more participants agree with these statements, the less likely they are to get a job. For variables "Friends, relatives, personal connections" and "Development of research, technology, innovation, and entrepreneurship," the regression coefficients have a positive sign, which indicates a directly proportional relationship; that is, the more survey participants agree with these statements, the more likely they are to get a job. It should be noted that the variable "Friends, relatives, personal connections" was found to have the most significant influence on the dependent variable compared with other variables due to the highest value of the Wald statistic.

Cox and Snell's R Square (0.604) and Nagelkerk's R Square (0.831) are analogs of R squared for linear regression models. According to Nagelkerk's R Square, the model obtained in the last step can explain 83.1% of the variation in the dependent variable. According to Table 2, which shows the number and percentage of correctly predicted values of the dependent variable, the percentage of correctly predicted values was 88.3%. Moreover, at the initial step, when the model included only one constant, without independent variables, the percentage of correctly predicted values was 64.7%. As a result, the percentage of correctly predicted values increased by 23.6%.

Table 2. Model classification

Observed		Predicted		
		Y		Percentage Correct
		Yes	No	
Y	Yes	88	18	83.0
	No	17	177	91.2
Overall Percentage				88.3

Note: The cut value is 0.500.

This logistic regression model can be used to predict the likelihood of university graduates finding a job in their specialty. The predicted value is determined by substituting the corresponding values of the independent variables into the regression equation. For example, if a student marked 3 points in question reflecting factor 1, 7 points in question reflecting factor 2, 7 points in question reflecting factor 3, and 1 point in question reflecting factor 4, substituting these values into the model, the equation will look like this:

$$Y = -26.838 - 1.341 \cdot 3 - 1.745 \cdot 7 \atop + 5.908 \cdot 7 + 1.361 \cdot 1 = -0.359. \qquad (4)$$

Thus, the probability that a university graduate will be able to get a job in his/her specialty within a year after graduation is:

$$p = \frac{1}{1 + e^{0.359}} = 0.411. \qquad (5)$$

Accordingly, such a graduate must be classified as part of the group who most likely will not be able to get a job in their respective specialty within a year after graduation.
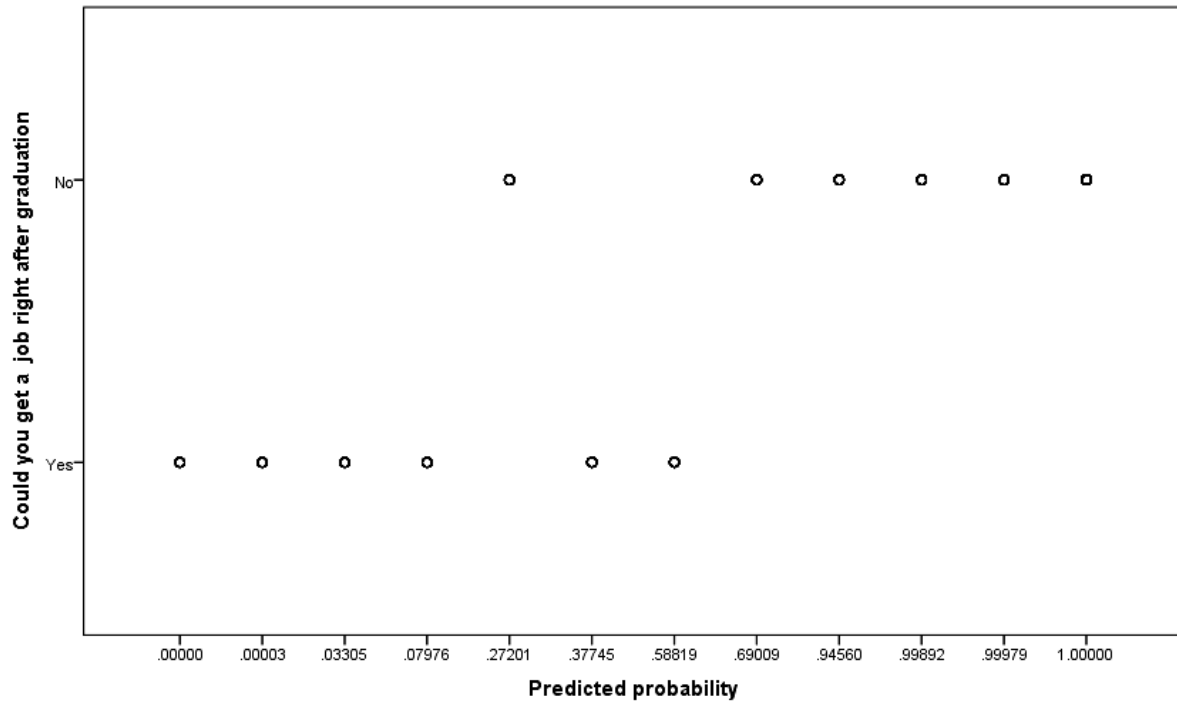
Figure 1. Classification graph

Figure 1 shows a classification graph of correctly and incorrectly predicted cases of two groups of event occurrence. The horizontal axis shows the probability, and the vertical axis shows the frequency of an event occurring. However, although the model has high predictive ability, it sometimes makes erroneous predictions, which were displayed in Table 2. This graph shows this visually. For example, 17 graduates were mistakenly classified by the model into the group of those employed, although, in fact, they were unable to find employment.

The calculation of correlation coefficients showed the relationship between students' employment in their specialty within a year after graduation and the categories of answers to questions that relate to student employment and characteristics of universities.

Thus, the micro-model revealed that the availability of practical experience and jobs in their specialty, social connections, and development of technology and entrepreneurship either facilitated or impeded the employment of university graduates. According to respondents, lack of experience has a negative relationship with employability. The same applies to the insufficient availability of job offers in a graduate's specialty, and this

factor was found to be negatively associated with employment. These findings support hypothesis 1. Conversely, the presence of acquaintances, relatives, and other personal connections positively affects employment opportunities, and the same applies to the development of research, technology, and innovation at the university. Their presence also has a positive effect on the employability of graduates. Research results also show that personal connections have the most significant influence on the employment opportunities of university graduates compared with other factors. These findings support hypothesis 2 and hypothesis 3.

This model showed good predictive properties. Accordingly, graduates, career centers, universities, employers, policymakers, and researchers (economic planners) can use this model. Students can understand how their performance and responses to certain factors (like the ones measured in the survey) can affect their job prospects and focus on improving these areas. Employment centers or university career centers can predict the likelihood of graduates being employed. Universities can identify areas where they need to improve their training or support services to enhance graduates' employability in their fields of study. Employers can understand the potential fit and employability of graduates based on specific

attributes and responses. Policymakers can design interventions to improve certain aspects of higher education and training programs, thereby increasing the employability of graduates. Researchers (economic planners) can forecast labor market trends and plan for future educational needs and workforce development. Overall, this model aids in understanding and improving the alignment between educational outcomes and labor market demands, which is crucial for economic development and efficient allocation of human resources.

4. DISCUSSION

According to the logistic regression results, graduates' employment is influenced by various factors that either facilitate or impede their employment. The study reveals the multifaceted nature of these factors, with personal connections, research, technology, and innovation within universities positively associated with employability. Conversely, the absence of practical experience and the constrained accessibility of job opportunities in specialized fields have adverse consequences for postgraduate employment.

In Kazakhstan, according to the PISA examination, the top 10 commonly selected professions are doctors, teachers, dentists, product and clothing designers, architects, sports coaches, psychologists, cosmetologists, advertising and marketing professionals, and graphic and multimedia designers. Priority is given to the engineering, manufacturing, and construction industries and the pedagogical and natural sciences when allocating the state funding. At the same time, the top 10 most in-demand categories include low-skilled individuals such as security guards, store clerks, and drivers. Interestingly, despite the limited job opportunities in economics, law, and finance, many individuals still pursue degrees in these areas. Therefore, there is a mismatch between labor market needs and vocational education (Serikbayeva, 2023). The ongoing mismatch between supply and demand in the labor market for different professions is exacerbated by a regional disparity in the young workforce. This issue stems from inadequate information about contemporary, relevant fields across various economic sectors, including at the regional level (Kaliyeva et al., 2020).

This study recommends creating a sophisticated online platform and different analytics-driven career services that use machine learning algorithms, artificial intelligence, and big data technologies to match graduates' skills with job opportunities and analyze employment trends and graduates' performance in the job market. Other recommendations are to help researchers gain access to administrative data, provide new surveys containing information about referrals and social networks, and promote new technology to tackle challenges related to labor market information. The study emphasizes that referral networks can be helpful for workers to find jobs that pay better and match highly skilled workers to more productive employment (Schmutte, 2016). However, the research efforts were significantly limited by insufficient accessibility, a lack of relevant information, and insufficient support from career centers and websites at universities in Kazakhstan. Although job placement of graduates should be the responsibility of university career centers, there is still a need for better management and collaboration with firms to improve the employment prospects of graduates.

The "First Workplace" project is being implemented in Kazakhstan. In particular, state employment centers organize the employment of university graduates seeking work for the first time in accordance with the specialty (profession) indicated in the diploma or a similar education profile. They also target job seekers, unemployed persons, and young people over 29 years of age, including those in the NEET category with no work experience, for permanent work for a period of at least 24 months with subsidized wages for one year of work. Any form of professional experience enhances employability and mitigates the likelihood of unemployment. Moreover, prior work experience, particularly when aligned with one's study area, diminishes the likelihood of skill mismatch in future careers (Passaretta & Triventi, 2015; Jackson, 2024). It is essential to help students achieve job experience at the university, including through work-integrated learning (Mabungela & Mtiki, 2024). Establishing partnerships between universities and industries, research institutes, and other organizations is recommended to facilitate long-term internships, co-op programs, and apprenticeships, including dual education programs (Doskeyeva et al., 2024) and

mentoring programs. Universities could manage their social network by establishing connections between their students and prospective employers. Moreover, universities should include networking skills in their educational programs to improve the networking abilities of soon-to-be graduates. It will help students to create formal links and build professional networks.

The prevalence of informal links, primarily familial ties, is one of the social elements. With these social links, students are hired at prestigious institutions. This issue is pervasive in Kazakhstan, both historically and culturally. Another prevalent factor in Kazakhstan is university graduates' lack of relevant work experience, which impedes their employment prospects. The findings align with previous studies that state that Kazakhstan is historically and culturally prone to use social ties for bonding, bridging, and linking (Narayan, 1999; Woolcock, 2000). A total of 247,000 Kazakhs were reported to view job postings online or in print as their most common method of job search, while 245,000 Kazakhs turned to their friends and acquaintances. In addition, 126,000 Kazakhs sought employment by posting and updating their resumes on professional and social networks, whereas only 92,000 Kazakhs used employment centers (Smajlov, 2021). The first item on the Electronic Government Portal of the Republic of Kazakhstan's "How to Look for a Job on Your Own" section is through friends and acquaintances. One is advised to pay attention to this strategy without any prior work experience. If a candidate fulfills the basic standards for a job and has at least a few recommendations from friends, the likelihood of employment increases dramatically (Egov. kz, 2023).

There has been significant research on the positive impacts of social connections. According to Dustmann et al. (2016), job search networks help bridge the information gaps in the labor market, leading to higher productivity for workers and companies. Additionally, an extensive yet loosely connected network of informal connections can improve an individual's mobility by providing access to resources and knowledge (Podolny & Baron, 1997). Family and school connections are more likely to increase earnings after nine years (Rosenbaum et al., 1999); at the same time, higher

co-worker network density is linked to increased regional productivity growth (Lengyel & Eriksson, 2017). Social capital is significant, but its impacts are inconsistent and may, in certain instances, mirror existing labor market inequities (Stone et al., 2003). Strong social links that benefit those with such ties often prevent others from obtaining employment opportunities. It indirectly restricts outsiders, and expectations for conformance to local standards and a shared normative structure result in limitations on individual liberty (Portes, 1998). Social networks may worsen labor market inequality (Eliason et al., 2023), referral networks can heighten inequality among various worker groups, sustain economic gaps (Schmutte, 2016), and play a crucial role in spreading and continuing gender and racial disparities in the labor market (Buhai & van der Leij, 2023) and in shifts in wage and employment inequality over time (Ioannides & Loury, 2004). According to Horvath and Zhang (2018), labor market regulations can lower inequality by enhancing the efficacy of formal job-search strategies.

Along with the help of relatives and friends, directly contacting employers and utilizing services from educational organizations are the most effective job search strategies for university graduates (Varshavskaya & Podverbnykh, 2021). Thus, career centers at universities can implement career development and lifelong learning programs with the involvement of university alumni. Alumni with a business can take an active part in students' practical training and their further employment. They can act as trackers in incubation and acceleration programs in business incubators, accelerators, technology parks, and entrepreneurial and innovation hubs based at universities. These measures and creating business infrastructure and environment will promote job creation through entrepreneurship and prepare graduates to launch their businesses. Entrepreneurship among university graduates as a strategy for their employment is a strategic decision since research examining the effects of an entrepreneurial education initiative revealed no enduring effects on self-employment or job outcomes within a four-year period following graduation (Alaref et al., 2020).

Thus, the prevalence of informal links, primarily familial ties, and the disparity in the labor mar-

ket in Kazakhstan stem from a lack of alignment between educational outputs and market demands, exacerbated by regional imbalances and inadequate forecasting of job market needs. To address this, it is critical to develop mechanisms that enhance both formal and informal job search strategies. Strengthening university-industry collaborations and collaboration career centers with other stakeholders, enhancing professional training, and leveraging alumni networks are vital. Additionally, the creation of digital platforms and analytics-driven career services, improving information dissemination about viable career paths, and fostering entrepreneurial initiatives directly within university settings could significantly bolster graduate employability.

CONCLUSION

This study effectively highlights the complex interplay of factors influencing the employment prospects of university graduates in Kazakhstan. In 2023, the unemployment rate among youth was 3.6%. It is low, but it is expected that by 2030 the annual influx of youth into the labor market will be over 300 thousand people. High demographic pressure on the labor market will lead to increased youth unemployment. Therefore, youth employment is one of the main directions of public policy in Kazakhstan.

Holding a bachelor's degree or university diploma provides only a slight advantage over those without higher education, making other factors crucial in determining a graduate's employment prospects. There are many employment factors for university graduates, which include individual characteristics and personal skills (enthusiasm, willingness to learn, problem-solving skills, hard and soft skills, etc.), quality of education, entrepreneurship education and culture of innovation, work experience, characteristics and demands of employers, networking, social capital, etc. The main factors influencing the employment of university graduates are the availability of practical experience and jobs in their specialty, social connections, as well as the development of technology and entrepreneurship.

In Kazakhstan, the prevalence of informal links, primarily familial ties and the disparity in the labor market, stems from a lack of alignment between educational outputs and market demands, exacerbated by regional imbalances and inadequate forecasting of job market needs. The presence of acquaintances, relatives, and other personal connections and the development of research, technology, and innovation at the university positively affect employment opportunities. Conversely, lack of experience and insufficient availability of job offers in a graduate's specialty negatively affect employability. The developed predictive model could serve as a valuable tool for employment and university career centers, helping to forecast employment probabilities for graduates and thereby better tailor career support services.

The identified factors of employment of university graduates allow the development of several measures for public administration and university management in Kazakhstan. Firstly, one needs to create a sophisticated online platform and different analytics-driven career services that use machine learning algorithms, artificial intelligence, and big data technologies to match graduates' skills with job opportunities and analyze employment trends and graduates' performance in the job market. Secondly, researchers should gain access to administrative data, conduct new surveys containing information about referrals and social networks, and promote new technology to tackle challenges related to labor market information. Thirdly, students should obtain job experience at the university through long-term internships, co-op programs, and apprenticeships, including dual education programs and mentoring programs. Fourthly, networking skills should be included in university educational programs, and career development and lifelong learning programs should be implemented with the involvement of university alumni. Finally, governments should create business infrastructure and environment, and different incubation and acceleration programs should be created in business incubators, accelerators, technology parks, and entrepreneurial and innovation hubs based at universities.

Future research should focus on the role of emerging technologies in enhancing job-matching processes, which could provide insights into more efficient employment strategies. There is also a need to study the long-term effects of integrating entrepreneurial and innovation-focused education within university curricula on employment outcomes. Further investigation into the impact of social capital on employment prospects across different regions of Kazakhstan could yield a nuanced understanding of regional disparities and inform targeted policy interventions.

AUTHOR CONTRIBUTIONS

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Software: Aigerim Sekerbayeva.
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