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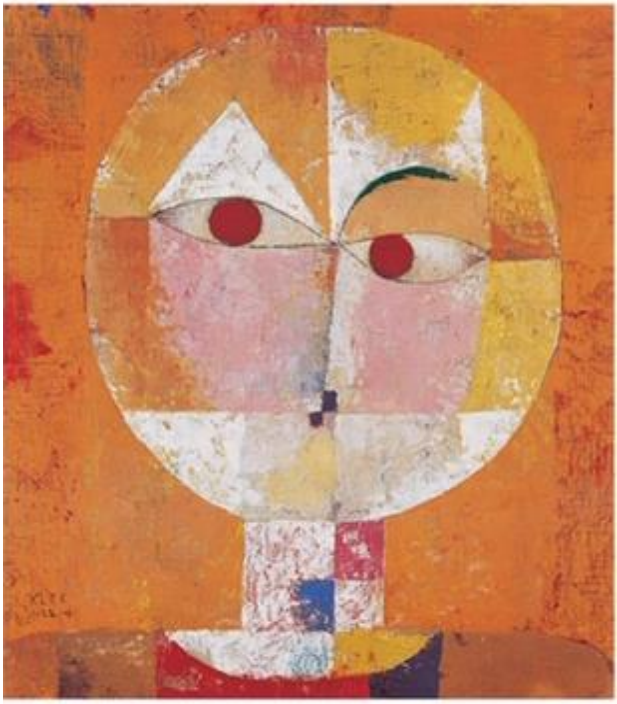

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Evaluation of professional competencies of Kazakhstan university students

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Abstract

The goal of this research is to create a methodological approach to evaluating the level of professional competencies of graduates as a factor improving employment prospects via canonical analysis. In result, all professional competencies of graduates from Kazakhstan universities are currently at a low level. The low level of professional training competencies is primarily due to the lack of practical job skills. In conclusion, the main factors for successful employment of university

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graduates at the labor market in the Republic of Kazakhstan are professional skills in the relevant field, as well as the competencies of professional socialization and professional mobility.

Keywords: Professional Competencies, Universities, Kazakhstan, Employment**.**

Evaluación de las competencias profesionales de los estudiantes universitarios de Kazajstán

Resumen

El objetivo de esta investigación es crear un enfoque metodológico para evaluar el nivel de competencias profesionales de los graduados como un factor que mejora las perspectivas de empleo a través del análisis canónico. Como resultado, todas las competencias profesionales de los graduados de las universidades de Kazajstán se encuentran actualmente en un nivel bajo. El bajo nivel de competencias de capacitación profesional se debe principalmente a la falta de habilidades laborales prácticas. En conclusión, los principales factores para el empleo exitoso de los graduados universitarios en el mercado laboral en la República de Kazajstán son las habilidades profesionales en el campo relevante, así como las competencias de socialización profesional y movilidad profesional.

Palabras clave: Competencias profesionales, Universidades, Kazajstán, Empleo.

1. INTRODUCTION

Currently, the concept of "professional competencies" (BUTLER, 2018; GURAYA & CHEN, 2019) is a crucial component of most modern approaches to professional education that seek to improve its quality. Graduates require professional competencies for successful employment aligned with their degree field and interests, with a good salary and working conditions that comply with their personal needs (KAZISTAEV, 2019). In 2018, the National Chamber of Entrepreneurs "Atameken" and the Ministry of Education and Science of the Republic of Kazakhstan held the third stage of the ranking of educational programs in Kazakhstan universities. It turned out that 35.4 % of graduates do not work in their degree field, and 40 % of them were unemployed in their first year after graduation. A total of 430 educational programs did not have accreditation, and only 31 higher education institutions (out of 124 currently operating in Kazakhstan) had international accreditation for their educational programs. The unemployment rate among Kazakhstan youth in 2018 was higher than that in 2012 and reached 4.1 %. Considering all this, it is obviously necessary to increase the quality of students' training with a focus on

developing their professional competencies. To increase the level of students' professional competencies, Kazakhstan universities should not only restructure the content and training technologies aimed at achieving the expected results but also improve tools and procedures for evaluating these results and the procedure for individual student assessment (AL-SHAHER, 2019). In addition, employers have different requirements, although educational institutions award standard diplomas (state recognized).

At the same time, universities often copy the content of educational programs from each other (KAZISTAEV, 2019), which demonstrates lack of a unique approach. Therefore, programs for developing students' professional competencies should be created with a focus on competencies ensuring successful employment (HAMOUD & HUMADI, 2019). The targeted formation of professional competencies, as well as an effective mechanism for evaluating their development, will allow Kazakhstan to make the transition to a model of sustainable socioeconomic development. The goal of the article was to develop a methodological approach to evaluating the level of the professional competencies of

graduates from Kazakhstan universities, as a factor in successful employment.

2. LITERATURE REVIEW

European higher education is moving "from the concept of qualification to the concept of competence," and the same trend can be observed worldwide (COULET, 2011; BUTLER, 2018). This can be explained by the fact that increasing cognitive and informational aspects in modern industry are not reflected in the traditional concept of professional qualifications (COULET, 2011; WELTY, 2013). Competence becomes a more accurate concept (BUTLER, 2018). A set of acquired competencies is integrated into the concept of "professional competence," that is a personal quality of a highly qualified graduate (GURAYA & CHEN, 2019). Professional competence is often defined as the ability of an expert to solve a certain class of professional problems (MIHAELA, 2015). This view is confirmed by the fact that in pedagogical papers, professional competence is considered a multifaceted and integral characteristic of the personality of a future expert, which ensures successful employment due to

acquired knowledge and skills. A competence-based approach has certain impacts on the system of knowledge assessment with a focus on students' employment prospects. At the same time, the emphasis is now shifted from controlling how well particular subjects are mastered, to monitoring the development of competencies required for work (KACHALOV ET AL., 2015). Each professional competence consists of a number of components, reflecting the degree of mastery over the required theoretical knowledge, practical skills and experience in solving professional problems (professional training competence), as well as an individual's personal qualities—competencies related to professional socialization, mobility, self-development, and communication (ESPOSITO & FREDA, 2015). These personal qualities include the student's focus on further education, motivation to obtain a particular result, creative approaches to the problem-solving, communicative leadership skills necessary for working on a team; and the ability to make decisions, as well as take responsibility for them.

3. MATERIALS AND METHODS

In the first stage of the study, the authors estimated employment success by surveying graduates from Kazakhstan universities. This allowed them to evaluate the impact of professional competencies and their components on employment. The respondents were 200 graduates from S. Seifullin Kazakh Agro Technical University (majors in Agronomy, Agrarian Equipment, and Technology), University of International Business (Marketing and Management), D. A. Kunaev Eurasian Law Academy (Jurisprudence and International Law), and Eurasian Technological University (Mechanical Engineering and Information Systems). The universities and programs were selected randomly to obtain representative research results. The universities included in the national ranking of the best Kazakhstan universities for 2019 were not invited to participate in the survey, as graduates from these universities already have the best employment prospects. The survey was conducted remotely by emailing the questionnaire to the respondents using Google Forms. All respondents graduated from their universities sixth months prior to the sending of the survey. This period is not enough for any fundamental change to occur in the level of competencies developed while studying at university. However, it is sufficient time for

finding a job. According to the Order of the Minister of Labor and Social Protection of the Republic of Kazakhstan No. 259, the expected duration of unemployment for applicants who are motivated to find jobs, that is, the period within which employment centers should provide work vacancies according to applicants' qualifications, does not exceed six months.

The graduates were asked to evaluate statements regarding the success of their employment from 0 to 10 points. The first question asked whether the graduates were working in their degree field (Indicator Y1). A high level of professional competence implied having a job in the same field as the awarded diploma. However, this indicator would not enable a comprehensive evaluation of the formed competencies. Employment in the relevant field does not mean superior knowledge, skills, communication, or self-development potential (RUSSO, 2016). Therefore, a qualitative indicator of professional competencies—the ratio of the salary earned to the average for a certain job (Y2)—needed to be considered. A good salary meant high competitiveness of a graduate in a given niche, and a low one denoted a lack of competitiveness and competence (BORISOVA & TIMOFEEVA, 2015). The remaining

indicators (Y3–Y11), which characterized the extent to which one's needs were satisfied, were built according to Maslow's hierarchy of needs (HOPPER, 2019).

A higher score (from 0 to 10) reflected greater agreement with the statement; 0 meant total disagreement with a statement, and 10 meant full agreement. For the first statement, the respondents were to choose 0 if they were working in a field different from their major or if they were still unemployed, and 10 if they were working in their degree field. A respondent who believed that his job partly correlated with his qualifications could choose an answer from 1 to 9.

The second stage involved evaluating the professional competencies of the graduates. To ensure the accuracy of the results, the authors surveyed colleagues of the graduates. Each graduate was assessed by five immediate colleagues (experts). The list of statements used to determine the level of professional competence was based on recommendations of the Council of Europe that identify main competencies and focus on the ability to adapt to the work environment. The evaluation procedure was the same as in the first stage of the research (questionnaire).

The level of each graduate's professional competencies was calculated as the arithmetic mean of the assessments of the five experts for each statement. Before the mean values were calculated, the estimates obtained were checked for homogeneity using the coefficient of variation. The calculated values of the variation coefficients for statements X1–X23 did not exceed 8 %. Therefore, the expert opinions were consistent and the obtained results were objective despite the limited number of experts. In cases where the coefficient of variation initially exceeded 10 %, which signaled questionable objectivity of the results, the number of experts was increased to 10. If doing so did not help ensure consistency, another graduate was chosen.

The authors used a t-test to confirm the hypothesis of the statistical significance of the survey results. If the empirical value of the criterion (Formula 1) was higher than the table value, then the difference was statistically significant. If the table value was higher, then the result was considered insignificant. The results of the calculations are presented in Tables 1 and 2.

$$t = \frac{|M_i - M_j|}{\sqrt{\frac{\sigma_i^2}{N_i} + \frac{\sigma_j^2}{N_j}}}, \quad (1)$$

Where M_i is the arithmetic mean of the score of the *i*-th sample;

M_j is the arithmetic mean of the score of the *j*-th sample;

σ_i is the standard deviation of the *i*-th sample;

σ_j is the standard deviation of the *j*-th sample;

N_i is the size of the *i*-th sample;

N_j is the size of the *j*-th sample.

The authors used canonical analysis to identify the professional competencies that had the greatest influence on employment success. This process involved calculating weights that maximized the correlation between weighted sums in two sets and then using these weights to determine the value of the first root. The authors first evaluated the

entire set of roots and then assessed the significance of the set after removing the first (most significant) root, after removing the second, and so on. The feasibility of finding each subsequent canonical root was evaluated according to statistical indicators R, R^2, χ^2, and p.

The canonical analysis was conducted in the software Statistica 10.0 with two data arrays: score values for indicators X1–X23 and Y1–Y11 for 200 observations (for 200 graduates) (Table 3). According to the method of canonical analysis, the composition of the dominant factors (canonical roots) of the students' professional competencies was determined in a manner similar to factor analysis—according to the significant loads of canonical factors (> 0.7), corresponding to the correlation coefficients of competence with the relevant canonical variable (MARTÍNEZ-ALCALÁ ET AL, 2018).

To assess the development level of the selected professional competencies of students in Kazakhstan universities, the authors calculated the values of factors as an integral value consisting of particular indicators (X1–X23), corrected by a relative significance coefficient determined according to the values of correlation indicator and factor:

$$F_i = \sum_{j=1}^{n} \frac{r_{ij}}{\sum_{j=1}^{n} r_{ij}} \times X_j \quad (2)$$

Where F_i is the value of the *i*-th factor—the *i*-th group of professional competencies;

X_j is the value of the *j*-th indicator, which forms the factor. The value of the indicator corresponds to the score of the level of student's professional competencies (a 10-point scale);

r_{ij} is the value of the pair correlation coefficient between the *i*-th factor and the *j*-th indicator, which forms the factor;

$\sum_{j=1}^{n} r_{ij}$ is the sum of the pair correlation coefficients between the *i*-th factor and all the indicators that form the factor;

n is the number of indicators in the factor.

The quality of professional competencies development is estimated with the Fibonacci sequence (Ruiz & Luca, 2017):

$$\begin{cases} F_1 = F_{min} + 0.38\left(F_{max} - F_{min}\right) \\ F_2 = F_{min} + 0.62\left(F_{max} - F_{min}\right) \end{cases} \quad (3)$$

Where F_{min} is the minimum possible value of the factor that equals 0, when all the indicators that formed the factor received 0 points;

F_{max} is the maximum possible factor value that equals 10, calculated as a sum of maximum values of indicators forming the factor weighted by weighting coefficients;

$[F_{min}; F_1]$ is low level of professional competencies development at Kazakhstan universities;

$(F_1; F_2]$ is medium level of professional competencies development at Kazakhstan universities;

$(F_2; F_{max}]$ is high level of professional competencies development at Kazakhstan universities.

To determine the quantitative increase in employment success with higher professional competences, the authors calculated the values of the indicator of employment success

Y for each respondent as the sum of points for indicators Y1–Y11. Next, the authors built a 5-factor regression model reflecting the dependence of indicator Y on the values of factors of professional competencies development F, calculated by Formula 2. The regression model of the dependence of indicator Y on the values of the factors is written as:

$$Y = 0.29 \times F_1 + 0.23 \times F_2 + 0.19 \times F_3 + 0.14 \times F_4 + 0.13 \times F_5 + 0.2 \quad (4)$$

Where Y is the dependent variable representing the value of the indicator of employment success, calculated as the sum of indicators *Y1–Y11*;

F is independent variables—the values of factors of professional competence;

F_1 is the value of the factor of professional training;

F_2 is the value of the factor of professional socialization;

F_3 is the value of the factor of professional mobility;

F_4 is the value of the factor of professional self-development;

F_5 is the value of the factor of professional communication.

4. RESULTS

The survey among students in some Kazakhstan universities aimed at evaluating employment success and the level of professional competencies showed that there are insignificant differences in the evaluation of professional competencies of the graduates in samples 1-8 and the success of their employment. This can be explained by different geography of the universities studied and different majors of graduates. The empirical values of the t-test were calculated according to the average expert estimates of indicators Y1–Y11 characterizing the respondents. Statistically significant differences in the values of indicators by majors were registered for indicator Y1, which is not included in the table. This is not so much due to the level of competencies development, but different demand in the labor market for

technical and non-technical majors. The empirical value of the t-test does not exceed the table one for indicators Y2–Y11 (Table 1). This proves that there are no statistically significant differences in the level of job satisfaction of graduates with different majors and from different universities.

What is more, there are no statistically significant differences in the questionnaire results reflecting the professional competencies of graduates from Kazakhstan universities (Table 2). Thus, the carried-out evaluation of professional competencies based on the estimated values of indicators X1–X23 and Y1–Y11 is representative of the entire Kazakhstan education system.

The results of canonical analysis show that there is a strong relationship between the level of students' professional competence and the success of their employment: the multiple correlation coefficient $R = 0.90 \rightarrow 1$, $\chi^2 (253) = 522.51$, $p = 0.00$, which confirms the validity of the evaluation of professional competencies impact on employment success (Table 3). *Variance extracted* indicator characterizes the quality of the generated questionnaire used in the survey: proposed statements X1–X23 describe 91.13 % of the

professional competence level, and statements Y1–Y11 for 99.40 % describe the success of employment.

The carried out canonical analysis allowed the authors to conclude that according to criteria R ($\rightarrow$ 1), R^2 (> 0.8), χ^2, p (< 0.05), the analysis is significant without removing roots (Root Removed = 0), with the removal of the first most significant root (Root Removed = 1), with the removal of roots 2–4 (Root Removed = 2, 3, 4) (Table 4). That is, five canonical roots were statistically significant. The roots are interpreted as factors (groups) of professional competencies, grouped by the nature and strength of influence on the success of employment in the order of decreasing influence.

The analysis allowed ranking professional competencies formed in Kazakhstan higher education according to the strength of their influence on employment success.

The identified structure of professional competencies, including competencies of professional training, professional socialization, professional mobility, professional self-development, and professional communication, in total, for 81.5 % covers the system of developing professional competencies in universities of the Republic of Kazakhstan.

Among the determined components, competencies of professional training have the greatest influence on the success of employment (22.1 % of the impact), namely, indicator X23, which reflects practical skills in one's job. The correlation coefficients with the indicators of employment success Y1-Y11 prove strong and very strong connection between these indicators and the indicator of possessing practical job skills (0.79–0.94). The second factor is the competence of professional socialization, which characterizes the ability to work in a team without conflicts or labor misconducts, the ability to respect all members of the team regardless of their education level, nationality, age, or position, and without demonstrating any discrimination. The impact of this group of competencies is 19.7 %. An important role in successful employment is played by the competencies of professional mobility – the ability to quickly adapt to the conditions of the labor market, choose the right qualifications, change one's specialty if necessary (15.6 % of the dispersion). The competencies of professional self-development (11.7 % of the dispersion) reflect students' ability to improve their personal qualities and qualifications and climb the career ladder.

Based on the score of indicators used to determine professional competencies of graduates from Kazakhstan universities and loads of canonical factors, the authors carried out a quantitative evaluation of the level of professional competencies using Formula 2. This was first calculated for each graduate, then the average for the sample. Along with this, the authors identified qualitative characteristics of professional competences: low level corresponds to the range of factor values [0; 3.8], medium – (3.8; 6.2], high – (6.2; 10] (Table 6).

Table: Evaluation of professional competencies of graduates from Kazakhstan universities

Graduates sample	The level of professional competencies development									
	Competence of professional training		Competence of professional socialization		Competence of professional mobility		Competence of professional self-development		Competence of professional communication	
	Factor value	Competence level	Factor value	Competence level	Factor value	Competence level	Factor value	Competence level	Factor value	Competence level
Sample 1	3.9	Medium	3.8	Low	3.8	Low	3.3	Low	4.7	Medium
Sample 2	4.2	Medium	4.1	Medium	3.9	Medium	3.5	Low	5.2	Medium
Sample 3	2.3	Low	3.4	Low	3.6	Low	2.6	Low	3.6	Low
Sample 4	2.9	Low	2.9	Low	3.8	Low	2.1	Low	4.0	Medium
Sample 5	2.2	Low	3.0	Low	2.0	Low	2.4	Low	3.7	Low
Sample 6	2.8	Low	2.3	Low	2.1	Low	2.9	Low	2.9	Low
Sample 7	1.9	Low	3.1	Low	2.7	Low	3.2	Low	3.3	Low
Sample 8	3.0	Low	3.9	Medium	1.9	Low	3.0	Low	3.4	Low

The analysis showed a predominantly low level of professional competencies of graduates from Kazakhstan universities regarding their quality. The average factor value for all students reflecting their competencies of professional training, professional mobility and self-development did not exceed 2.9. The factor value for the competencies of professional socialization and communication was in the range of 3.3–3.9.

The constructed regression model demonstrated that with an increase in the competencies of professional training by 1 % compared with the level estimated in Table 5, the indicator of employment success increases by 0.26 %; a 1 % increase in the competencies of professional socialization means a 0.23 % higher employment success; a 1 % increase in the competencies of professional mobility—a 0.17 % growth, respectively; a 1 % increase in the competencies of professional self-development—0.12 %; a 1 % increase in the competencies of professional communication leads to a 0.15 % higher employment success. The cumulative increase in professional competencies development by 1 % will lead to an increase in the success of employment by 0.94 %. The statistical significance of the impact of the indicators is

confirmed by the adequacy of the regression model: R^2 = 0.86, F_{calc} = 107.6 with $F_{table.}$ = 2.26, $|t_{calc}| > t_{table.}$ for all factors of professional competencies.

5. CONCLUSION

The conducted study allowed the authors to make some scientific conclusions with a practical focus. In modern conditions, the main factors for successful employment of university graduates at the labor market in the Republic of Kazakhstan are professional skills in the relevant field, as well as the competencies of professional socialization and professional mobility. The development of these professional competencies should become a priority when improving the efficiency of Kazakhstan higher education in the near future. The evaluation revealed a predominantly low level of professional competencies of university graduates in the Republic of Kazakhstan regarding their quality characteristics. This is the reason for poor employment prospects in the country, especially in one's degree field. The low level of professional competencies is primarily due to the insufficient development of practical job skills. This indicator

of the hierarchical structure of professional competencies has the greatest impact on the employment prospects of graduates from Kazakhstan universities. This problem is due to the theoretical focus of curricula. In the studied universities the number of practical classes was insufficient and their quality could be improved. At the same time, a1% increase in the level of practical professional skills of students can increase their employment prospects by 0.26 %.

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