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Development Factors of the Lecturers' Professional Mobility in System of Higher Education in Kazakhstan

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Abstract

Internationalization and integration of the educational environment raises the issue of university lecturer development of professional mobility in Kazakhstan's higher education system. The aim of the study is to find an empirical approach to defining the factors for the development of lecturer professional mobility in the modern conditions of functioning of higher education in Kazakhstan. Using the cluster analysis and justification of the efficiency criterion, the researcher conducted a representative sample of 30 local universities. In order to obtain quantitative estimates of their professional mobility level, the researcher surveyed 1109 lecturers from a sample set of Kazakhstan universities. To determine the structure and factors of professional mobility and the role of the resource component in professional mobility, the researcher employed principles component analysis, which was carried out on the basis of the quantitative estimates obtained as a result of the survey. Finally, the influence of pedagogical mobility factors on the efficiency level of the university was studied using regression models made using the method of nonlinear evaluation. The results of the study are of a practical nature. To know the factors of professional mobility is fundamental for educational management as it determines the ratio of resource and process components that underlie the coordination of interests of both the employee and the university, as well as the strategy for the development of lecturers in universities. This, in turn, can significantly increase the efficiency of their activities, as well as ensure the success of integration into the world educational space.

Keywords: Kazakhstan, professional mobility, lecturer, higher education, factors, resource components, process components, universities.

1. Introduction

Teaching and learning to teach can be defined as complex, multifaceted, value-laden enterprises that are managed against the global backdrop of the so-called knowledge society.

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The continuum of lecturer learning and education, which turns out to be fundamental in a lifelong learning perspective, implies the need for extended lecturer professionalism (Caena, 2011; Yazan, 2018). In most cases, the quality of higher education depends on the quality and competence of university teaching staff (Jusuf et al., 2020). By pedagogical competences, we understand those professional skills and abilities that are indispensable for the successful work of a present-day university lecturer. The document "Common European Principles for Lecturer Competences and Qualifications", elaborated by a working group of experts form EU member states contains one of the key requirements for lecturers; namely, to act as responsible professionals in local educational communities and with different actors, promoting the development of students as European citizens with global responsibilities and encouraging dispositions and attitudes to cooperation and mobility, intercultural dialogue and mutual respect (European Commission DG Education and Culture, 2020).

By circumstance, the modern world has created a single educational space, which determines the harmonization of educational standards, approaches, curricula, and specialties in different countries (Woldegiyorgis, 2018; van der Aa et al., 2019; Usembayeva et al., 2016; Mihut et al., 2017; Patrinos, Angrist, 2019; Jumakulov, Ashirbekov, 2016). The open educational space implies the increased cooperation of university professors from different countries, in particular from Kazakhstan, which is expected to contribute to the success of people in their chosen profession, as well as to improve the system of employment of university graduates and to enhance the status of these countries in the field of education. The Head of State has identified three basic aspects of the intellectual formation of the nation: 1) breakthrough in the development of education and science, 2) increasing the scientific potential of the country, and 3) the development of an innovation system (Official Website of the President of the Republic of Kazakhstan, 2018; Strategy 2050, 2020). The Ministry of Education and Science (Government of the Republic of Kazakhstan, 2020) controls all these processes. Continuously generating initiatives aimed at enhancing the development of human capital, the Ministry justifiably targets universities to improve their organizational, managerial, and professional competencies. Professional mobility is one of the most important aspects of the process of integration of HEIs and science into the international educational space and improvement of quality of the higher education system (Vitenko et al., 2017).

Kazakhstan has a national strategy for the internationalization of higher education and belongs to a category of countries where inward and outward professional mobility of staff is part of the national strategy. The percentage of higher education institutions that have adopted this strategy is 100 % in Kazakhstan (Analytical report..., 2018). Kazakh universities are also actively involved in the joint projects of international organizations, such as UNESCO, UNICEF, DAAD, ERASMUS+, Mevlana, and others. The main sources of project financing are international coordinators. Every year, the range of alternative sources of the program of external outgoing academic mobility increases (Analytical report..., 2018; Gabdulina, Zhuman, 2019). Kazakhstan lecturers are given a unique opportunity to participate in various international programs. In this aspect, international organizations provide significant support to the country's higher education institutions. For example, the British Council project has supported setting up Professional Development and Cooperation Centers in Kazakhstan's higher education institutions (Analytical report..., 2018). The work of these centers is aimed at improving the professional competencies of researchers and other university staff in order to develop international cooperation and maximize the effectiveness of their work. The project united Sh. Yesenov State University of Technology; S. Baishev Aktobe State University; E.A. Buketov Karaganda State University, A. Baitursynov Kazakhstan State University, M. Auezov South Kazakhstan State University; and Kazakh-American Free University (Analytical report..., 2018).

However, despite the fact that practical steps are being taken to implement efficient professional pedagogical mobility, it should be noted that its level in the higher education system of Kazakhstan remains at a very low level. The absence of official statistics on the mobility of university lecturers indicates that this aspect of the national strategy of improving the quality of education in the country has not received due attention in practice. Most scientists, considering this issue, identified a number of destructive factors, such as the low level of funding (Abdiraiymova et al., 2013; Ahn et al., 2018) and the low level of English ability (Seitzhanova et al., 2015) (only 6.8 % of lecturers in Kazakhstan's higher education institutions can give lectures in English) (Analytical report..., 2018). Yet it should be noted that professional mobility is being

formed and developed under the influence of objective and subjective factors (Gabdulina, Zhuman, 2019; Shegda, 2016; Bense, 2016). Mobility acts as an integrative education that incorporates the personal and activity components that exist and develop in unity, mutually conditioning each other (Shegda, 2016). Therefore, the objectives of this study were to empirically determine the structural components of the professional mobility of lecturers in higher education, to determine their priority and the nature of their impact on the efficiency of higher education institutions, and to justify the priority areas for the development of lecturer professional mobility in today's conditions, deferring to the experience of foreign countries and taking into account the specifics of Kazakhstan's education system.

The paper is divided into several sections as follows: Section 2 reviews the literature; Section 3 provides an outline of the factors and hypotheses of this study and describes the research methodology; Section 4 describes the data collection; while the data analysis and results are discussed in Section 5. Finally, Section 6 summarizes the conclusions of this study, with recommendations outlined in Section 7.

2. Literature review

The concept of "professional mobility" is present in the scientific literature since the early 1950s. At first it was interpreted as a change of various types of occupations or professions as related to physical, non-physical, and farm types of labor (Pavlenko, 2017). Thanks to the works of American sociologists Lipset & Bendix (Lipset, Bendix, 2018), professional mobility has been given the status of an independent subject of research. The study of the problem of professional mobility is rooted in the study of the phenomena of the division of labor and social displacements. According to Durkheim (Durkheim, 2014), the division of labor is the main factor of social progress. The individualization of social behavior associated with the intensification of the division of labor, mentioned by Durkheim (Durkheim, 2014), was contained in the concept of the "flexible", which he introduced for assessment of the relations change in the "man-labor" system. This concept reflects the capability and possibility of an individual to form his labor, his professional orientations and prospects. A characteristic feature of a "plastic" worker is the constant internally determined increase in the level of self-competitiveness, identification of new opportunities for his profession and new forms of professional self-actualization. The definition of "professional mobility" traditionally includes the ability of an expert to change professions, places and kinds of activity (Pavlenko, 2017). It should be noted that the dynamics of modern public life makes its own adjustments to the understanding of the concept of professional mobility, without confining professional mobility within one industry, and considering the professional mobility as an opportunity for professional and personal self-realization in any sphere of socio-economic and socio-cultural activities. In other words, professional mobility is considered as an indicator of flexibility of an employee, i.e. his or her ability to adapt to new working conditions, such as the technological development; introduction of new technology or software; promotion or transition to a related position; necessity to master a new profession, etc (Abd, Behadili, 2019).

Active consideration of this problem within a framework of professional pedagogy started in the 1970s. Professional mobility at that time was defined primarily as the willingness of the worker, including the civil servant, to rapidly change production tasks, jobs and even specialties within the same profession or industry, as well as the ability to quickly master new specialties or changes in them that arise under the influence of technical transformations (Bense, 2016). Professional mobility is an important element for the career development for lecturers as well, but also in other areas of activity, especially since the young generation is more flexible considering the career change (Zamir, 2018). Professional mobility in pedagogical field, as in material production and other spheres of employment, is predetermined by objective factors, but its course and intensity of formation and development depend more on personal, subjective factors (Iucu et al., 2011; Zamir, 2018). Professional mobility is a process where by a lecturer has the opportunity to develop both personally and professionally. The secure lecturer feels confident where she is and wishes to learn and advance. At the same time, for there to be mobility, the lecturer needs a sense of personal and organizational empowerment. Someone who feels appreciated, whose opinion is worth something within the organization, will develop the desire to grow within it (Bense, 2016). Mobility does not occur necessarily in a bottom-up process, in other words it is not necessarily a job promotion to a more senior position, and it may also be lateral mobility expressed in greater professionalization

within the teaching field. Sometimes this kind of mobility leads society to sense that the person is "treading water" career-wise, even though that person doesn't actually feel that way (Steffy et al., 1999).

However it should be noted that there is also a scientific point of view in the relevant literature concerning the priority of material factors for the development of lecturer academic mobility in the educational environment (Gabdulina, Zhuman, 2019; Jumakulov, Ashirbekov, 2016). Especially, when it comes to the higher education in developing countries, in particular in Kazakhstan. Lack of adequate funding for education significantly hinders the implementation of a service that would inform on participation in foreign programs, differences in the structures of educational programs and courses, transfer of credits and assessments, harmonization of curricula between universities, etc. (Abdiraiymova et al., 2013; Ahn et al., 2018).

Despite the differences in views of researchers on the list of factors and their priority of influence on the lecturer professional mobility, they are unanimous on the direct proportionality of the influence of complementary factors of mobility on the efficiency of higher education institutions (Malikov, 2014; Monobayeva, 2013; Belyakova, 2014).

Having considered the phenomenon of a lecturer professional mobility in potential and actual aspects, we concluded that this integrative quality of the personality of an expert can be represented in two interdependent planes: as a personality trait and as a characteristic of activity in cognitive and professional processes. Therefore, in this study, the professional mobility of a lecturer will be considered as internal freedom, personal self-improvement based on stable values and the need for self-organization, self-determination and self-development, and the ability to respond quickly to changes in society using professional competences. According to Zeer (Zeer, 2014), this can provide vocational education with "convertible", social and professional mobility. Most of the studies on lecturer professional mobility are positioned within a larger body of research that identifies factors that have been linked to lecturer rotational mobility (Bense, 2016; Lipset, Bendix, 2018; Zamir, 2018). These studies are often policy-focused and emphasize practical steps that school districts and states can take to retain lecturers. Given the policy-oriented nature of these studies, almost none of them clearly articulate a theoretical framework (Iucu et al., 2011; Pavlenko, 2017).

Researchers emphasize a set of common characteristics: lecturer personal skills or the moment in which they are in the career. A major factor which is emphasized is the need for professional and personal development (Appleton et al., 2006; Garam, 2007). This is consonant with the formation of lecturers and the motivation for choosing the teaching career and work in this area (Iucu et al., 2011) put forward that professional mobility is in direct proportion with every lecturer's career expectations.

Disagreement over the factors determining professional mobility in the pedagogical field may be explained by the ambivalence inherent in professional work: the discord between lay people who appraise professional performance in terms of outcomes, and professionals who tend to judge performance in terms of what is accomplished in relation to contextual constraints of the specific situation.

Practically implementing approaches to the development of professional mobility of lecturers in the higher education system, it is necessary to pay attention to the study of both external and internal systems of personal value-based relations, revealing the general nature of their interaction. We are interested in what lecturer needs in order to build the concept of continuous professional self-identification as a system that comprises two sub-systems, external (social professional) and internal (personal). The external subsystem ensures awareness of changes in the world of professional activity. The personal subsystem presupposes self-assessment by the lecturer of his interests, abilities, aptitudes, determines his attitude to professional values and norms and reveals the direction of dominant motives.

3. Data

To determine the structure of lecturer professional mobility, a survey of Kazakh universities was conducted. The list of universities participating in the survey was determined through hierarchical clustering and stochastic indicators of universities' efficiency and participation in world education rankings. The most comprehensive list of Kazakh universities is found in Webometrics Ranking of World Universities (121 universities). Clustering was carried out on the

basis of the rating indicators "Openness Rank" (*Y1*) and "Excellence Rank" (*Y2*) from 2018 (Webometrics Ranking of World Universities, 2019). The "Openness Rank" indicator reflects the references according to figures captured from Google Scholar, while the "Excellence Rank" indicator reflects the number of papers published over the last five years that are included in 10 % of the most cited works and indexed by Scopus. The selected indicators characterize the publication activity of university professors and how frequently their works are cited. The number of citations reflects the quality of their research, which is directly related to the lecturer's competence and ability to present the material, as well as to the relevance of the research. In turn, this is a representation of mobility on the one hand and a factor influencing the quality of teaching on the other (Webometrics Ranking of World Universities, 2019).

Five clusters of universities were singled out using the efficiency criterion. The dispersion analysis (Table 1) indicates the statistical significance of the results obtained.

Table 1. Dispersion Analysis of Kazakh Universities Clustering

Variable	BetweenSS	df	WithinSS	df	F	signif. p
Y1	27.31866	4	0.663984	116	1193.162	0.00
Y2	18.25014	4	0.690201	116	766.812	0.00

In terms of the indicators (*Y1, Y2*) of clustering, the value of intergroup variance (BetweenSS) exceeded the intragroup variance (WithinSS); the calculated value of the F-criterion exceeded the tabular one (2.46) with the number of degrees of freedom df = 4; 116; and the error level (signif. p) did not exceed 0.05.

The second cluster included 95 universities (meeting the criterion (1) – see below), and the indicators *Y1* and *Y2* often had the same value, so in order to determine the distances to the center of the cluster an additional criterion was added to reflect the overall rank of the university according to the Webometrics Ranking of World Universities. Standardized values were used in the clustering process.

In order to form a sample set of research and ensure both its representativeness and sufficiency for factor and regression analyses, 30 universities were singled out that met best the criterion (1). The universities selected for the sample that met criterion (1) were distributed in proportion to the total number of universities included in the cluster. From the first cluster that included three universities (2 % of the total), one university was selected to form a sample set; from the second cluster (82 % of the total) 24 universities were selected; from the third cluster (3 %), one university was selected; from the fourth cluster (6 %), two universities were selected; from the fifth cluster (7 %), two universities were selected. The universities were clustered as follows:

First cluster: L.N. Gumilyov Eurasian National University.

Second cluster: International Education Corporation, College of International Business Academy, Atyrau Engineering and Humanitarian Institute, Humanities Technical Academy, Kazakh National Academy of Choreography, Eurasian University of Technology, University Sirdariya, University of Almaty, Kazakhstan Innovation University, Bolashak University, Astana University, Atyrau University of Oil and Gas, Central Kazakhstan Academy, West Kazakhstan Innovative and Technological University, Institute of Information and Computational Technologies, SILKWAY International University SWIT, K. Satpayev Ekibastuz Technical and Engineering Institute, Kazakhstan Engineering-Pedagogical Peoples' Friendship University, Academy of Law Enforcement Agencies Kazakhstan, O. A. Dzholdasbekov Academy of Economy and Law, Humanitarian and Technical Institute Akmeshit, Syrdarya University, Kokshetau Technical Institute of Ministry of Emergency Measures, Central Asian Academy.

Third cluster: Abay Kazakh National Pedagogical University.

Fourth cluster: Karaganda State Technical University and D. Serikbayev East Kazakhstan State Technical University.

Fifth cluster: Kazakh National Agrarian University and Kazakhstan Medical University KSPH.

The sample thus formed is representative: all groups of universities are reflected in terms of their level of performance, while the representation of these groups in the sample reflects the structure of the whole in percentage terms.

The same indicators, which served as a basis for clustering Kazakh universities, were also used to assess the impact of factors of lecturer mobility on the efficiency of their universities. Positive effect is manifested as a result of the lecturer's ability to adapt to the variability of key competencies, which are demanded form the graduates on the labor market, as well as to the variability of legislative, methodological an institutional regulation of the educational process. Among the negative effects is the excessive staff turnover that leads to smaller individual and university productivity indicators as a result of additional time taken to adapt to new conditions or to make changes in the existing process.

The list of indicators affecting pedagogical mobility is based on lecturer's characteristics that are necessary to ensure their professional mobility, and based on a generalization of relevant literature (Ahn et al., 2018; Belyakova, 2014; Biktuganov, Igoshev, 2013; Pavlenko, 2017; Teichler, 2017) (Appendix).

The proposed list of indicators characterizes lecturer competence, professional and personal qualities, as well as the organization of the educational process of universities at which they teach – all of which affect their professional mobility. This list allows for the comprehensive assessment of professional mobility, because it takes into account the qualitative characteristics of the participants in the educational process (e.g., lecturer), various relations (e.g., lecturer – student, or lecturer – management), educational environment management tools (e.g., professional conditions like legislative and internal regulatory changes), and the technical and informational support of the educational process. Scoring is used because of the lack of statistical information pertaining to the field of research.

The survey (Appendix) was assessed as internally consistent with the help of Cronbach's alpha. The "alpha if deleted" coefficient, as calculated using Statistica 12.0, was 0.91, which exceeds the threshold rate of 0.7 and suggests the survey's reliability (Dubina, 2006). The "alpha if deleted" coefficient value exceeds the average one for X7-X10, X20-X23 indicators. Their exclusion from the questionnaire would lead to its greater consistency, while narrowing down the problem under study, since the two significant factors identified by the principal component method would be lost. Since the value of the Cronbach's alpha throughout the questionnaire significantly exceeds the threshold value, the exclusion of these questions is impractical.

4. Materials and methods

The universities for questioning lecturers were selected according to the criterion:

$$arg\ min \sqrt{\sum (Y_{li} - Y_{l\mu_k})^2}, \quad (1)$$

with Y_{li} being a standardized value of the l-th indicator (Y1, Y2), use for clustering, for the i-th university;

$Y_{l\mu_k}$ is a value of the l-th indicator for the center (μ) of k-th cluster;

$i = \overline{1,n}$, with n being the number of the universities;

$k = \overline{1,m}$, with m being the number of clusters, determined with the hierarchical clustering method.

$Y_{l\mu_k}$ values are calculated by the method of clustering of k-average using the Statistica 12.0 software based on standardized values of Y1, Y2 indicators for n universities.

A survey conducted among lecturers from the universities selected by criterion (1) for each of the clusters served as the methodological basis for obtaining quantitative assessments of the level of professional mobility. The questionnaire was voluntary in nature, which was necessary to ensure the research ethics, and was carried out via e-mail. The number of respondents (1109 lecturers of different age categories, various academic degrees, ranks, and areas of knowledge) was representative, as the minimal representative sample for the survey is 273 people. Another factor that ensured representativeness was the presence of universities from all clusters.

The structure (factors) of professional mobility and the role of the resource component were determined using principal components method. It was based on quantitative estimates obtained

as a result of the survey. The influence of factors of pedagogical mobility on the university's efficiency level was studied with the help of regression models that were constructed using the nonlinear estimation method. A standardized arithmetic mean value of the indicators Y1, Y2 was used as a dependent variable in the regression models, while values of the principle components (Fi) were used as independent variables. Due to the incommensurability of dependent and independent variables, independent variables acquire values in the range [0.02; 5.8], and dependent acquires values in the range [2203; 6721]. Dependent variable was standardized:

$$Y_i = \frac{(Y1_i + Y2_i) - \overline{(Y1+Y2)}}{\sigma_{(Y1+Y2)}}, \quad (2)$$

with Y_i being an efficiency indicator for i-th university;

$Y1_i, Y2_i$ being the values of $Y1$ and $Y2$ indicators respectively for i-th university;

$\overline{(Y1+Y2)}$ are the university sample average values of the Y1 + Y2 sum;

$\sigma_{(Y1+Y2)}$ is a standard error for the university sample values of the Y1 + Y2 sum.

The values of the independent variables Fij are determined by the arithmetic mean value of the principle component Fj with respondents from i-th university ($j = \overline{1,n}$, with j being an ordinal number of the principle component and n being the number of significant principle components).

Clustering analysis method, principle components method and regression analysis were performed using Statistica 12.0.

5. Results and discussion

As a result of processing lecturers' profiles and on the basis of the quantitative estimates obtained by the principal component method, the following factors of lecturer professional mobility are determined (Table 2). The number of observations for factor analysis was: N = 1109.

Table 2. Factors of Lecturers' Professional Mobility at the Universities of the Republic of Kazakhstan

Factor	Indicators	Factor's proper value	Factor variance, %	Cumulative variance, %
F1 – Competence factor	X1-X6	12.58	41.78	41.78
F2 – Psychological factor	X11-X14, X16	9.24	30.69	72.47
F3 – Self-development ability factor	X9, X10, X15	4.22	14.02	86.48
F4 – Information technology factor	X7, X8	1.39	4.62	91.10
F5 – The factor of efficiency of interaction between the actors in the educational process	X20, X21	0.84	2.79	93.89
F6 – Informational mobility factor	X17, X18	0.43	1.43	95.32

F7 – The professional mobility stimulation factor	X22, X23	0.24	0.80	96.11
F8 – Software and hardware support factor	X19	0.11	0.37	96.48

The basis of professional mobility is the competence factor (F1) with 41.78 % influence on the development of lecturer professional mobility. This factor combines professional knowledge, professional skills, measured by scientific achievements (availability of education, academic degree, title, awards, publications).

The psychological factor embraces personal characteristics necessary for successful adaptation and self-realization in various situations of professional activity, contributing to professional mobility, like social activity, adaptability, creativity, and interest in pedagogical activity. Conservatism is a stimulant in the development of professional mobility, but indicator X14 (the level of conservatism) was formed in such a way that the higher its value, the lower the degree of manifestation of conservatism. Therefore, this indicator is also a stimulant in the development of professional mobility. The influence of factor F2 is 30.69 %.

The self-development ability factor includes a psychological indicator of self-development ability (X15) and activity indicators characterizing the inclination towards self-development: the presence of multi-scientific (multi-professional) competencies (X9), advanced training, internships (X10). The variance of factor F3 is estimated at 14.02 %.

The mobile information related to professional activities (X7) and modern information technologies (X8) form the information technology factor (F4) with 4.62 % variance.

The factor of efficiency of interaction between the actors in the educational process characterizes the efficiency of interaction between lecturers and students both in classroom and extracurricular activities (indicators X20 and X21 respectively). The efficiency of the organization of interaction provides faster adaptation of students and contributes to the development of mobility of students and lecturers.

Information Mobility Factor (F6) characterizes the rate of information transfer regarding changes at the university level and national level. The development of the factor contributes to the development of professional mobility as a result of increased awareness, which contributes to professional development and optimization of the educational process.

F7 factor describes the stimulation of the development of professional mobility. These are the opportunities provided by the university and incentives for the development of lecturers' professional mobility: providing the opportunity for quick adaptation (X22), promoting international mobility of lecturers (X23).

Software and hardware support factor (F8) characterizes the availability of technical means (computers, multimedia) and software products at the university level. This factor contributes to the development of professional mobility by creating appropriate working conditions, access to operational information, professional development.

The analysis of the content of factors allows to determine two components of the professional mobility of university lecturers: 1) the resource component characterizing the presence of professional, personal characteristics of lecturers, their propensity for mobility (factors F1-F4), and the availability of software and hardware for the effective organization of the educational process (factor F8); 2) the process component is associated with the efficiency of the organization of the educational process: the organization of interaction between the lecturer and the student, the lecturer and the university management, aimed at promoting mobility and adaptation of students and lecturers (factors F5-F7). The contribution of the resource component in the formation of professional mobility of lecturers is 91.46 %, while the process component has 5.01 % and unrecorded factors have 3.52 %.

According to the Kaiser criterion (Table 2) and Cattell criterion (Figure 1), factors F1-F4 are significant, as their proper values exceed 1.0 and the cumulative percentage of variance is 91.10 %, which indicates the complete factorization. Therefore, the decisive role in the development of professional mobility is played by the resource component, namely the individual (professional and psychological) characteristics of the lecturer. The influence of the process component is not statistically significant.

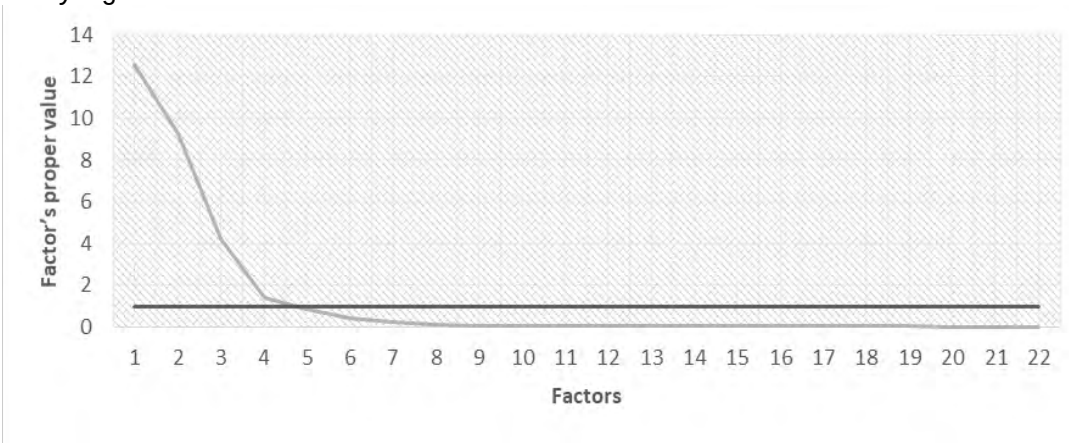
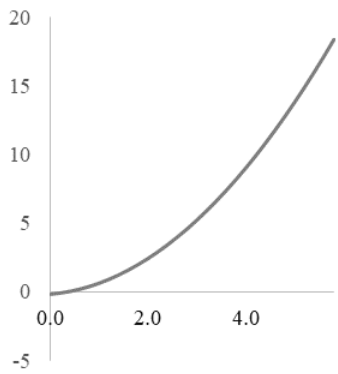
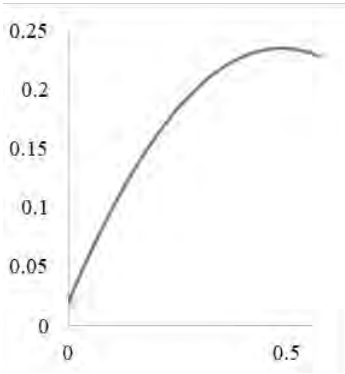


Fig. 1. The scree plot for proper values of factors of lecturer professional mobility in the Kazakh universities

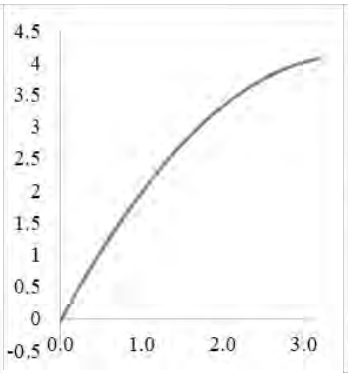
The way the dynamics of the development of factors of lecturer professional mobility influences their universities' efficiency was established by constructing one-way non-linear regression models in which Y was a dependent variable for universities, calculated by formula (2), while the independent variables were the university average values of statistically significant factors F1-F4. Thus, the number of observations was N = 30. The results of building models are shown in Figure 2.



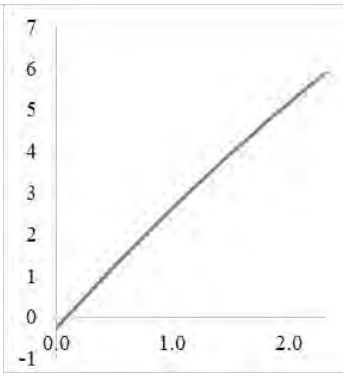
$Y = 0.5 * F1^2 + 0.3 * F1 - 0.18$
The model of factor F1 influence



$Y = - 0.9 * F2^2 + 0.88 * F2 + + 0.02$
The model of factor F2 influence



$Y = -0.33 * F3^2 + 2.34 * F3 - - 0.04$
The model of factor F3 influence



$Y = -0.18 * F4^2 + 3.07 * F4 - - 0.26$
The model of factor F4 influence

Fig. 2. Models of the influence of lecturer professional mobility development factors on university efficiency

The constructed models testify to the positive influence of all factors of professional mobility on the efficiency of the university at a given level of development. But, with an increase in the value of factors F2-F4, the increase in the efficiency indicator (Y) decreases. This indicates that there are critical values for the development of factors, which, being overpassed, would lead to a decrease in efficiency.

The following indicators prove the adequacy of the constructed models:

1) the multiple correlation coefficient with the values tending to 1: 0.92 for the function Y = f (F1), 0.96 for the function Y = f (F2), 0.90 for the function Y = f (F3), 0.94 for the function Y = f (F4);

2) a determination coefficient with values exceeding a sufficient level of 0.75: 0.85 for the function Y = f (F1), 0.92 for the function Y = f (F2), 0.81 for the function Y = f (F3), 0.88 for the function Y = f (F4);

3) F-test criterion with calculated values (16.84-29.08) exceeding the tabulated 4.20 at a significance level of 0.05.

The extreme points of the functions Y = f (F2), Y = f (F3), Y = f (F4) were obtained by finding the first-order derivative of the constructed functions (Figure 2). The extreme points corresponding to the maximum value of the resulting indicator (Y) were: F2crit = 0.49, F3crit = 3.55, F4crit = 8.53. An increase in the value of factors above critical values will lead to lower university efficiency.

Potentially possible values of factors at this stage of development of professional mobility at universities in Kazakhstan are calculated by supplementing the sample with a series of data that corresponds to the maximum score values of indicators X1-X4, X6-X23 according to the proposed assessment scheme (Table 1) and calculating the values of the main components in the program Statistica 12.0. Potential values of the factors were: F2pot = 0.53, F3pot = 3.19, F4pot = 2.32. For factor F1, the potential value was not calculated due to the absence of an upper bound on the value of the indicator X5.

As part of this study, an approach was presented to determine the factors for the development of lecturer professional mobility within the higher education system. This approach is accurate, adequate, universal in application, consistent and valid. It found that the resource component (personal and professional qualities of a person) is a driver for the development of professional mobility of lecturers in universities in Kazakhstan. These results confirm the results of earlier theories surrounding professional mobility: personality characteristics and immaterial factors (process component) are dominant in the process of developing the lecturer professional flexibility in the educational environment (Iucu et al., 2011; Zamir, 2018). But meanwhile, given the specifics of the educational system of Kazakhstan, as well as its cultural features, it should be noted that in the framework of this study, the evidence for the dominance of the resource component in the development of professional mobility is completely contrary to the point of view of scientists in Kazakhstan (Abdiraiymova et al., 2013; Malikov, 2014; Monobayeva, 2013; Gabdulina, Zhuman, 2019), as well as the main priorities of the national strategy (Official Website of the President of the Republic of Kazakhstan, 2018; Strategy 2050, 2020) to ensure the effectiveness of the higher education system. The top-priority consideration of a lecturer's personal and professional characteristics is explained by the fact that professional mobility in the pedagogical sphere has a number of features arising from the specifics of professional activity. Ensuring the flexibility and versatility of vocational education significantly enhances the development of professional mobility in the educational sphere, especially with regard to higher education. In the conditions of worldwide integration, internationalization and openness of the educational sphere, the functioning of many international grant support funds that encourage the academic mobility of lecturers and students, it is the personal factor that is the basis for the development of professional mobility regardless of the level of economic development of the country. That is, the influence of the material factor in this aspect is secondary, which is also characteristic of Kazakhstan. Consequently, the professional mobility of a lecturer is not just a declared educational strategy, but a product of time and an expression of world educational trends. The obtained results are highly relevant as the specific set of factors for the development of professional mobility of a lecturer in a higher school of Kazakhstan is determined, which will improve educational management in the country and make adjustments to the priorities of the national strategy for the innovative development of higher education. In our conditions, it seems appropriate for the improvement of the universities' efficiency to introduce various trainings on the development of university lecturers: creativity and motivation for mental flexibility, emotional control, resistance to stressors, self-confidence, self-acceptance, a positive attitude world, independence, autonomy, responsibility, motivation for self-actualization, and self-improvement. Thus, the lecturer personality formation should become the primary goal, meaning and task of any educational system and should be considered as a system-forming component.

The proposed methodological approach for determining the development factors of lecturer professional mobility also helped conclude that contrary to previous research results (Malikov, 2014; Monobayeva, 2013; Belyakova, 2014), not all factors of the resource component of professional mobility in the education field directly affect the universities' efficiency. The F1 factor's development, however, helps increase such efficiency. The F2 factor's potential value exceeds the critical value. The development of the psychological factor by more than 92.5 % of the potential level creates the opposite effect, namely a decrease in the efficiency of the functioning of the university. For factors F3–F4, critical values exceed potential ones. At this level of lecturer professional mobility development, the cultivation of the ability for self-development, as well as the informational and technological factor have a positive impact on the university's efficiency.

However, it should be noted that the results of the study were obtained only on a sample of universities in the Republic of Kazakhstan, which limits the possibility of their application in educational management practices in other countries. Moreover, in the framework of the study, the influence of the structural dimensions of the professional mobility resource component on the efficiency of higher education institutions was not considered in dynamics, and the qualitative and quantitative laws of such an impact were not identified because of their fundamental nature. Nevertheless, in view of the importance of these aspects and with the results of our study, these aspects will form the basis for further scientific developments.

6. Conclusion

The study revealed that one of the highest priorities to increase the efficiency of higher education in Kazakhstan in the context of the internationalization of the higher education system is the development of the professional mobility of university lecturers. The proposed methodological approach to determine the development factors of lecturer mobility in higher education attests to the importance of the resource component, which encompasses the personal factors, such as competence, psychological, and self-development ability, and information and technological factors that determine the development of professional mobility of the teaching staff in the universities of Kazakhstan. That is, the structure of the lecturer mobility implies the presence of new value qualities that should be formed in the educational sphere. Consequently, the professional mobility of a lecturer is not just a declared educational strategy, but a product of time and an expression of worldwide educational trends. At the same time, despite the presence of a directly proportional effect of the resource component of the lecturer's professional mobility on the efficiency of the university, the development of the self-development factor and the information and technological factors to a critical level negatively affects university efficiency.

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Appendix

Table 1. Systematization of Indicators Affecting Lecturer Professional Mobility in the Higher Education Institutions of Kazakhstan

Designation	Indicator	Estimation
Questionnaire		
X1	The basic higher education in the expert area	0 – Yes, I have one; 1 – I don't have one
X2	Academic degree	0 – I don't have one; 1 – I am a Candidate of Sciences; 2 – I am a Doctor of Sciences
X3	Academic title	0 – I don't have one; 1 – I am a senior lecturer;

		2 – I am a professor; 3 – I am a member of the Academy of Sciences
X4	Awards for scientific and pedagogical activity	0 – I don't have any; 1 – I have regional awards; 2 – I have national awards; 3 – I have international awards
X5	Publications in Scopus and WoS journals	The number of publications (0 if there are no)
X6	Knowledge of a foreign language	0 – I don't know any; 1 –A2 level; 2 – B1 level; 3 – B2 level; 4 – C1 level; 5 – C2 level
X7	Tracking legislative changes in education and specialization	0 – I'm not interested; 1 – I have some information from colleagues and friends; 2 – I monitor these issues, but maximum once a month; 3 – I regularly monitor these issues
X8	Skills in modern information technology	0 – at a simple level; 1 – the basic software (for example, MSOffice); 2 – use of modeling software in professional activities
X9	The multi-scientific (multi-professional) competencies	0 – narrow area of expertise (1-2 disciplines); 1 – expertise in all disciplines within one specialist area; 2 – expertise in cognate disciplines; 3 – knowledge and skills in various fields
X10	Further training and internship	0 – advanced training in established terms; 1 – active professional development (more often than prescribed) within the country; 2 – active professional development, including abroad
X11	Social commitment	5-point scale with 0 being the lowest level of social commitment and 5 being the highest level of social commitment
X12	Adaptability level	5-point scale with 0 being the lowest level of adaptability and 5 being the highest level of adaptability
X13	Creativity level	5-point scale with 0 being the lowest level of creativity and 5 being the highest level of creativity
X14	Conservatism level	5-point scale with 0 being the lowest level of conservatism and 5 being the highest level of conservatism
X15	Self-development ability	5-point scale with 0 being the lack of ability for self-development and 5 being the remarkable ability for self-development
X16	Interest in teaching	5-point scale with 0 being the lack of interest in teaching and 5 being the active interest in teaching
Questions about the educational process at the university		
X17	Timely informing of the scientific and pedagogical staff	0 – within more than 1 month; 1 – within 1 month;

	at the university level (department, dean's office) about changes in internal regulatory documentation	2 – within more 2 weeks; 3 – within more 1 week; 4 – within 1-2 days
X18	Timely informing of the scientific and pedagogical staff about changes in the legislation relating to the professional or organizational activities of the lecturer	0 – no information; 1 – within more than 1 month.; 2 – within 1 month; 3 – within more 2 weeks; 4 – within more 1 week; 5 – within 1-2 days
X19	Sufficient supply of technical means (computers, multimedia) and software products	0 – no opportunity to use computers; 1 – lack of technical equipment; 2 – provision with technical means, but without the ability to work with professional software products; 3 – availability of technical equipment with the ability to work with professional software products
X20	The efficiency of the organization of interaction between lecturers and students in classroom work	5-point scale with 0 being the lowest level of efficiency and 5 being the highest level of efficiency
X21	Efficiency of organization of interaction between lecturers and students in extracurricular activities	5-point scale with 0 being the lowest level of efficiency and 5 being the highest level of efficiency
X22	Providing the ability to quickly adapt staff and students	5-point scale with 0 being the lowest level of adaptability and 5 being the highest level of adaptability
X23	Promotion of international mobility of lecturers (participation in international conferences and continuing education programs, promotion of international publications)	5-point scale with 0 meaning the absence of any encouragement and 5 meaning the presence of material and non-material encouragement