

## Artículo de investigación

**Factors in the development of the education system in Russia**

Факторы развития образовательной системы России

Factores del desarrollo del sistema educativo de Rusia

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Written by:

**Elena N. Fokina**<sup>282</sup>

ORCID: 0000-0003-1916-952X

Elibrary.ru AuthorID: 462339

**Abstract**

The paper aims to uncover the substance and content of the factors exerting a profound effect on the functioning of the higher education market in Russia. The research highlights the relevance of studying the needs of the job market for personnel training in conjunction with determining the prospects for the development of the educational services market. The authors perform econometric analysis and construct the demand and supply models. The empirical basis of the study includes the statistical data for the 1993-2018 time period. The results indicate that throughout the entire period there was a steady decrease in the number of school graduates in Russia which exacerbated in 2005 due to the decline in the birth rate in the early 1990s. The analysis found no significant correlation between the number of school graduates and the number of entrants admitted to higher education institutions. On the other hand, the number of students enrolled at universities was decreasing at a much slower rate than the number of school graduates. The study clarifies that the faculty number has a principal influence on the demand for higher education services in Russia, whereas the volume of investment in education affects a supply of graduates in the job market.

**Key Words:** Higher education system, the educational services market, the job market, factor analysis.

**Аннотация**

Работа представляет собой попытку выявить сущность и содержание факторов, оказывающих наиболее значительное влияние на функционирование рынка образовательных услуг в системе высшего образования в России. В статье рассматривается актуальность проблемы изучения потребностей рынка труда в подготовке кадров во взаимосвязи с определением перспектив развития рынка образовательных услуг. Для этого проведен эконометрический анализ с построением моделей спроса и предложения. Эмпирическую базу исследования составили статистические данные за период с 1993 по 2018 гг. Полученные результаты указывают, что на всем периоде наблюдений прослеживается устойчивое снижение количества выпускников школ в России, обострившееся с 2005 г. в связи со спадом рождаемости в начале 1990-х гг. В ходе анализа не было обнаружено сильной корреляционной связи между количеством выпускников школ и числом абитуриентов, принятых в высшие учебные заведения. С другой стороны, установлено, что число студентов, принятых в высшие учебные заведения снизилось значительно меньшими темпами, чем сокращение численности выпускников школ. Нами определено, что на уровень спроса на услуги высшего образования в России наибольшее влияние оказывает фактор численности профессорско-педагогического персонала, а на уровень предложения выпускников на рынке труда наибольшее влияние оказывает объем инвестиций в сферу образования.

**Ключевые слова:** система высшего образования, рынок образовательных услуг, рынок труда, факторный анализ.

<sup>282</sup> Cand.Sci. (Pedagogical), Assistant Professor, Department of Business Informatics and Mathematics, Tyumen Industrial University, Russian Federation.

## Resumen

El trabajo es la prueba de identificación de la esencia y el contenido de los factores que tienen el impacto mayor en el funcionamiento del mercado de servicios educativos en el sistema de educación superior en Rusia. En el artículo se examina la actualidad del problema del estudio de las necesidades del mercado de trabajo en formación de cuadros en relación con la determinación de las perspectivas del desarrollo del mercado de los servicios educativos. Para ello se realizó un análisis econométrico con la simulación de demanda y oferta. La base empírica del estudio compiló los datos estadísticos para el período entre 1993 y 2018. Los resultados obtenidos indican que en todo el período de observación se observa una disminución constante en el número de graduados de las escuelas en Rusia, que ha aumentado desde 2005 debido a la disminución de la fecundidad al principio de los años noventa. Durante el análisis no se encontró una fuerte correlación entre el número de graduados de las escuelas y el número de solicitantes admitidos en las instituciones de enseñanza superior. Por otra parte, se ha determinado que el número de alumnos admitidos en instituciones de enseñanza superior ha disminuido considerablemente más que el número de las finalistas de las escuelas. Por nosotros es determinado que al nivel de la demanda de los servicios de la enseñanza superior en Rusia el impacto mayor tiene el factor del número del personal profesorado y al nivel de la oferta de los graduados en el mercado de trabajo el impacto mayor tiene el volumen de las inversiones en el campo de la educación.

**Palabras clave:** El sistema de la enseñanza superior, el mercado de los servicios educativos, el mercado del trabajo, el análisis factorial.

## Introduction

Competitiveness of higher education is viewed as one of the major prerequisites for sustainable development and economic growth (Aleksejeva, 2016; Volchik, Maslyukova, 2017; Prapakavičiūtė, Korsakienė, 2016; Starineca, Voronchuk, 2015). Justifiably, performance of universities and effectiveness of employment of graduates are among the most acute issues today (Sam, 2018; Dalati, Al Hamwi, 2016). The enhancing global competition aggravates the problem of the synchronous growth of the educational services market. At that, the strategy for socioeconomic development is based on the interrelation between the trends in the evolution of economic industries, the job market and the system of professional training (Dellis, Karkalakos, & Kottaridi, 2016; Watanabe, Miyake, & Yasuoka, 2018).

According to the WTO's estimates, the capacity of the global education market in 2018 was about 90-100 billion US dollars (Bartsits, 2018); by 2030, this figure is expected to reach 600-800 billion US dollars. Globally, there are around 140 million students and 36,000 universities (Bartsits, 2018). In 2016, Russia accounted for only about 4.5% of the global market for higher education, while the share of the United States was 17%. At the same time, about 2 million students study abroad. Bulaeva and Isaeva (2012) give the following numbers of foreign students: the USA – 548,000 students; the UK – 200,000 students; Germany – 160,000 students; France – over 140,000 students; Russia – about 65,000

students. Over the past years, there was a significant increase in the number of foreign students receiving education in Japan (+15%), Portugal (+13.5%), and Australia (+11%). The given figures demonstrates that internationalization and enhanced interdependence of countries are the central modern trends.

The experience of the developed countries indicates that improving the level of education is one of the most important ways to strengthen the level of material support for population, the quality of life and, consequently, the economic performance (Zayakina, 2008). In the context of structural shifts in the Russian economy, this aspect of development is gaining in relevance. The population's passivity after graduation from secondary school, college or university causes low involvement in optional educational programs, and as a result reduces labor productivity. Kuzminov, Frumin and Ovcharova (2018) have discovered that the proportion of adults aged 25-60 and engaged in any form of education in Russia was 2-3 times lower than in the developed countries. This partially explains the comparatively low labor productivity in the country.

It is obvious that there are numerous factors affecting the development of the education system. These factors clarified will allow building an optimal strategy for the sustainable development of the education system and

economy at large. The purpose of the research is to identify the main trends in the transformation of the educational services market in Russia based on an analysis of factors that determine a change in its defining characteristics. To establish the relationship between the job market and the educational services market, it is necessary to discover a correlation between the number of university graduates and the forecasted demand in the job market. The study is relevant due to the practical objectives of improving the management process of the education system so as to ensure its competitiveness.

### Literature review

Education as a system is becoming more diverse and is gradually transforming into an even more complex social institution. Higher education is generally perceived as one of the supreme social values, and as a must to get a well-paid job (Klushina, 2015) and learn throughout life. At the same time, the primary purpose of the higher education system is to prepare qualified specialists in accordance with the needs of society, as well as to realize personal ambitions for self-development.

The conscious and subconscious motivation of school graduates to receive higher education is influenced by certain factors, such as (Kolesnikova, 2011): to be well-connected since entering a higher education institution is a new stage of socialization; to have a priority over competitors when applying for a job, as any employer prefers an applicant with higher education; to get a powerful impulse for a successful career. Maksimov and Telezhkina (2018) investigated the phenomenon of massification of higher education. They found that the increase in the number of students before 1999 was due to the growing electric energy consumption resulting from the spread of electronic equipment and devices, whereas after 1999 the increase in student numbers was attributable to technology imports and growing importance of information technology.

Lately, there has been a trend towards the integration of world education. According to Mansurova (2014), integration in education is a process and an outcome of the interaction between differentiated components resulting in a new quality state, i.e. a new system-related integrity. This process is due to the ever-growing need for rapprochement of the education systems of different countries, which are associated with the increasing competition in the global market

for educational services. A number of researchers (Nazarov et al., 2007; Kimstach, 2008) agree that the modern civilization has an urgent need to create a global education system.

The contradictory nature of the impact of globalization on the education sphere is relieved if education is interpreted as an international public good. Badarch and Sazonov (2007) emphasize that education should remain a public good, but not turn into a commodity. The threat of this transformation is of concern and not consistent with the interests of universities, students, employers, faculty and society as a whole. It is noteworthy that internationalization of higher education has internal and external aspects: internal internationalization is the cross-national and cross-ethnic content included in curricula and learning processes; external internationalization is the process of exchange of educational products and services between countries.

The world education system is being formed simultaneously with the development of the global economy and the information sphere, increasing academic mobility and exchange of scientific data, formulating a new education paradigm, forming a favorable legal environment to devise an effective organization strategy and education programs (Sofoklis, Megalokonomou, 2016; Litau, 2018; Garcés-Voisinat, 2016). Today, there is a direct correlation between the levels of educational and socioeconomic development (Kuzovenkova, 2018). Volchenskova (2009) distinguishes the following factors in the formation of the global education system: the philosophy of education, information technology, learning theory, and organizational-administrative factors.

Researchers concentrate on studying the characteristics of the educational services market in the context of challenges and prospects for its further development. For example, the Russian educational services market and its specific elements are examined by Khmel'nitsky (2006), Muratov (2009), Myasnikova and Katkova (2018), et al. Polikarpova and Popova (2013) analyze the effectiveness of the Russian regions by the development level of higher professional education on the basis of choice models.

An overview of the scientific literature on economic-mathematical modelling of the dynamics of the higher professional education system shows that the issues of identification of influence factors and the depth of outreach are yet poorly studied. For instance, Galenkova and

Nikitin (2016) took the number of graduates of higher education institutions and specialized secondary schools as variables. They found that a 1% increase in the number of graduates, other things being equal, would result in a 0.4% rise in GRP in three years. The econometric linear model by Kaverina and Bogomolov (2019) confirms the interrelationship between GDP and education spending. At that, they highlight that economic growth is directly dependent on higher education spending. Echenike (2012) proves that there is a correlation between the population's education level and the choice of the strategy for the country's innovation development.

The scarce literature on the factors in the development of the Russian education system demonstrates the necessity to explore and analyze the structure and properties of the system's elements. It is of high importance to identify the factors affecting the formation of the economic-mathematical model for both the demand for educational services and the supply in the job market.

### Materials and Methods

Higher education is a scientifically complex system. The input of this system is an inflow of entrants that mainly consists of graduates of secondary schools, gymnasiums, specialized and technical schools, colleges and other categories of the population who are eligible to enter higher education institutions. The output is qualified specialists (bachelors and masters) who are the final result of the functioning of the education system. An effective method for examining such complicated systems is economic-mathematical modelling.

The present study was divided into the following stages:

- 1) Statistical analysis of the main indicators characterizing the system of higher education in Russia for the period of 1993-2018. The indicators included the number of higher education institutions, the number of students, entrants accepted and graduated from higher education institutions and the number of faculty. The information base of the research was the Rosstat (The Federal State Statistics Service in Russia) data;
- 2) Analysis of correlation between the main indicators;
- 3) Construction of possible correlation and regression models describing the

relationship and interaction of factors of the internal and external environment in the higher education system (Batkovskiy et al., 2015; Batkovskiy et al., 2016).

To construct correlation and regression models, the following notations are introduced:

- a) Dependent variables:  $U$  is the number of entrants accepted to higher education institutions,  $W$  stands for the number of graduates of higher education institutions;
- b) Factors of the external environment: factors describing the economic situation; factors characterizing the sociodemographic situation; factors describing the state of the job market; factors characterizing the political and legal situation; factors relevant to the scientific and technical situation. The group of the factors includes the birth rate and employment;
- c) Factors of the internal environment: factors describing the inventory of the higher education system; factors describing financial security; factors characterizing the educational process; factors describing the information support for the higher education system. The group of the factors includes the number of faculty and investment in education.

The conceptual econometric models for (1) the demand for higher education services and (2) the supply of specialists in the job market is written as:

$$U = f(x_1, x_2, x_3, x_n) \quad (1)$$

$$W = f(x_1, x_2, x_3, x_n) \quad (2)$$

The research limitation is that the number of factors included in the model can be significantly expanded, which will affect the final results.

### Results and Discussion

#### *Trends in the development of the Russian higher education system*

The Russian market for educational services, despite a relatively large number of higher education institutions operating in it, can be described as a market for nearly homogeneous products. In addition, the market exhibits some

signs of deformation due to indirect state intervention through the instruments of direct regulation of higher education institutions and the state order mechanism. In contrast to a perfectly competitive market, an education product in this market is differentiated and realized under both price and non-price competition. The range of educational services and the structure of consumption are rather wide. Currently, the situation in the system of higher education in Russia is characterized by a number of negative trends, such as: inconsistency between the level of young specialists' education and employers' expectations; the mismatch

between the number of graduates and the needs of the economy (in the job market, there is a shortage of certain professions, e.g. technical specialties, and an excess of other specialists, e.g. economists and legal advisors); insufficient funding to higher education.

During the period of 1993-2000, the Russian system of higher education enjoyed a liberal attitude of the government to its development, which was due to the growing demand for educational services. Since 1990, the number of higher education institutions in Russia has almost doubled (Table 1).

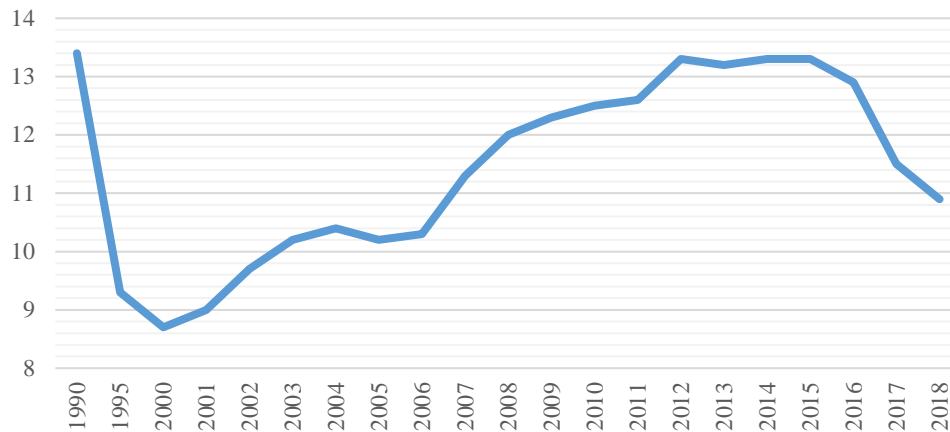
**Table 1.** The state of the higher education system in Russia in 1993-2018

Academic year	Number of higher education institutions	Number of students, thousands	Number of entrants accepted, thousands	Number of graduates, thousands
1993/1994	626	2613.0	590.0	445.0
1994/1995	710	2644.5	626.5	395.5
1995/1996	762	2791.0	681.0	395.5
1996/1997	817	2624.9	674.3	415.1
1997/1998	880	3248.3	814.6	436.2
1998/1999	914	3597.9	912.9	470.6
1999/2000	939	4073.0	1059.0	514.6
2000/2001	965	4741.0	1292.5	578.9
2001/2002	621	4797.4	1461.0	720.0
2002/2003	655	5228.7	1504.0	840.0
2003/2004	652	5596.2	1411.7	860.2
2004/2005	662	5860.1	1385.5	977.0
2005/2006	1068	7064.0	1372.5	1076.0
2006/2007	1090	7310.0	1376.7	1055.9
2007/2008	1108	7461.0	1384.0	1108.9
2008/2009	1134	7513.0	1362.7	1125.3
2009/2010	1114	7419.0	1329.6	1166.9
2010/2011	1115	7050.0	1399.5	1177.8
2011/2012	634	5453.9	1057.7	1157.3
2012/2013	609	5145.3	1111.6	1125.4
2013/2014	969	5647.0	1247.0	1291.0
2014/2015	950	5209.0	1192.0	1226.0
2015/2016	896	4766.0	1222.0	1300.0
2016/2017	818	4399.0	1158.0	1161.0
2017/2018	766	4246.0	1142.0	969.0

Source: Rosstat; Russia in numbers 2018.

The changes in the number of higher education institutions and students indicate that the trend is unsteady: an increase happened during the academic year 2008/09, however, after that there was a downward trend in both indicators. There

are several reasons behind that. First of all, this is a result of the demographic decline in the country that has a direct effect on the potential of entrants in the horizon of the educational cycle (Fig. 1).



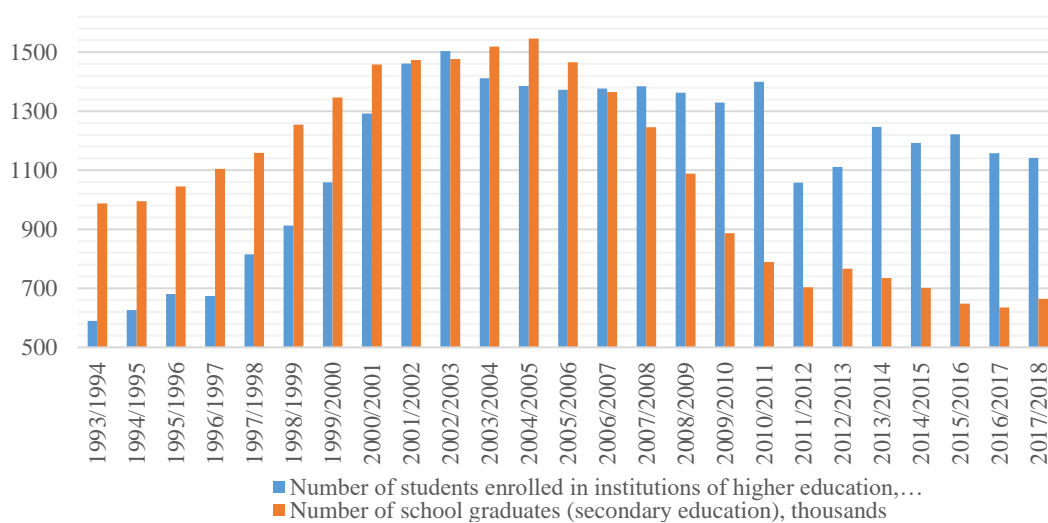
**Fig. 1.** Changes in the birth rate in Russia in 1990-2018, per thousand  
Source: Rosstat.

Consistent with a high correlation of these processes, until 2008 an annual rise in the number of students was a consequence of the baby boom in Russia in the 1980s. Since the early 1990s, the birth rate in the country was in a significant decline. In 1990, the rate was 13.4 births per 1,000, but in 1995 it was only 9.3 births. The birth rate declined for several consecutive years reaching the minimum level in 2000.

In recent years, there has been an upward trend in the number of school graduates entering foreign universities, which also reduces demand for educational services in Russia. The influence

of employers on students' choice is growing; this fact facilitates internationalization of higher education.

One of the main indicators of the quality of education is the ratio of graduates to entrants enrolled in higher education institutions. This indicator started growing in 2008/09, when the trends in increasing motivation for learning and a conscious choice of future specialties by applicants were clearly identified. The attractiveness of higher education for future students is evidenced by the statistical data on the ratio of admitted entrants to the total number of school graduates (Fig. 2).



**Fig. 2.** Changes in student enrollment and school graduation in 1993-2018  
Source: The Russian statistical yearbook (RSY) 2003; RSY 2006; RSY 2011; RSY 2015; RSY 2017; RSY 2018.

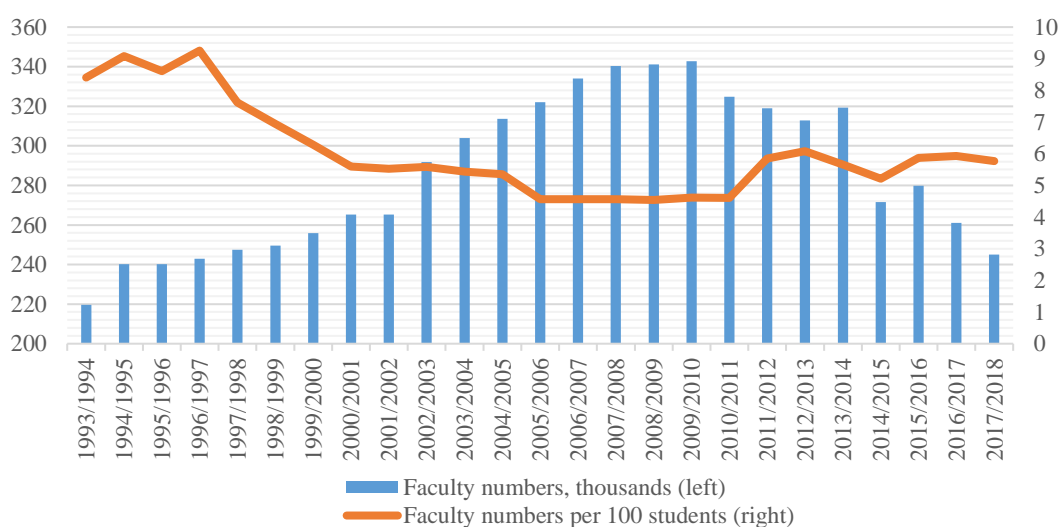


In the early 1990s, the high demand for higher education encouraged the rapid development of education on a fee-paying basis in both the public and private universities of the country. This led to the fact that over the two-decade period (from 1992 to 2012) the number of private universities increased 15 times. However, since 2010, the private education sector has been experiencing a decline: in 2013–2018, their number reduced by 130 universities, with 178 universities left (The Bulletin of the Analytical Center for the RF Government (ACRF)).

One of the positive trends was the steady growth in the number of students admitted to private

universities for full-time education. During the period from 2013 to 2017, the share of full-time students in private universities increased by more than 6%, to 201,000 (ACRF).

A drop in the number of higher education institutions in Russia, which happened after the financial crisis of 2008-2009, entailed a reduction in faculty numbers (Fig. 3). The number of lecturers per 100 students is one of the key indicators. By 2018, the average decline in this indicator was 31%. For example, in the academic year 1993/1994 there were 8.41 lecturers per 100 students, but in 2017/2018, this indicator fell to 5.77.



**Fig. 3.** Changes in faculty numbers in Russia's higher education institutions in 1993-2018  
Source: Rosstat.

The analysis shows that today's market for educational services in Russia inherited the demand-supply mismatch of the 1990s (Paevskaya, 2013). The excess of supply over demand is obvious, which aggravates the severity of the competition between universities for applicants amid growing demand for high-quality educational services. There was an increase in potential demand without regard to the trend in the structure of the job market. We can ascertain that student numbers and their specialization collide with the real demand in the country's economy. Such a situation necessitates the search for an optimized model for the development of higher education.

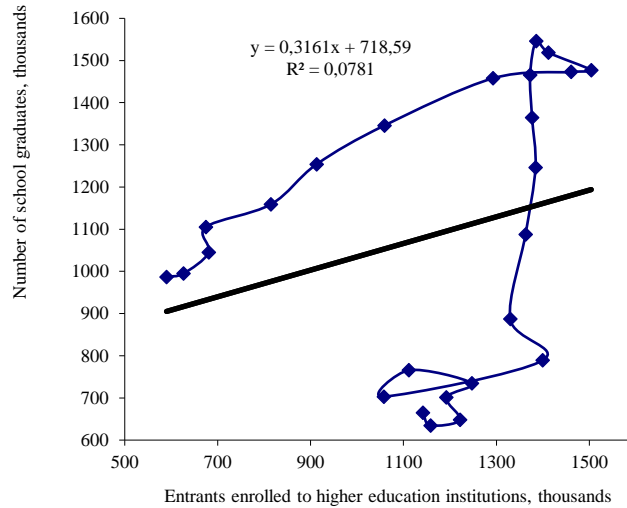
### Correlation analysis

In the course of the research, we built an econometric model which took into account the following: the number of school graduates; the number of entrants admitted to higher education institutions; the number of institutions of higher education in Russia; the number of students in higher education institutions; the number of faculty. The parameters were used to verify the presence of a pairwise relationship between them.

The analysis of the data demonstrated that, firstly, there was no significant correlation between the number of school graduates and the number of entrants accepted to universities (Fig. 4). The correlation coefficient was 0.078.

According to the Cheddock scale, there is practically no relationship in this case. This means that not only secondary school graduates, but also graduates of technical schools, colleges

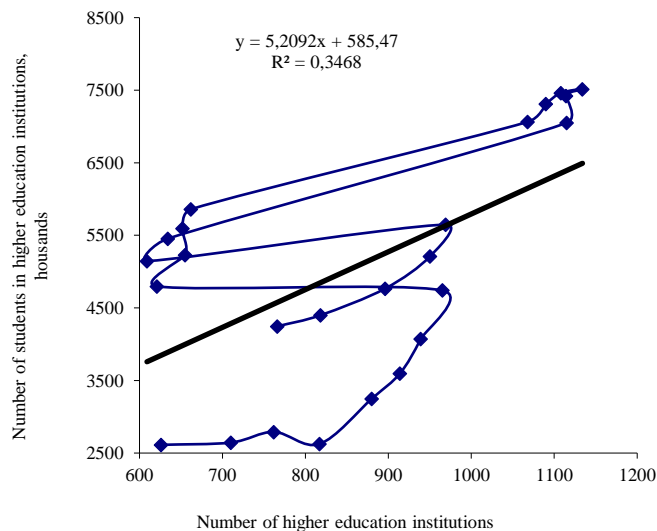
and other categories of the population receive higher education in Russia. The general structure of university entrants is very heterogeneous.



**Fig. 4.** Correlation between the number of school graduates and the number of entrants enrolled to higher education institutions

Secondly, the correlation coefficient between the number of higher education institutions and the number of students was 0.346, which indicated that there was an average direct relationship (Fig. 5). In other words, the growing number of educational institutions results in a rise in student

numbers. However, it is worth noting that this correspondence can be explained through the converse that an increase in the student numbers causes the number of educational institutions to grow.

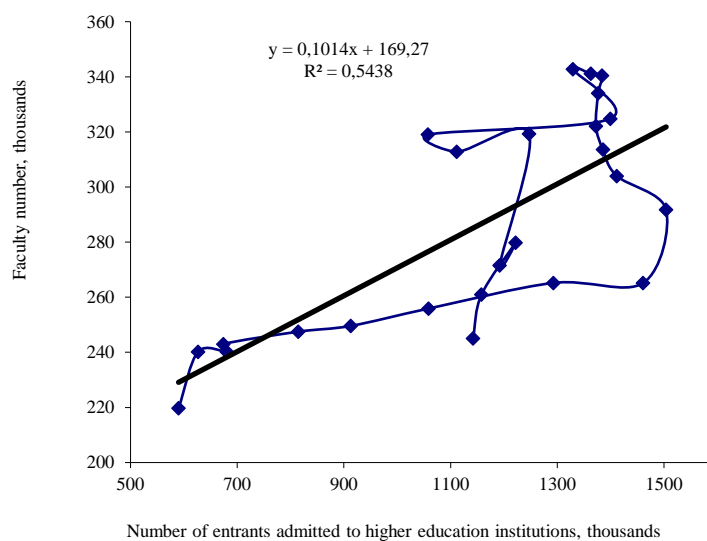


**Fig. 5.** Correlation between the number of higher education institutions in Russia and student numbers



Thirdly, an average direct relationship is found between the number of entrants admitted to higher education institutions and faculty numbers

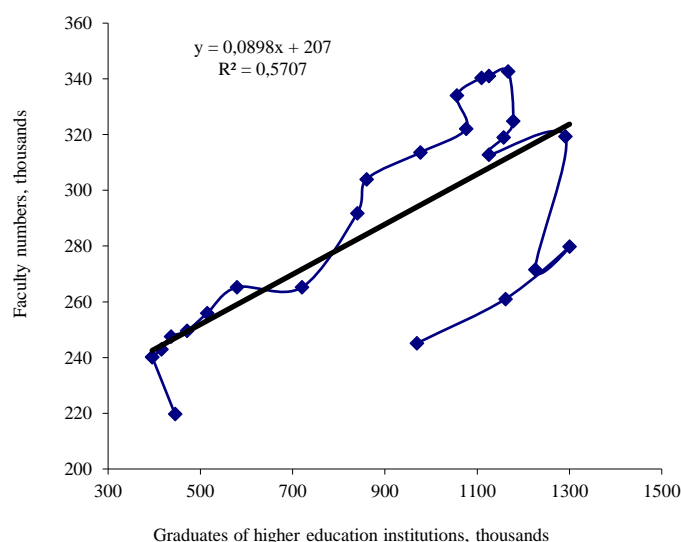
(correlation coefficient amounts to 0.543) (Fig. 6).



**Fig. 6.** Correlation between the number of entrants admitted to higher education institutions and faculty numbers

Fourthly, there is an average direct relationship between the number of graduates and faculty numbers in higher education institutions. The correlation coefficient amounts to 0.570 (Fig. 7),

i.e. an increase in the number of graduates of higher education institutions produces a rise in faculty numbers.



**Fig. 7.** Correlation between the number of graduates of higher education institutions and faculty numbers

### Regression models

The initial data for constructing an econometric model of (1) demand for higher education services and (2) supply of specialists with higher education in the job market are given in Appendix. When building the models, it was assumed that the higher education market in Russia was influenced by factors of the external and internal environment, such as the birth rate, the number of the employed, the faculty number and investment in education. The effect of other factors was not taken into account which corresponds to research limitations.

The regression analysis has produced the following equation for the demand model:

$$Y = 2800.9699 - 81.6161X_1 - 35.222X_2 + 5.0686X_3 + 1.6104X_4 \quad (3)$$

Statistical significance of equation (3) is verified through the coefficient of determination and the *F*-test. It was discovered that in the situation under study 61.1% of the total variability of *U* was due to a change in factors  $X_j$  ( $R^2 = 0.611$ ). The *F*-test value for degrees of freedom  $k_1 = 4$  and  $k_2 = 20$  was  $F_{kp}(4;20) = 2.87$ ,  $F = 7.86$ . Since the actual value is  $F > F_{kp}$ , the coefficient of determination is statistically significant and the regression equation is statistically reliable (i.e.  $b_i$  coefficients are jointly significant).

The matrix of paired correlation coefficients of the model parameters is presented in Table 2.

**Table 2.** Matrix of paired correlation coefficients of the model of demand for higher educational services

	Y(U)	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>
Y(U)	1	0.456	-0.403	0.737	0.393
X <sub>1</sub>	0.456	1	0.068	0.668	0.899
X <sub>2</sub>	-0.403	0.068	1	-0.359	0.252
X <sub>3</sub>	0.737	0.668	-0.359	1	0.492
X <sub>4</sub>	0.393	0.899	0.252	0.492	1

Based on the results obtained, the model's parameters can be economically interpreted in the following way: an increase in the birth rate by 1 unit leads to a decrease in the number of entrants enrolled in higher education institutions by an average of 81,600 people; an increase in the number of employees by 1 million people leads to a decrease in the number of entrants entered higher education institutions by an average of 35,200 people; an increase in the number of faculty by 1 thousand people causes a rise in the number of entrants enrolled in higher education institutions by an average of 5,100 people; an increase in investment in education by 1 billion rubles increases the number of entrants admitted to higher education institutions by an average of 1,600 people.

According to the maximum coefficient  $\beta_3=0.703$ , we can conclude that the indicator of faculty numbers ( $X_3$ ) exerts the most significant influence on the resulting parameter *W*.

The conducted regression analysis allowed us to obtain the following equation for the supply model:

$$Y = -981.9815 + 47.3646Y_1 + 4.2996Y_2 + 3.0193Y_3 + 1.5779Y_4 \quad (4)$$

Statistical significance of equation (4) was also verified through the coefficient of determination and the *F*-test. It was found that in the situation under consideration 92.9% of the total variability of *W* was due to a change in factors  $Y_j$  ( $R^2 = 0.929$ ). The *F*-test value for degrees of freedom  $k_1 = 4$  and  $k_2 = 20$  was  $F_{kp}(4;20) = 2.87$ ,  $F = 64.53$ . Since the actual value is  $F > F_{kp}$ , the coefficient of determination is statistically significant and the regression equation is statistically reliable (i.e.  $b_i$  coefficients are jointly significant). Since the actual value is  $F > F_{kp}$ , the coefficient of determination is statistically significant and the regression equation is statistically reliable (i.e.  $b_i$  coefficients are jointly significant).

The matrix of paired correlation coefficients of the model is presented in Table 3.

**Table 3.** Matrix of paired correlation coefficients of the model of supply of specialists with higher education in the job market

	Y(W)	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>	Y <sub>4</sub>
Y(W)	1	0.924	0.034	0.756	0.887
Y <sub>1</sub>	0.924	1	0.068	0.668	0.899
Y <sub>2</sub>	0.034	0.0678	1	-0.359	0.252
Y <sub>3</sub>	0.756	0.668	-0.359	1	0.492
Y <sub>4</sub>	0.887	0.899	0.252	0.492	1

Based on the results obtained, the model's parameters can be economically interpreted in the following way: an increase in the birth rate by 1 unit leads to an increase in the number of graduates of higher education institutions by an average of 47,400 people; an increase in the number of employees by 1 million people leads to an increase in the number of graduates of higher education institutions by an average of 4,300 people; a rise in the number of faculty by 1,000 people increases the number of graduates of higher education institutions by an average of 3,000 people; an increase in investment in education by 1 billion rubles leads to an increase in the number of graduates of higher education institutions by an average of 1,600 people.

According to the maximum coefficient  $\beta_4=0.476$ , we can conclude that the indicator of investment in education exerts the most significant influence on changes in the number of graduates of higher education institutions.

### Conclusions

The present research showed that the development of the educational services market in Russia was characterized by such important trends as aggravating competition between the participants and optimization of the network of higher education institutions. This was due to a number of reasons associated with the demographic situation in the country and international migration of the population and the youth, in particular.

The analysis of the statistical data found no strong correlation between the number of school graduates and the number of entrants enrolled to higher education institutions. Throughout the entire period of observation, there was a stable decline in the number of school graduates in Russia which became especially massive in 2005 due to a fall in the birth rate in the early 1990s. On the other hand, we discovered that the number of students admitted to higher education

institutions was falling at a much slower rate than the number of school graduates. These assessments revealed that the numbers of higher education institutions, students and faculty increased.

The constructed econometric models allowed us to conclude that the number of faculty exerted the most profound effect on the demand for higher education services in Russia, whereas the volume of investment in education was the central factor influencing the supply of graduates in the job market.

It should be noted that the rapid development of the modern market for educational services necessitates a detailed study of the patterns of its functioning.

The model of demand for higher education services and the model of supply of specialists with higher education in the job market can be expanded with new factors not included in the present study.

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## Appendix

Factor matrix of the model of demand for higher education services and the model of supply of specialists with higher education in the job market in Russia

Year	Factor					
	U	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	W
1994	590.0	9.6	70.4	219.7	4.8	445.0
1995	626.5	9.3	70.7	240.2	4.8	395.5
1996	681.0	8.9	69.7	240.2	5.6	395.5
1997	674.3	8.6	68.1	243.0	6.2	415.1
1998	814.6	8.8	67.3	247.5	7.2	436.2
1999	912.9	8.3	72.2	249.6	10.4	470.6
2000	1059	8.7	65.1	255.9	15.6	514.6
2001	1292.5	9.0	65.1	265.2	21.9	578.9
2002	1461.0	9.7	66.7	265.2	26.0	720.0
2003	1504.0	10.2	66.3	291.8	31.2	840.0
2004	1411.7	10.4	67.3	304.0	51.1	860.2
2005	1385.5	10.2	68.3	313.6	68.8	977.0
2006	1372.5	10.3	67.2	322.1	100.6	1076.0
2007	1376.7	11.3	68.0	334.0	144.6	1055.9
2008	1384.0	12.0	68.5	340.4	170.6	1108.9
2009	1362.7	12.3	67.5	341.1	140.6	1125.3
2010	1329.6	12.5	67.6	342.7	163.7	1166.9
2011	1399.5	12.6	67.7	324.8	198.3	1177.8
2012	1057.7	13.3	68.0	319.0	213.3	1157.3

2013	1111.6	13.2	67.9	312.8	228.9	1125.4
2014	1247.0	13.3	67.8	319.3	242.7	1291.0
2015	1192.0	13.3	68.4	271.5	241.0	1226.0
2016	1222.0	12.9	72.8	279.8	210.5	1300.0
2017	1158.0	11.5	71.1	261.0	225.3	1161.0
2018	1142.0	10.9	72.2	245.1	270.8	969.0

Note:

(U) stands for the number of entrants admitted to higher education institutions, thousands;

( $X_1$ ), ( $Y_1$ ) is the birth rate;

( $X_2$ ), ( $Y_2$ ) is the number of employees, million people;

( $X_3$ ), ( $Y_3$ ) is the number of faculty, thousands;

( $X_4$ ), ( $Y_4$ ) denotes investment in education, billion rubles\*;

(W) is the number of graduates of higher education institutions, thousands;

\* in trillion rubles until 1998.

Source: Rosstat; Russia in numbers 2018.