

Statistical Factor Analysis of Demand for Russian Higher Education Institutions with Foreign Students

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Abstract

Russian higher education is gaining new frontiers, becoming an increasingly strong competitor to European universities. For one year the number of students from Europe in Russian universities increased by 40%, reaching 2.5 thousand people in 2015-2016 academic year. Russian higher education institutions have entered a number of TOP ratings in recent years, and it has happened because the number of foreign students and applicants entering institutes and universities of the Russian Federation is growing every year. So, the number of foreign students in Russian universities increased by one and a half in 2015-2016. The target of this research is to study the influence of individual factors on the relevance of the university with foreign students. The scope of the research is universities in the subjects of the Russian Federation and quantitative characteristics of universities' activity.

Keywords: University Demand, International Students, Student Mobility, University Demand Factors

Introduction

Establishing a context

The university's relevance reflects the ability of a higher education institution to attract the best students. Global world trends have shown that higher education is becoming increasingly international. According to experts from the Organization for Economic Cooperation and Development (OECD), more than 4 million applicants enter universities outside their countries. The interest in attracting foreign students to the country is traditionally high in developed countries, and the trend of interest growth will only increase. For example, to support the US innovation economy, according to the Center for Higher Education Studies of the University of California, it is required to double the number of foreign students by 2020 (today more than 700,000 foreigners graduate in the US) (Smetanina, 2017) [1].

Over the past ten years, the number of foreign students in Russia has increased almost threefold. In 2004-2005, they were about 100 thousand foreign

students, and by the summer of 2015 it reached 282 thousand foreign students ("Russia is gaining popularity with foreign students", 2016) [2]. Russian universities managed to attract foreign students, but they have not been recognized in the world yet. Three Russian universities were included in the ranking of the best universities in the world in 2016, published by the British edition of Times Higher Education (THE).

Today, according to UNESCO, Russia ranks 6th in the world in terms of the number of foreign applicants studying in universities. Russia is ahead of the United States, Britain, France, Australia and Germany. The highest demand for Russian higher education is among the citizens of the CIS: most students come from Belarus, Kazakhstan, Ukraine and Uzbekistan. If we take into account foreign countries, the main stream of students comes from China, India, Malaysia and Vietnam. Among the leading universities in terms of the number of students studying abroad are: Russian Peoples' Friendship University, Moscow State University, St. Petersburg State University, St. Petersburg Polytechnic University, I. M. Sechenov Moscow State Medical University. In addition, foreign students receive higher education not only in Moscow and St. Petersburg. Foreign students often chose Tomsk, Novosibirsk, Irkutsk and Rostov-on-Don (Terekhina, 2015) [3].

According to Krasnova, in 2014-2015 Russian universities received about 13,7 billion rubles (\$215 million) from foreign students. Within the total budget of Russia universities this is a insignificant sum, but there are signs that it could increase significantly. Additionally, the government is taking steps to open Russia education for foreign students. "Currently, the Russian state budget allots about 15,000 quotas annually for foreign students to study in Russia. Recently this indicator has increased by three times," said Zamolodchikov ("How Russian universities are profiting from foreign students", 2016) [4].

Popularization of rating systems in Russia leads to the search for new models of universities' development, which must take into account the factors that influence the choice of the university by the best applicants. At the same time, the ratings do more than just determine the level of the university's activity. These ratings are becoming a model for marketization and globalization of higher education, as well as a tool for fighting for world-class quality.

The main indicators of the QS rating, which is taken as the basis for the Ministry of Education and Science of the Russian Federation:

- The reputation of the university in academic circles (40% of the assessment);
- The ratio of students and teachers (20%);
- The citation ratio of scientific works of the teaching staff (20%);
- The reputation of the university among employers (10%);
- The number of foreign students (5%) and teachers (5%).

Despite its insignificant share (only 5%), the number of international students enrolled in educational programs in Russian universities is not easy to carry out at all, especially for universities working outside central regions of Russia. Foreign students are important for Russia because of economic and political benefits: they can create jobs in the region's economy, import foreign currency and spend it on the territory of the Russian Federation, while maintaining sales, services, etc. In addition, some of them become potential resources for business development and bilateral economic relations between countries (Vorobyova, 2015) [5].

Literature Review

Many Western countries have long recognized the key role of student migration as a key source of high-quality workforce. The issue is to transfer the potential of foreign students to permanent human capital in the host country. This is especially important for countries facing a shortage of qualified personnel in certain areas. Unlike other types of migration, foreign students are rather temporary ones. Foreign students also create global networks that often cause future skilled labor immigration. This led to an increase in the number of national programs aimed at obtaining and maintaining excellent foreign students (Bijwaard & Qi Wang, 2013) [6]; NORFACE MIGRATION. Discussion Paper No. 2013-05 [7]).

Oosterbeek and Webbink (2011) [8] found that for those outstanding applying students, studying abroad and the length of their study experience increase their propensity to live abroad. Since the sample is limited to those very outstanding students, the extrapolation to general conclusions about student

behaviour is dangerous (Oosterbeek & Webbink, 2011) [8].

Oana Dumitrașcu & Anca Șerban (2013) [9] in their study have showed that a huge role in choosing the university for the foreign applicant is the reputation of the university, the high quality of teaching methods and excellent opportunities for career growth. The analysis conducted by the authors Antonio Mihi-Ramirez & Vilmante Kumpikaite (2014) [10] have showed the main reasons for the migration of foreign students are related to economic reasons, while other factors influencing the decision of migrate students depend on the particular country analyzed. Beine, Noel and Ragot (2014) [11] have analyzed the determinants while choosing the location by international students. Elena Y. Kosheleva et al. (2015) [12] argue that international student mobility is currently one of the most promising areas of research, not only for the development of the innovative university, but also for the economy and foreign policy of the whole country.

"International Migration Outlook 2016" [13] illustrates that OECD countries continue to rework their framework for attracting and retaining international students, trying to balance the important role of students in contributing to the higher education system and labour migration channels with the need to ensure compliance with conditions of admission. Cary, Wu & Rima, Wilkes (2017) [14] in their work titled: "International students' post-graduation migration plans and the search for home" expanded the definition of migration and considered the role of life experiences and aspirations.

Aim of the Study

The goal of the research is to study the influence of individual factors on the relevance of the university among foreign students. The scope of the research is quantitative characteristics of universities' activity. The information base of the research is information and analytical materials on the results of monitoring the effectiveness of higher education institutions. This monitoring was carried out by the Ministry of Education and Science of the Russian Federation in 2017.

The monitoring involved 769 universities and 692 branches (the total volume of the population - 1461) from all regions, except for the Nenets Autonomous District, which does not have higher education institutions.

The authors of this research have selected a 10 percent sample (150 units). It included universities of various forms of ownership - 122 federal and regional budgetary and autonomous education institutions (EI), as well as 28 private (non-profit). If

only one university from the region was included in the sample, then it had federal subordination; if 2 universities - then both universities could have a federal form of ownership, in case if their number significantly exceeded the number of non-governmental organizations; or there were universities of different forms of ownership.

The representation of each entity of the Federation was different – it was proportional to the number of higher education institutions (HEI): for example, if the number of HEI in the region was less than 15, then 1 higher education institution was selected. In the city of Moscow 167 universities participated in the Monitoring-2017, and 9 were included in the sample.

Methodological Framework

The mainstreaming of universities into the sample by branches of science was carried out in a random order, but in regions with a small number of institutions, the preference was given to state universities. In total 49 state and federal universities were included. The branches of science “Art and Culture” and “Defense and Security of State, Military Sciences” are not represented, since they have very few foreign students for various reasons.

The basis for calculating the majority of performance indicators is not the total number of university students, but the so-called “enrolled student body”. It is calculated by the formula:

$$a+0,25b+0,1c,$$

where a is the number of students enrolled in full-time education, b is the number of students enrolled in full-time (evening) education, c is the number of students enrolled in correspondence courses.

A set of factor and performance indicators for conducting statistical analysis is the array of data that is collected during the Monitoring. The Ministry has divided them into 7 groups, containing 62 indicators:

- 1) Educational activity (15 indicators);
- 2) Research activity (16 indicators);
- 3) International activity (13 indicators);
- 4) Financial and economic activity (4 indicators);
- 5) Infrastructure (8 indicators);
- 6) Employment (1 indicator);
- 7) Staffing (5 indicators).

Taking into account the specifics of the research, the authors presented some indicators of the third block in the form of effective variables. Thus, the authors have received the following system of 7 effective statistical indicators characterizing the level of demand for Russian higher education institutions with foreign students:

Y_1 - ratio of foreign students (except for the countries of the Commonwealth of Independent States) who are pursuing bachelor's, specialist's, master's degree,

in the total number of students (enrolled student body), %;

Y_2 - ratio of foreign students from the CIS countries, who are pursuing bachelor's, specialist's, master's degree, in the total number of students (enrolled student body), %;

Y_3 - ratio of foreign students who completed bachelor's, specialist's, master's degree programs, in the total number of students (enrolled student body), %;

Y_4 - ratio of foreign students (except for the CIS countries) who completed bachelor's, specialist's, master's degree programs, in the total number of students (enrolled student body), %;

Y_5 - ratio of foreign students from the CIS countries who completed bachelor's, specialist's, master's degree programs, in the total number of students (enrolled student body), %;

Y_6 - ratio of students enrolled in full-time education: who are pursuing bachelor's, specialist's, master's degrees and have studied abroad for at least a semester (trimester), in the total number of students enrolled in full-time education, %;

Y_7 - number of students from foreign education institutions enrolled in full-time education: who are pursuing bachelors, specialist's, master's degrees, and have studied abroad no less than a semester (term), per 100 students enrolled in full-time education.

The division of foreign students (and graduates) into representatives of the CIS countries and countries of the far abroad is generally logical. It seems quite obvious that the representatives of the first group are larger than the second one. First, the CIS countries are geographically closer; secondly, the procedure for admission and exit is simpler; thirdly, the commonality of the language and (often) related links allow students of the near abroad to choose Russian universities. This hypothesis is confirmed in most universities, and in some HEI the difference is very noticeable. For example, in three universities it is more than 20% (Siberian Institute of Business and Information Technology in Omsk does not have students from the far abroad (0%), while the share of students from the CIS countries is 26.73%, in Kostroma State Agricultural Academy, respectively, 0.01% and 24.74%, in Tomsk State University of Control Systems and Radio electronics - respectively, 0.28% and 22.09%).

However, there is a large number of institutions (36, that is 24%) in the sample, where this hypothesis is rejected. If the students of the far abroad dominate over the CIS students in almost one-fourth of universities, this should not be considered an exception and it requires a separate monographic survey. Let us consider some of the revealed trends. 12 out of 36 (1/3) of these institutions are located in the regions of Eastern Siberia and the Far East.

Almost all (35 of 36) of the HEI are owned by the state, except for East-Siberian Institute of Economics and Law (Irkutsk), although in this institution the total share of foreign students is less than 2%. As for the specifics of universities' activity in this group, there are no regularities: universities of pedagogical, medical, economic and other profiles are represented.

Results

Not all universities have students from countries outside the Commonwealth of Independent States in their ranks. The number is 24 in the sample, which is

16%. At the same time, it is impossible to say unambiguously which regions they belong to and what form of property they have. For example, among them there are universities from Yakutia (Yakut State Agricultural Academy), and Moscow (Moscow Financial and Economic Institute). The average share of foreign students (except for the CIS countries) was 1.5% in the sample, and the average ratio of foreign students from the CIS countries was 4.1%.

More detailed statistical characteristics of each performance indicator are presented in Table 1

Table 1. Basic Statistical Characteristics by Performance Indicators

Indicators	Average value	Median	Modal value	Standard deviation	Coefficient of variation, %
Y ₁	1,497400	0,625	0,00	2,528556	168,8631
Y ₂	4,113267	2,815	2,40	4,528842	110,1033
Y ₃	3,449267	2,180	0,00	4,417267	128,0640
Y ₄	1,097933	0,150	0,00	2,387208	217,4274
Y ₅	2,350867	1,350	0,00	3,801522	161,7072
Y ₆	0,285333	0,070	0,00	0,513227	179,8694
Y ₇	0,501067	0,000	0,00	2,069372	412,9933

The most representative is Y₂ among all 7 indicators – “the ratio of foreign students from the CIS countries, who are pursuing bachelors, specialists, master's degrees, in the total number of students (enrolled student body).” It is the largest indicator by average value and by median, and also the only indicator whose modal value differs from zero. In half of the universities represented, the share of students from the CIS countries is less than 2.815%, and in half - more than 2.815%. Each university has students - representatives of the Commonwealth states, and the minimum value of their ratio is 0.04% (SIBUP in Krasnoyarsk).

It should be noted that all seven indicators are distributed very unevenly - the coefficient of variation exceeds 100%. The most vivid variation of the values is shown by the Y₇ indicator.

The remaining 55 indicators included in the monitoring program are also heterogeneous in terms of the goal of the research. This is due to the fact that the demand indicators for Russian universities with foreign students are not “dead-end”. This circumstance means that the number of foreign students, due to some or other factors, is projected on the structure of enrolled student body at different levels of education, as well as the volume of the university's income. Based on this, 3 indicators were chosen as effective indicators of the second level (Z). These are indicators that are influenced not only by general university factors, but also by factors represented by demand indicators for Russian universities with foreign students. They include:

Z₁ - ratio of foreign citizens (except for the CIS countries): postgraduate students, interns, assistant trainees of the education institution in the total number of postgraduate students, interns, assistant trainees, %;
 Z₁ - ratio of foreign citizens from the CIS countries: post-graduate students, interns, assistant trainees of the education institution in the total number of postgraduate students, interns, trainee assistants, %;
 Z₃- amount of funds from educational activities received by the education institution from foreign citizens and foreign legal entities, thousand rubles.

Thus, the ratio of factor indicators contains remaining 52 indicators from the Monitoring program, as well as the fictitious dichotomous variable “The form of ownership of the education institution”, which takes two values: 0 - private (Private Education Institution, Educational Autonomous Not-for-profit Organization of Higher Education); 1- state ([Federal State Budgetary Educational Institution of Higher Education](#), FSAEI, etc.).

The correlation-regression analysis (CRA) is a classical method of stochastic modeling of random mass phenomena. It studies the correlation ratio between indicators, when the relationship between them is not strictly functional and is distorted by the influence of extraneous, random factors. When carrying out the correlation-regression analysis, various correlation and regression models of economic activity are developed. In these models, there are factor and performance indicators (signs).

The correlation analysis aims to measure the correlation ratio between variables and to assess the factors that have the greatest impact on the outcome. The regression analysis is designed to select the form and type of model for determining the calculated values of the dependent variable (the resultant attribute).

The necessary and final stage of preliminary processing of initial quantitative data for the

regression analysis is the verification of their normal distribution. The basis for testing is Pearson’s chi-squared test.

The results of checking performance indicators for compliance with the normal distribution law are shown in Figures 1-7. Calculations were conducted in “Statistica.10”.

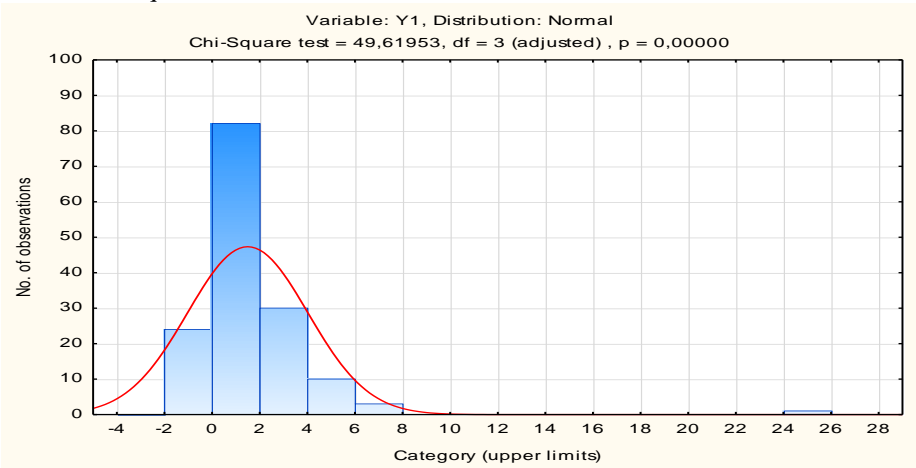


Fig. 1 - Distribution of the Random Variable by the Variable Y₁

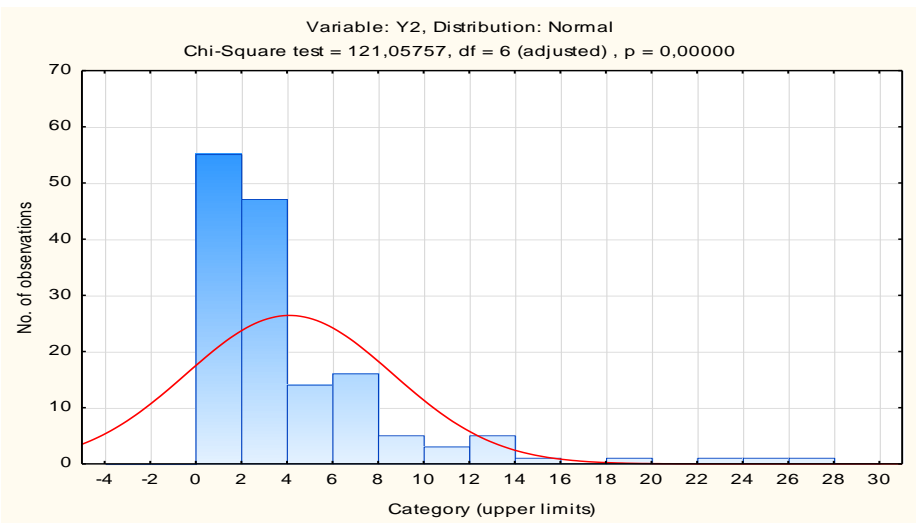


Fig. 2 - Distribution of the Random Variable by the Variable Y₂

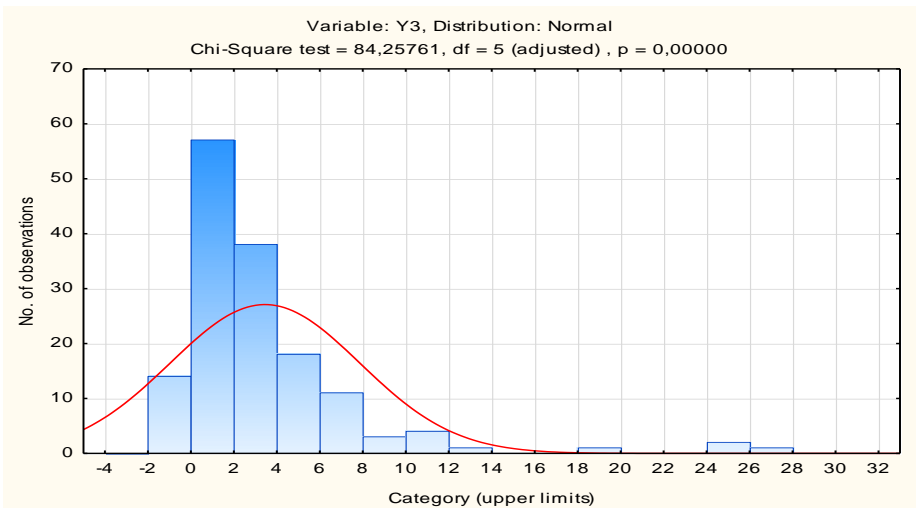


Fig. 3 - Distribution of the Random Variable by the Variable Y_3

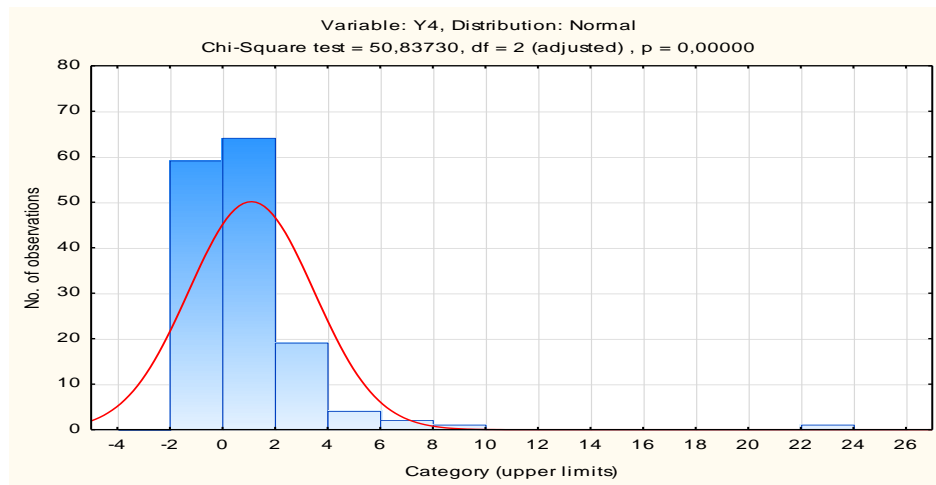


Fig. 4 - Distribution of the Random Variable by the Variable Y_4

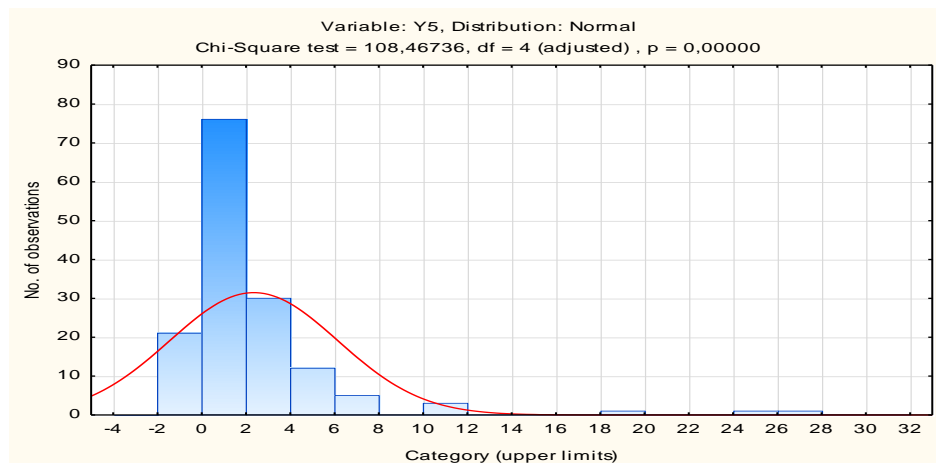


Fig. 5 - Distribution of the Random Variable by the Variable Y_5

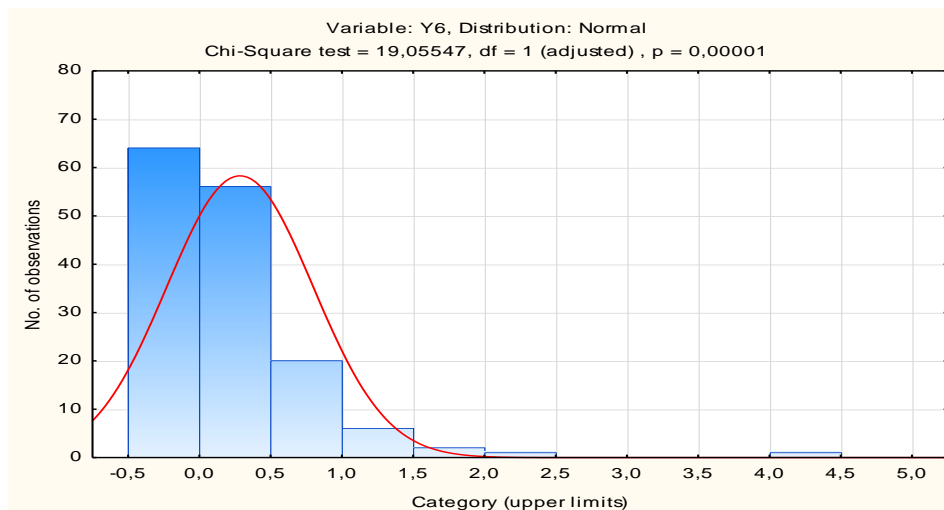


Fig. 6 - Distribution of the Random Variable by the Variable Y_6

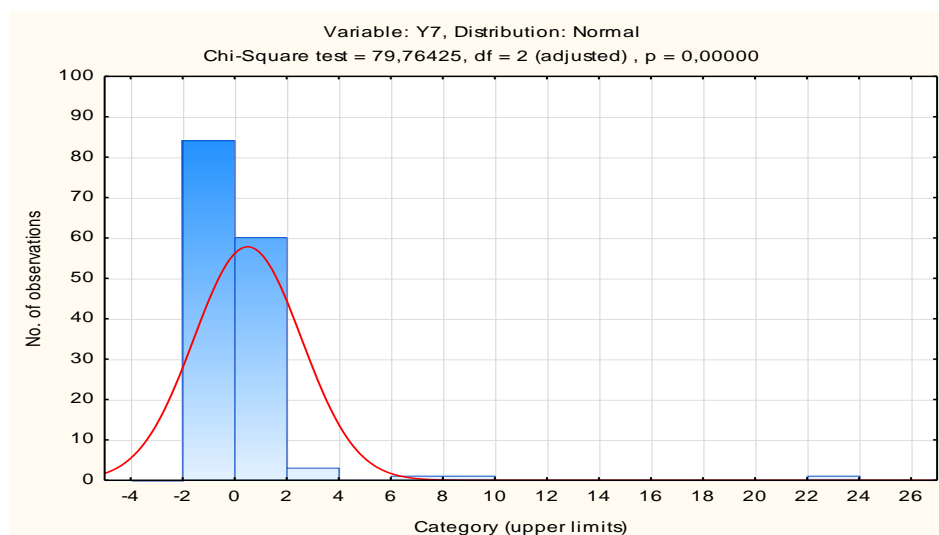


Fig. 7 - Distribution of the Random Variable by the Variable Y₇

The distribution of none of the seven performance indicators is not subject to the normal principle. Thus, it is not correct to apply parametric analysis methods to them. We will use nonparametric methods of the correlation analysis - methods of rank correlation.

At the same time, the presence of the fictitious (nominal) variable allows abstracting from the check for normality and developing a regression model with a variable structure (1):

$$\hat{Y}_1 = 0,416 + 1,330x, \quad (1)$$

where: Y₁ - ratio of foreign students (except for the CIS countries) enrolled in full-time education: who are pursuing bachelor's, specialist's, master's degrees, in the total number of students (enrolled student body), %;

X – form of ownership.

Interpretation of the model parameter: in higher education institutions of state subordination, the percentage of students from the far abroad is, on average, 1.33% higher than in private EIs.

In terms of Y₂, the model is insignificant (according to the F-criterion), so for students from the CIS countries there are no fundamental differences what form of ownership of the institution of higher education they study at.

The further analysis is carried out in two stages. The first stage is the analysis of the impact of factor indicators on demand indicators of Russian universities with foreign students. The second stage is the analysis of the impact on demand indicators of Russian universities on the structure of students and some financial results of the university. To analyze the factor correlation ratio with quantitative factors (under distribution conditions other than normal), the authors apply a nonparametric measure of Spearman's correlation coefficient.

The rank is the ordinal place occupied by the studied object in the series of all statistically examined

objects, in descending order or increasing the degree of analyzed characteristics values of these objects. If the characteristic values have the same quantitative evaluation, then the rank of all these values is taken equal to the arithmetic mean of corresponding numbers that they determine. Such ranks are called connected. The first rank is assigned to the maximum value of one or another indicator.

The verification of Spearman's correlation coefficient at a certain level of significance (α) is based on the application of the random variable having Student distribution.

Each factor feature has a discrete numbering, identical to that shown in the Monitoring-2017 program. The most important note is the following: according to factors X_{1.1} - "The average score of USE (Unified State Examination) students, enrolled on USE results for full-time education: who are pursuing bachelor's and specialist's degrees at the expense of corresponding budgets of the RF budgetary system" and X_{1.2} - "The average score of USE students of the university, enrolled on USE results for full-time education: who are pursuing bachelor's and specialist's degrees at the expense of the corresponding budgets of the RF budgetary system, with the exception of persons who entered with regard to special rights and within the target quota", the analysis was carried out only for institutions that had budgetary positions.

The results of the factor correlation analysis are briefly shown in Tables 2-8. As for X factors, only the highest values of Spearman's correlation coefficient are given (in total - no more than 5). In this case, the coefficient does not have a decisive value - the absolute value is taken into account.

As for the variable Y₁ (table 2), it can be concluded that the decisive factors for admission of foreign applicants to a Russian university is not only the form of ownership of HEI, but also its educational

activity: three factors represent this group among first five factors. At the same time, the presence and

level of advanced education, such as master's, post-graduate degree programs, etc.

Table 2. Spearman's Correlation Coefficient (ρ) by the Variable Y_1 (5% level of significance)

Factors (X)	
Name	ρ
$X_{1,10}$ – ratio of students (enrolled student body), who are pursuing master's degree program, training of scientific and pedagogical staff in post-graduate study, internships, internship assistants in the total number of enrolled student body in the basic educational programs of higher education, %	0,534
$X_{1,13}$ – number of postgraduate students, interns, assistant trainees of the education institution per 100 students (enrolled student body), people	0,484
$X_{7,4}$ – number of academic staff with Ph.D. per 100 students, people	0,478
$X_{2,7}$ – total volume of research and development (R & D), thousand rubles	0,465
$X_{1,9}$ – ratio of students (enrolled student body) who are pursuing master's degree, in the total number of enrolled student body enrolled in bachelor's, specialist's, master's degree programs, %	0,434
Performance indicators of the second level (Z)	
Name	ρ
Z_1 – ratio of foreign citizens (except for the CIS countries): postgraduate students, interns, assistant trainees of the education institution in the total number of postgraduate students, interns, trainee assistants, %	0,714
Z_3 – amount of funds from educational activities received by the education institution from foreign citizens and foreign legal entities, thousand rubles	0,511
Z_2 – ratio of foreign citizens from the CIS countries: postgraduate students, interns, assistant trainees of the education institution in the total number of postgraduate students, interns, trainee assistants, %	0,334

The variable Y_2 (Table 3) has only two significant factors with the variables X and one with the variable Z. Moreover, the values of Spearman's correlation coefficient are very small, which indicates a weak ratio. Let's draw a conclusion that for students from the CIS countries there are no clearly expressed priorities

when choosing a higher education institution in Russia. Most likely, a greater role for them is played by environmental factors (the presence of family ties with a particular city, territorial proximity, etc.). At the same time, this group of students, adapting to the new environment, is actively continuing education in postgraduate and internship programs.

Table 3. Spearman's Correlation Coefficient (ρ) by the Variable Y_2 (5% level of significance)

Factors (X)	
Name	ρ
$X_{4,3}$ – ratio of the average salary of academic staff in the education institution (from all sources) to the average salary in the economy of the region, %	0,206
$X_{2,9}$ – ratio of R & D performed by own forces (without involvement of co-executors), in the total income of the education institution from R & D, %	-0,164
Performance indicators of the second level (Z)	
Name	ρ
Z_2 – ratio of foreign citizens from the CIS countries: postgraduate students, interns, assistant trainees of the education institution in the total number of postgraduate students, interns, trainee assistants, %	0,358

As for the variable Y_3 (Table 4), there is only a moderate factor correlation. The leading factors are from the group "Research and Development"; in

addition, the variable Y_3 is the only one influenced by the average USE score of budgetary training. All of the above is in a logical chain: foreign students-graduates

chose a university with a high passing score and, as a consequence, active scientific work.

Table 4. Spearman's Correlation Coefficient (ρ) by the Variable Y_3 (5% level of significance)

Factors (X)	
Name	ρ
$X_{2,9}$ – ratio of R & D performed by own forces (without involvement of co-executors), in total revenues of the education institution from R & D, %	0,272
$X_{2,7}$ – total volume of research and development (R & D), thousand rubles	0,269
$X_{3,9}$ – number of foreign leading professors, teachers and researchers working in the education institution for at least 1 semester, people	0,267
$X_{4,3}$ – ratio of the average salary of academic staff in the education institution (from all sources) to the average salary in the economy of the region, %	0,254
$X_{1,1}$ – ratio of USE students enrolled by the results of USE for full-time education according to bachelor's degree and specialist programs at the expense of the corresponding budgets of the RF budget system	0,231
Performance indicators of the second level (Z)	
Name	ρ
Z_2 – ratio of foreign citizens from the CIS countries: postgraduate students, interns, assistant trainees of the education institution in the total number of postgraduate students, interns, trainee assistants, %	0,458
Z_1 – ratio of foreign citizens (except for the CIS countries): postgraduate students, interns, assistant trainees of the education institution in the total number of postgraduate students, interns, trainee assistants, %	0,395
Z_3 – amount of funds from educational activities received by the education institution from foreign citizens and foreign legal entities, thousand rubles	0,314

Variables Y_4 and Y_5 (tables 5-6) specify the previous indicator, dividing all the graduates into two categories – “far abroad” (Y_4) and “CIS countries” (Y_5). In fact, the set of factors in each category is duplicated by the

factors from tables 1 and 2. Consequently, both current students and graduates are subject to the action of similar determinants, and if we take into account students from the CIS countries there is a weak correlation ratio.

Table 5. Spearman's Correlation Coefficient (ρ) by the Variable Y_4 (5% level of significance)

Factors (X)	
Name	ρ
$X_{1,10}$ – ratio of students (enrolled student body), who are pursuing master's degree program, training of scientific and pedagogical staff in postgraduate study, internships, internship assistants in the total number of enrolled student body in the basic educational programs of higher education, %	0,556
$X_{2,7}$ – total volume of research and development (R & D), thousand rubles	0,530
$X_{1,7}$ – number of students, enrolled on the basis of admission results to the first year of full-time study pursuing bachelor's and specialist's degree, people	0,488
$X_{1,9}$ – ratio of students (enrolled student body) who are pursuing master's degree, in the total number of enrolled student body enrolled in bachelor's, specialist's and master's degree programs, %	0,487
$X_{3,9}$ – number of foreign leading professors, teachers and researchers working in the education institution for at least 1 semester, people	0,412
Performance indicators of the second level (Z)	
Name	ρ

Z ₁ – ratio of foreign citizens (except for the CIS countries): postgraduate students, interns, assistant trainees of the education institution in the total number of postgraduate students, interns, trainee assistants, %	0,738
Z ₃ – amount of funds from educational activities received by the education institution from foreign citizens and foreign legal entities, thousand rubles	0,516
Z ₂ – ratio of foreign citizens from the CIS countries: postgraduate students, interns, assistant trainees of the education institution in the total number of postgraduate students, interns, trainee assistants, %	0,386

Table 6. Spearman's Correlation Coefficient (ρ) by the Variable Y₅ (5% level of significance)

Factors (X)	
Name	ρ
X _{2,9} – ratio of R & D performed by own forces (without involvement of co-executors), in the total income of the education institution from R & D, %	-0,242
X _{4,3} – ratio of the average salary of academic staff in the education institution (from all sources) to the average salary in the economy of the region, %	0,224
X _{2,8} – share of income from R & D in the total revenues of the education institution, %	0,217
X _{7,2} – ratio of academic staff with Ph.D. in the total number of academic staff, %	0,197
X _{5,1} – total area of teaching and laboratory facilities per student (enrolled student body), m ²	-0,194
Performance indicators of the second level (Z)	
Name	ρ
Z ₂ – ratio of foreign citizens from the CIS countries: postgraduate students, interns, assistant trainees of the education institution in the total number of postgraduate students, interns, trainee assistants, %	0,445

The variable Y₆ (Table 7) is subject to significant influence of factors from the group “International activities”. This is quite logical, considering that academic mobility in the era of globalization is a world trend, and those universities where the level of international relations (including scientific and educational) is high, actively promote education of

their students abroad. Moreover, such higher education institutions take their scientific activity to the world level, conducting research and experimental development on the funds of foreign citizens and foreign legal entities.

Table 7. Spearman's Correlation Coefficient (ρ) by the Variable Y₆ (5% level of significance)

Factors (X)	
Name	ρ
X _{3,12} – amount of funds received by the education institution from performing R & D from foreign citizens and foreign legal entities, thousand rubles	0,468
X _{2,7} – total volume of research and development (R & D), thousand rubles	0,447
X _{1,9} – ratio of students (enrolled student body) who are pursuing master's degree, in the total number of enrolled student body enrolled in bachelor's, specialist's and master's degree programs, %	0,428
X _{3,9} – number of foreign leading professors, teachers and researchers working in the education institution for at least 1 semester, people	0,423
X _{3,8} – ratio of foreign academic staff in the total number of academic staff, %	0,414
Performance indicators of the second level (Z)	
Name	ρ
Z ₃ – amount of funds from educational activities received by the education institution from foreign citizens and foreign legal entities, thousand rubles	0,468

Z_1 – ratio of foreign citizens (except for the CIS countries): postgraduate students, interns, assistant trainees of the education institution in the total number of graduate students, interns, trainee assistants, %	0,409
Z_2 – ratio of foreign citizens from the CIS countries: graduate students, interns, assistant trainees of the education institution in the total number of postgraduate students, interns, trainee assistants, %	0,263

The set of factors by the variable Y_7 (Table 8) is identical to the set by the previous variable. It is natural, as they both relate to such a phenomenon as “academic exchange”.

The direct influence of the ratio of foreign students who studied at a Russian university on the amount of funds from educational activities received by the HEI from foreign citizens and foreign legal entities (Z_3) is also logical.

Table 8. Spearman’s Correlation Coefficient (ρ) by the Variable Y_7 (5% level of significance)

Factors (X)	
Name	ρ
$X_{3,9}$ – number of foreign leading professors, teachers and researchers working in the education institution for at least 1 semester, people	0,504
$X_{3,8}$ – ratio of foreign academic staff in the total number of academic staff, %	0,481
$X_{1,9}$ – ratio of students (enrolled student body) who are pursuing master's degree, in the total number of enrolled student body enrolled in bachelor's, specialist's and master's degree programs, %	0,454
$X_{3,12}$ – amount of funds received by the education institution from performing R & D from foreign citizens and foreign legal entities, thousand rubles	0,448
$X_{1,6}$ – number of students, enrolled on the basis of admission results to the first year of full-time study pursuing bachelor's and specialist's degree, people	0,443
Performance indicators of the second level (Z)	
Name	ρ
Z_3 – amount of funds from educational activities received by the education institution from foreign citizens and foreign legal entities, thousand rubles	0,477
Z_1 – ratio of foreign citizens (except for the CIS countries): postgraduate students, interns, assistant trainees of the education institution in the total number of graduate students, interns, trainee assistants, %	0,414
Z_2 – ratio of foreign citizens from the CIS countries: graduate students, interns, assistant trainees of the education institution in the total number of postgraduate students, interns, trainee assistants, %	0,352

Conclusion

The authors have chosen the sample set, since the rank correlation coefficient can only be calculated from the sample data, it is necessary to evaluate its statistical significance within the general set as a whole. The level of significance, that is, the probability of making an error, is automatically 5%. Consequently, the conclusions about the significance of correlation coefficients have a statistical reliability of 95%.

According to the results of the research, it is clear that statistically more reliable conclusions about demand factors for Russian universities can be made based on the group of foreign students from the far abroad. These students believe that, such aspects as

the form of ownership of the institution (priority given to public HEI), its educational and scientific activities, as well as the level of development of international relations are very important. Taking into account students from the CIS countries, there is no reliable correlation ratio, which makes it possible to draw conclusions about the factors influencing their choice of the Russian higher education institution with a high probability. It requires a deeper study involving sociologists and psychologists.

Another conclusion was the insignificant influence of the employment factor of graduates. For 5 out of 7 indicators, this effect is statistically significant, but the magnitude of the correlation coefficient varies at very low values of 0.17 ... 0.22. It is impossible to underestimate this factor, but it must be understood that it is delayed (lagged): not all applicants are ready

to analyze and forecast the situation in the labor market in 4-5 years when choosing a university. There are the following ways to attract foreign students:

- Establish new educational programs in cooperation with leading foreign universities;
- Transition to a modular interdisciplinary principle while establishing and implementing educational programs;
- Develop a virtual educational environment with the active use of the world's open educational resources (EdX, Coursera);
- Develop the university's reputation, which implements unique educational programs that meet international standards;
- Provide grant support of the best Russian and foreign students;
- Develop the campus.

In conclusion: in order the ratio of foreign students positively influences the higher education institution, it is necessary to work with a foreign enrolled student body so that this will further enhance the university's reputation in academic national and international circles. The precisely planned bilateral academic mobility of students can further lead to results that will be measurable and visible: established joint scientific groups, developed joint scientific projects, published joint publications, and it will help exchange both students, postgraduate students, and scientific and academic staff, which in turn will help develop a competitive global educational environment in the Russian university and become leaders in the world ratings.

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