

Russian Universities: Towards Ambitious Goals

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ABSTRACT

An increased competition in the world market of educational services has brought about new tools to raise the prestige of higher education institutions in the opinion of students and employers. The most important of these tools are the rankings of the best universities in the world, regularly compiled by well-known foreign agencies. The Russian leadership pays focused attention to the ranking positions of our universities, which resulted in the development of the national program "5-100-2020" in 2013, the implementation of which should allow at least five Russian universities to occupy positions in a leading hundred of the QS World University Ranking in 2020. The article discusses the way the rating positions of the leading Russian universities have changed over the past year. The importance of advancements in international rankings is illustrated by the success of foreign universities in terms of advertising and attraction of a large number of international students. Particular attention is given to an increasingly larger role of distance learning in extending the coverage of the global student audience. A comparative geographical analysis of the regions of residence of international students, attracted both to national and foreign universities, has been conducted. The problems of raising the international prestige of Russian high school in the world educational space have been considered, the causes of unreasonably low rating of Russian universities according to leading rating agencies have been identified. The author has proved the importance of enhancing the mobility of students within Russia, taking into account the regional diversity of scientific schools.

KEYWORDS

University, rating, competitiveness, mobility,
international students, globalization, export, ranking,
dynamics, citation index

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Introduction

In A year ago, as part of the program 5-100-2020 (The Project of Improving the Competitiveness of the Leading Russian Universities among the World's Leading Research and Education Centers) upon the results of the prepared presentations 15 Russian universities have received targeted funding for the development of scientific and educational activities in accordance with the indicators of the world rankings. The promotion of these universities to the leading positions in the international rankings had to become one of the results.

Features and tendencies of development of modern education, its quality, as well as the criteria that influence the formation of ranking scores, were studied in detail in the works of Russian (Gratsinskaya, Ogurtsova and Puchkov 2005; Degtereva 2010; Fersman, Zemlinskaya 2013; Fersman 2014; Fersman and Akopova 2010; Sharafanova, Kostin and Viktorova 2010; Sharafanova 2005) and foreign scientists (Altbach and Reisberg 2013; Altbach 2012; Hongcai 2009; Hazelkorn 2011; Liu and Liu 2005), including our team of authors (Rodionov, Rudskaya and Kushneva 2013a; 2013b; 2014; Rodionov, Yaluner and Kushneva, 2015). Let us recall only the main indicators of one of the most representative world ranking – QS Ranking (Table 1).

Table 1. Ranking indicators of the QS World University Ranking

No.	Indicator	Percentage
1.	Academic reputation	40%
2.	Employer reputation	10%
3.	Students-to-faculty ratio	20%
4.	Citation index	20%
5.	International student ratio	5%
6.	International faculty ratio	5%

Prepared based on the data of the QS World University Ranking (QS World University Ranking)

Data and Method

From year to year the number of universities in the ranking is growing. This number has increased from 700 to 900 ranked universities over the past two years. This is due not only to the prestige but also to the fact that many universities have recognized the value of rankings as essential advertising platforms for attraction of students and postgraduates.

Table 2 contains the list of countries with more than 10 universities in the ranking.

Table 2 shows that the USA occupies a leading position by the number of universities in the QS Ranking. For four years nearly twenty American universities have been included in the ranking. The same growth is observed in England – the second leader of the international rankings. Russia, Brazil and Argentina have managed to double the number of their universities in the ranking.

Over the past year, three more Russian universities have been included in the QS Ranking, thus increasing their number up to 21. However, we recognize that this is only the beginning. In Russia there are a large number of universities that deserve to be included in the ranking, but, until recently, very few of them have realized the importance of work in this direction. Unfortunately, due to

difficulties occurred not through the fault of our country, funding of this program is reduced, but, nevertheless, we can consider the way those universities, which have been allocated targeted funding to participate in this national program, approached the desired result.

Table 2. Top-rated universities by countries worldwide

Country	The number of universities in the ranking			
	2011/12	2012/13	2013/14	2014/15
USA	129	122	144	147
England	54	54	69	73
Germany	43	42	42	44
France	33	35	40	46
Japan	32	32	38	39
Australia	25	25	31	33
Italy	19	21	26	27
China	23	23	25	27
Canada	20	22	26	26
South Korea	22	21	24	25
Brazil	11	12	22	22
Russia	12	14	18	21
Spain	13	17	18	19
Taiwan	11	14	15	16
Argentina	8	6	16	16
India	12	11	11	14
Netherlands	13	13	13	13

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Only 3 of these 15 universities remain outside the ranking – these are the Samara State Aerospace University named after Academician Korolev S.P., St. Petersburg Electrotechnical University "LETI" named after Ulyanov V.I. and St. Petersburg National Research University of Information Technologies, Mechanics and Optics (ITMO). Although these universities are known for their achievements, for example, a team of programmers (ITMO) became the world winner on programming, it was not enough, since the entry into the ranking requires specific results for each of the ranking indicators.

At the same time, we should note the Peoples' Friendship University of Russia (PFUR), the Southern Federal University, the Russian University of Economics named after Plekhanov, the Voronezh State University, the Saratov State University named after Chernyshevsky N.G., which have not received funding under the program 5-100-2020 (The Project of Improving the Competitiveness of the Leading Russian Universities among the World's Leading Research and Education Centers), but have made a great deal of effort and were included in the world QS Ranking.

Only 9 of 21 of our universities have reached sufficient ranking indicators (Table 3) to receive scores.

Every year the fight for the position in the ranking is getting harder; every point counts. Moreover, the closer to the leading position, this importance is greater. Thus, additional three points allowed the Moscow State University to rise by 6 positions in the ranking. The Saint Petersburg University moved forward by seven positions after having received 3.3 points over the year. MIPT also received 3.3 points, but in the fifth hundred, and rose by 25 rating positions. Only 0.9 points adding to last year's score was not enough for MGIMO: this University lost his



position in the fourth hundred, dropping by 15 positions. The St. Petersburg Polytechnic University lost only one-tenth of the point and dropped by 32 positions. The dynamics of distribution of our universities by rating intervals is displayed in Figure 1.

Table 3. Universities that have received scores

Name of the university		2012	2013	2014	
1.	Lomonosov Moscow State University	Line No.	116	120	114
		Scores	61.79	63.9	66.9
2.	Saint Petersburg State University	Line No.	253	240	233
		Scores	41.88	45.9	49.2
3.	Bauman Moscow State Technical University	Line No.	352	334	323
		Scores	34.13	38	40.1
4.	Novosibirsk State University	Line No.	371	352	329
		Scores	32.94	36.2	39.9
5.	Moscow State Institute of International Relations (MGIMO)	Line No.	367	386	401
		Scores	33.03	33.8	34.7
6.	Moscow Institute of Physics and Technology (State University)	Line No.		443	418
		Scores		30.3	33.6
7.	Saint-Petersburg State Polytechnic University	Line No.		457	489
		Scores		30	29.9
8.	National Research Nuclear University MEPhI	Line No.			487
		Scores		-	29.8
9.	Peoples' Friendship University of Russia (PFUR)	Line No.	522	495	477
		Scores	-	28.4	30.5

 - universities that have received targeted funding under the program 5-100-2020

Prepared based on the data of the QS World University Ranking (QS World University Ranking)

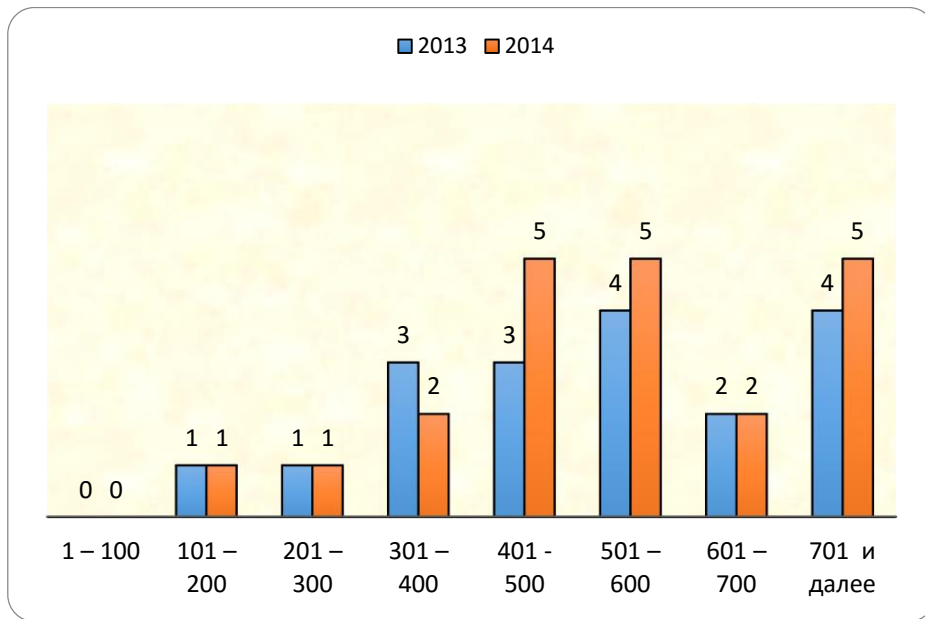


Figure 1. Distribution of Russian universities in the QS Ranking

Table 4 shows the changes in scores of Russian universities by rating indicators for the previous year.

Table 4. Evaluation of Russian universities by key indicators of the QS World University Ranking for the period of 2013/2014

Name of the university		Academic reputation	Employer reputation	Student-to-faculty ratio	International faculty ratio	International student ratio	Citations per faculty	In total
Lomonosov Moscow State University	2013	84.1	64.8	99.9	8.7	37.3	6.3	63.9
	2014	86.1	76.2	99.9	10.9	52.1	7.8	66.9
Saint Petersburg State University	2013	49.7	40.3	97.9	5.2	24.3	3.6	45.9
	2014	55.7	48.5	98.8	5.3	24.8	3.7	49.2
Bauman Moscow State Technical University	2013	27.8	58.5	100	1.0	12.5	1.1	38.0
	2014	31.8	65.8	100	1.6	8.8	1.1	40.1
Novosibirsk National Research State University	2013	32.7	24.8	87.3	4.9	35.3	5.2	36.2
	2014	36.7	39.2	85.8	7.3	41.1	8.1	39.9
Moscow State Institute of International Relations (MGIMO)	2013	15.8	46.0	98.7	8.3	48.7	1.0	33.8
	2014	-	47.4	97.4	-	48.5	-	34.7
Moscow Institute of Physics and Technology	2013	-	-	99.6	11.2	35.9	2.7	30.3
	2014	-	-	99.9	-	36.1	-	33.6
	2013	-	-	92.9	1.3	20.3	2.1	30.0



Saint-Petersburg State Polytechnic University	2014	-	-	89.5	-	-	-	29.9
Peoples' Friendship University of Russia (PFUR)	2013	-	-	84.5	1.7	93.7	1.2	28.4
	2014	-	-	90.7	-	93.6	-	30.5
National Research Nuclear University MEPhI	2013	-	-	-	-	-	-	-
	2014	-	-	85.5	-	-	-	29.8
<i>Average value</i>	2013	23.3	26.0	84.5	4.7	34.2	2.6	34.1
	2014	23.4	30.8	94.2	2.8	33.9	2.3	39.4

Prepared based on the data of the QS World University Ranking (QS World University Ranking)

While the first five universities in this list have achieved a harmonious growth of scores for all indicators rankings, the other universities have not been certified for a number of important areas, including those areas that have obtained scores in 2013 (Table 5).

Table 5. Universities that have not received scores

	Name of the university		2012	2013	2014
10.	National Research University Higher School of Economics	Line No.	550	518	528
		Scores	-	-	-
11.	The Ural Federal University named after the first president of Russia B.N. Eltsin	Line No.	469	549	598
		Scores	26.47	-	-
12.	Tomsk National Research Polytechnic University	Line No.	616	583	535
		Scores	-	-	-
13.	Tomsk National Research State University	Line No.	568	584	501
		Scores	-	-	-
14.	Kazan (Volga region) Federal University	Line No.	697	612	565
		Scores	-	-	-
15.	South Federal University	Line No.		626	627
		Scores		-	-
16.	Far Eastern Federal University	Line No.	612	723	731
		Scores	-	-	-
17.	N.I. Lobachevsky State University of Nizhni Novgorod	Line No.	646	740	744
		Scores	-	-	-
18.	Plekhanov Russian University of Economics	Line No.	623	747	760
		Scores	-	-	-
19.	Voronezh State University	Line No.		832	860
		Scores		-	-
20.	Chernyshevsky Saratov State University	Line No.			619
		Scores			-
21.	National Research Technological University "MISA"	Line No.			752
		Scores		-	-

□ - universities that have received targeted funding under the program 5-100-2020

Prepared based on the data of the QS World University Ranking (QS World University Ranking)

It should be noted that due to these weaknesses average values for this group of universities have slightly changed as shown in the diagram (Figure 2).

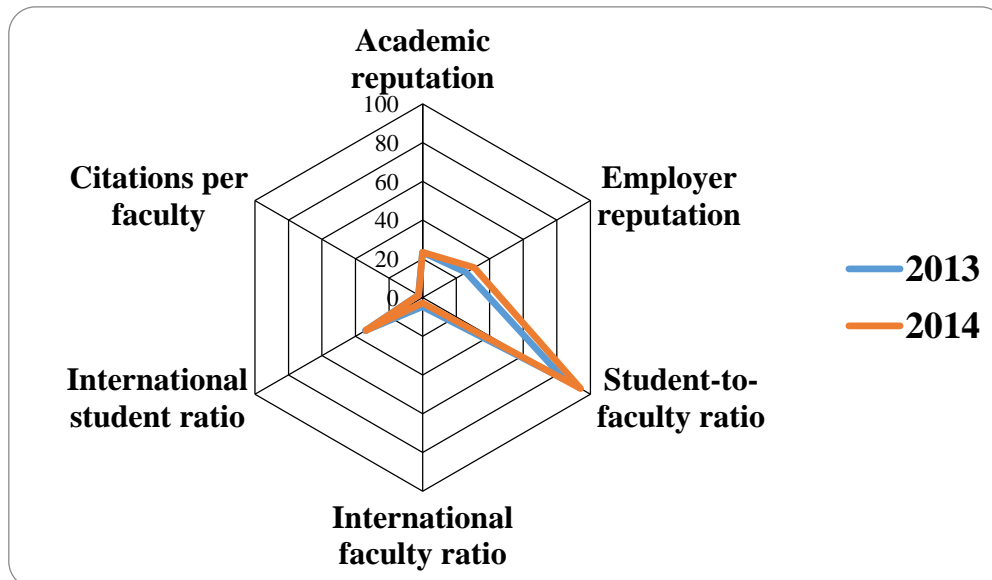


Figure 2. Comparison of average values of rating indicators

The international student and faculty ratio is the only truly successful indicator of Russian universities. Rectors of several Russian universities worsen this ratio by reduction of the faculty, thus depriving their universities the only advantage.

The increasing demands for scientists in terms of publicity and citation in international scientific publications caused a mixed reaction of the Russian scientific community. This is partly understandable. Publications in international magazines are accepted in English, but among Russian scientists, especially of middle-aged and elderly ones, there is too small proportion of those who speak a foreign language sufficiently to write a research paper. This means that they have to pay for the translation services, but salaries in the Russian universities are still so small that people care about their standard of living more than about the international prestige of the Russian high school.

On the other hand, we must understand education authorities too. As we have considered above, the position of Russian universities in world rankings is still quite weak, and one of the biggest factors is the low index of publication activity and citation of the university staff. Nevertheless, today in the era of the Internet the rankings are an advertising space where future students get acquainted with the universities of the world. In the context of globalization, attracting international students is a long-term system deliberate policy designed for the leading countries. The so-called "soft power" is one of the tools of geopolitics widely used by certain countries to expand their influence. And attraction of international students is the best way to do this: citizens of different countries



educated in the same university are united in the student fraternity during the life. Coming up the country over time to the level of the intellectual and political elite, former students retain fond memories of the years of study and often keep in touch with their groupmates. Loyalty not only to the University but to the whole country where a student spent a great time, is formed. Young people fix in the mind the standard of the lifestyle, certain ideological and moral guidelines. That is why internationalization and globalization of higher education, as the current trends of modern world, of course, must be actively supported by government, including in terms of funding.

In addition to the geopolitical, there still exist economic and financial aspects which can be seen most clearly in the example of the United States of America.

For the eighth consecutive years a growth of matriculation in American universities was observable. According to the International Education Institute, in 2012-2013 academic years 820 thousand foreign students studied in American universities from all geographical regions of the world that added 24 billion dollars to the US economy. In 2013-2014 the number of foreign students increased up to 886 thousand, and the US economy received 27 billion dollars. As for training, maintenance, accommodation, food, rest provided for young foreigners, there was a need for 340,000 new workplaces since the fall of 2013. This success covers the costs of the USA on the promotion of education in all regions of the world. According to media reports in 15 years, the number of matriculated international students in American campuses has increased by 72%: there were two and a half times more of Chinese students than Indian ones, seven and a half times more of Vietnamese students, and ten times more of the students from Saudi Arabia. The leading number of international students is from China: only in 2014, the number of applications from China has increased by 17%.

Analysis and Results

It is important to note that one of the reasons for the growth of the number of students in the U.S. universities is the improvement of distance learning technologies. Today students have possibility not only to obtain knowledge but also to demonstrate them in rather critical moments over the Internet. For example, at the recent world championship in the Czech Republic, the young American hockey players Jimmy Weixi and Mike Reilly passed examinations in their university directly from Prague – on the Internet.

This type of educational services is gaining momentum in the leading Russian universities. The relevance of distance learning emphasizes regulating all activities in the field of the education law "On Education in Russian Federation" (Sobranie Zakonodatel'stva Rossiiskoi Federatsii), in which distance learning technologies (DLT) are defined as the leading technologies in the implementation of educational programs (No. 273-FZ of December 29, 2012, Article 13 Paragraph 2, Article 16).

In distance learning (DL) several forms of its implementation can be distinguished: open learning, online training and mixed learning. Open and online learning are based on a student's interaction with a teacher via the Internet by

using special computer programs. The main emphasis is made on independent work of a student, his/her ability to build his/her educational trajectory for the end result of learning adequately. Unlike the first two types of DL, mixed learning is a combination of resident and distance learning.

In light of the obvious relevance of DL and DLT, what are the prospects for their further implementation and use in the educational process? What factors determine the importance of the use of DL and DLT? In our opinion, the integration of Russia into the international educational space is one of the leading factors; the use of distance learning technologies in the educational process provides access to both students and teachers to the best world educational resources. For example, in Peter the Great St. Petersburg Polytechnic University there is an access both to Russian and foreign educational resources on applied, natural, socio-economic, humanitarian sciences, and also to databases of Scopus and Web of Science.

Another important factor of the viability and importance of the use of DLT for the implementation of educational programs is the provision of equal opportunities to all categories of students, which is especially important for Russia with its vast territory and a concentration of leading universities in major cities of the country. Leading universities use the DLT for the implementation of educational programs, presented in Table 6.

Table 6. Top 10 best Russian universities in the distance learning market (e-learning pilot monitoring of the Interagency Working Group on the development of e-learning and distance learning technologies, 10.06.2013 - 17.09.2013)

Item No.	Organization	Region	City
1	Volgograd State University of Architecture and Civil Engineering (VolgGASU) FSBEI HPO	Volgograd region	Volgograd
2	East Economics and Legal Humanitarian Academy (Academy VEGU) NSEE HPO	Republic of Bashkortostan	Ufa
3	Vyatka State University (VSU) FSBEI HPO	Kirov region	Vyatka
4	Eurasian Open Institute (EOI) (Autonomous non-profit organization for higher education)	Moscow	Moscow
5	Institute of Business Economics (INEP) NSEE HPO	Moscow	Moscow
6	Irkutsk State Linguistic University (ISLU) FSBEI HPO	Irkutsk region	Irkutsk
7	Moscow State University of Economics, Statistics and Informatics (MESI) FSBEI HPO	Moscow	Moscow
8	Tomsk State National Research University (TSU) FSBEI HPO	Tomsk region	Tomsk
9	Samara State University of Economics (SSUE) FSBEI HPO	Samara region	Samara
10	Saint Petersburg National Research University of Information Technologies, Mechanics and Optics (ITMO) FSBEI HPO	Saint Petersburg	Saint Petersburg

In addition, as for this kind of educational services, an economic factor is taken into account. Thus, according to participants of the distance learning market (based on research data of the company NeoAnalytics (NeoAnalytics Company)) the value of distance learning in higher education institutions is 30-40% cheaper compared to full-time education. As for the corporate sector, savings in the distance learning are achieved by reducing the travel costs of companies on the training of employees.

When organizing distance learning, universities choose a variety of modern Learning Management Systems (LMS), where the educational content is located. Based on the review of the global and Russian e-learning market See Media, LMS Moodle is the main Learning Management System used in Russian universities (see Figure 3).

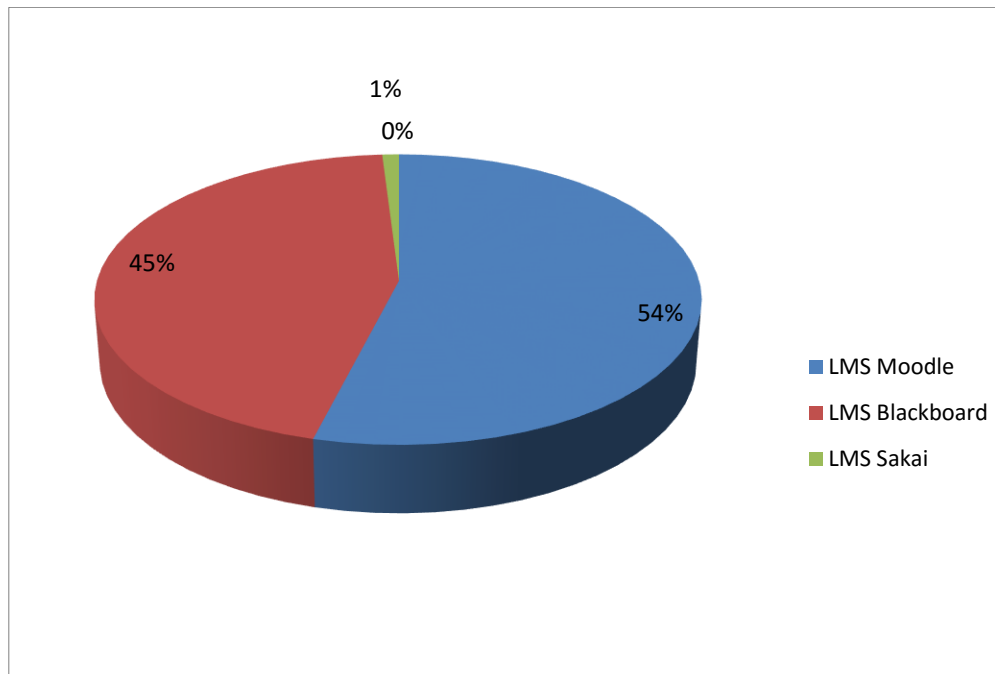


Figure 3. The share of Learning Management Systems in the global e-learning market

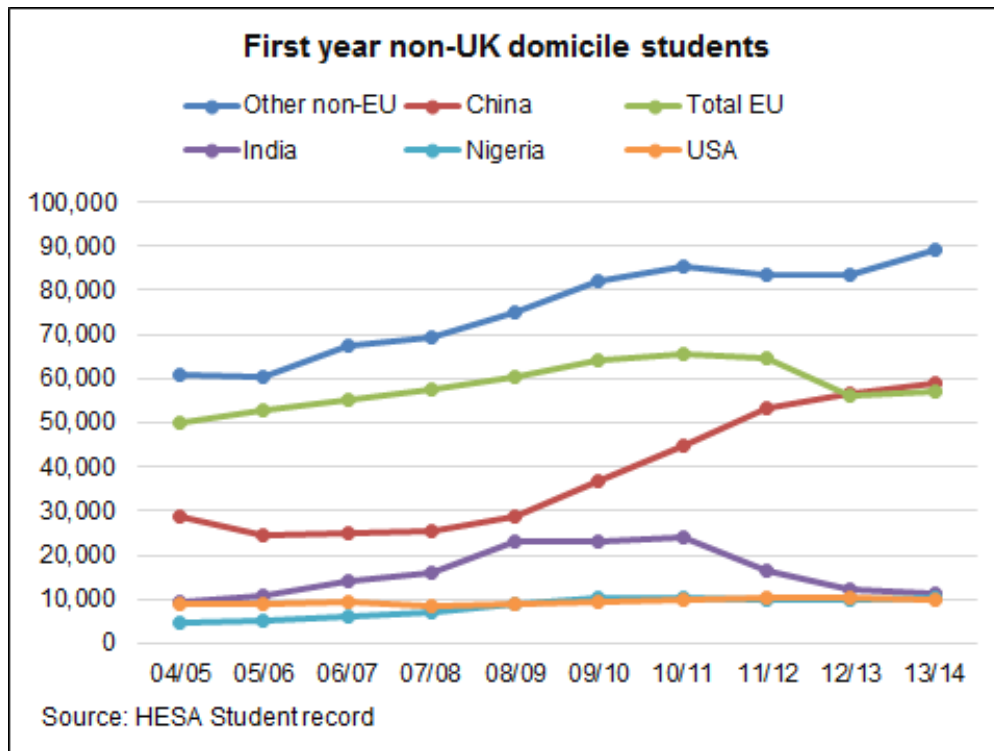
Upon the expert assessment, the distance learning market in Russia is expected to rapidly grow both by new customers and through the introduction of new products into the distance learning market by experienced and constant producers. Assessing the distance learning market prospects in Russia, in December 2012 the Interdepartmental Working Group for the development of e-learning (EL) and distance learning technologies in the implementation of educational programs in educational institutions has been established. The Working Group has developed a strategic plan for the development of DL/EL in Russia for 2013-2015 (The Work Plan of the Interdepartmental Working Group on Development of E-Learning, Distance Learning Technologies in the

Implementation of Educational Programs in Educational Institutions for the Period of 2013-2015 Years), comprising:

- development of the e-learning development program in Russia;
- implementation of pilot e-learning projects in universities and vocational educational institutions;
- development of e-learning infrastructure;
- professional retraining and advanced training in the use of e-learning;
- creation of a crowd-sourcing platform on the development of e-learning.

Giving credit for the scale of the American educational services that have become a global brand due to wide advertising, it should be noted that 43.4% of international students choose to study in European universities. Not only the credibility of the world's oldest classical universities of England, Germany, France, Italy, Austria and other countries of the Old World, but also the cost of training, which is significantly more affordable than in America, play an important role. While the leading universities in the USA prescribe fees 40,000-44,000 dollars, then studying at Oxford or Cambridge costs 26,000-32,000 dollars. England is the most attractive in Europe for international students. In the 2013/14 academic year, there were over 435,000 international students in the UK, which is 2.4% more than in the previous year. Moreover, 44% of international students come from the Asian region, while only 29% accounted for the share of the EU countries.

The data of the English Higher Education Statistics Agency reflect the growing interest of international students in universities in the United Kingdom (Figure 4).



Source: Higher Education Statistics Agency (*Higher Education Statistics Agency*).

Figure 4. Changes in the number of international students in the UK

In recent years, the growing popularity of Asian universities can be observed. Even today over 20% of international students study there. Nowadays, in the world market of educational services there is a fight for international students and the flexible price policy plays an important role: in some universities, and first of all – in Asian ones, even with a high reputation, tuition fees for international students are lower than those for their compatriots.

Discussion

The inclusion of the share of international students in university rankings indicators shows that the export of education is of high importance.

In the 1990-91 academic year 89,300 international students studied in higher educational institutions of the Soviet Union. The USSR ranked second in the world (after the USA) by the number of international students. According to the data of the Organization for Economic Cooperation and Development (OECD), in 2007 the total number of international students was 3 million, only 2% of students studied in Russian universities, while 20% of these students studied in the US universities, 12% – in the UK, 9% and 8% – in Germany and France respectively. Furthermore, a significant number of students study in Australia (7%), Canada (4%), and Japan (4%) (Degtereva 2010).

In time of crisis in Russia the number of international students has decreased dramatically, and in the 1995-96 academic year there were only 52,600

international students. However, after 2000 this figure began to grow and in the 2012/13 academic year, according to the data of the Federal State Statistics Service (The Federal State Statistics Service), this figure was equal to 164,800. The structure of students by regions of permanent residence is shown more clearly in Figure 5.

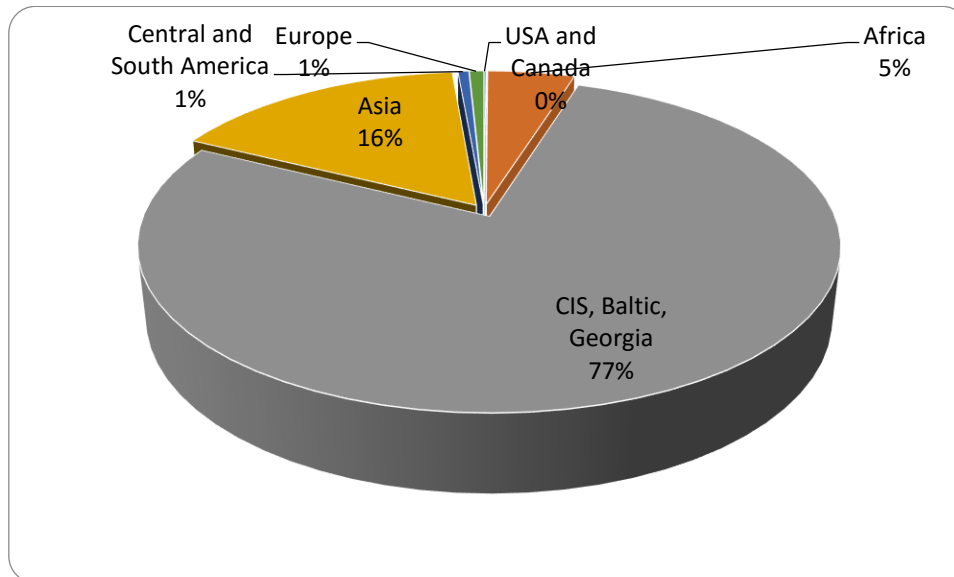


Figure 5. Distribution of international students studying in Russia by regions

Strategic objectives of the education public policy are as follows (Fersman and Akopova 2010):

- improvement of the quality, attractiveness and competitiveness of the Russian education system in the world and regional educational space;
- ensuring the effective participation of Russia in the global and major regional education development processes;
- increasing the share of export of educational services in the Russian GDP.

To achieve these objectives it is necessary, first of all, to promote our best universities in the world rankings. In order to qualify for a position in the ranking, they need to show their achievements in various fields of science. This goal can be achieved only if the university is multidisciplinary.

The Ministry of Education apparently took advantage of foreign experience of high school reformation and in order to enhance the status of national universities it combined the universities on a territorial basis, granting newly formed multidisciplinary universities the status of federal universities. This step made it possible to increase the number of Russian universities included in the world ranking. But this is only the first step. Further there will be a rather painful process of a merger and development of a common educational and scientific policy. In some cases these artificial mergers cannot be clearly explained. For example, in the town Korolev near Moscow the Space Engineering College was merged into the Financial and Technological Academy and, secondly, – what do



you think? Fashion design! It is clear that collective bodies of all three educational institutions, which were forced to cooperate with each other, are surprised with such a strange situation (The Official Website of the State Budgetary Educational Institution of Higher Education of the Moscow Region "University of Technology").

However, the benefits of total mergers are clear: the majority of universities formed part of new educational conglomerates occupy the buildings in their cities that attract an active commercial interest. It is recommended that the proceeds from redistribution of property will remain in high school and will be spent on the incorporation of associations that differ by their scientific and educational approaches, into an agglomerate, when rocks that differ by their composition are tightly sintered into a homogeneous structure. Unfortunately, the process of turning the conglomerate into the agglomerate is not so fast and the terms of the national program are extremely strict.

Conclusion

At all times the reforms are not painless. In pursuing the general goal – improving the quality of national education and the international prestige of the Russian diploma – in this case it is necessary to maintain the number of students in the country. The share of population with good education is an objective indicator of the nation's intellectual potential, the quality of human capital.

This is well understood in countries of the Old and New World.

In 2009, there were 4,352 higher education institutions in the USA, while in 2014 they were already 4,726, and the number of students has reached 21 million, accounting for 5.7% of the total American population. As for Russia, this ratio is 4.1%. In other words, 15 people in the country account for one student place in America, while in Russia – 24 people. Therefore, the statements of some of our officials that Russian people are the most educated in the world, raise doubts.

Unfortunately, negative externalities intervened in a more or less peaceful life in our society. Nevertheless, despite the difficulties with financing in the economic crisis and an imposed confrontation with the Western countries, it is necessary to follow the strategic directions of the high school development program for the period up to 2018.

An exchange of students and teachers between the universities of different countries is a very effective way to broaden the horizons of students, familiarizing them with different scientific schools in the West. An inclusion of Russian universities in this process is still hampered by the language barrier, the lack of a cross-cutting (from kindergarten to matriculation) English learning system generally accepted in international communication and training. The challenges of modern times caused another barrier – a psychological barrier: as a result of unfair interpretation of the Russia's role in the events in Ukraine, due to the formation of unkind attitude towards Russia by foreign media, communication of our universities with Western universities often loses its former warmth, the cautious wariness of all the Russian has occurred. In these circumstances we should not break the existing contacts, but further strengthen links with friendly-minded partners. For further development of student mobility, it is possible and necessary to use our own resources. Our country is large enough to find

interesting and beneficial inter-institutional exchanges of students and teachers from different regions. Russian science has glorious age-old traditions, and the diversity of scientific schools is a vast field for the work to improve the quality of educational services. In this communication a problem of language barrier disappears – people speak Russian in all parts of the country. There is no language barrier in the exchange of students of the universities from the former Soviet Union. We should and must use this important resource, for example – through the organization of Russian educational centers in the CIS countries – at least, on the example of the USA: they spend much money on such centers around the world, and American education is advertised throughout the whole planet.

The countries of the Euro-Asian Union and BRICS can be definitely included in the number of friendly countries. It is necessary to cooperate with them at the political, economic and humanitarian levels.

Challenges of modern times require an adequate response of our science. Nowadays, the role of the Russian high school science should increase accordingly. A convergence of research groups with the sectors of the real economy, with particular enterprises is necessary. In targeted financing of specific research that meets the needs of the national economy, many universities of the country will be able to find new solutions in their departments in the framework of the import substitution program. High school science will provide the national economy with innovations in the industrial and agricultural sectors. As a result, vacant market segments after the sanctions will be filled up with modern competitive products and services.

Disclosure statement

No potential conflict of interest was reported by the authors.

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