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## DRAG RACE

### 5-100-2020 NATIONAL PROGRAM

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#### Abstract

Stiffer competition in global market of educational services gave rise to new instruments that help improving the authority of educational institutions with applicants and employees. The most important instrument is rankings of the world best universities that are periodically compiled by different agencies. Global acknowledgement becomes more and more important for universities of the world. Internationalization and globalization of high education as hot topics of today should be an object of targeted state policy. Russian authorities pay much attention to ratings of our high educational institutions that was manifested by working out of 5–100–2020 National Program. Realization of this program should support including of not less than five Russian Universities in Top 100 of QS World University Ranking. Authors analyze ratings of leading Russian universities in comparison with foreign universities of Top 100 of this ranking because this problem has a pressing character. Analysis of factors affecting ratings of higher educational institutions is the aim of this research. Pressing character of this character is conditioned by raising requirements to the quality of human capital in today world, growth of intellectual impact of Russia and sharp necessity to scale export of quality of educational services in long perspective. Authors analyze dynamics improvement of the positions of the most successful Russian Universities and make forecasts of their ratings provided existing rate of upward movement in the list are preserved. Visual comparison of scores of foreign and Russian universities by ranking indicators has been made with the help of visual diagrams. Problems of improvement of international authority of Russian school in global educational space have been analyzed, reasons of unreasonably low rating of Russian universities by versions of leading rating agencies have been revealed. Authors have ground the necessity of comprehensive support of Russian scientists to improve their publishing activity and consequently growth of publications' citation index.

*Keywords:* globalization, export, ranking, dynamics, citation index

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## 1. Russian universities in global world

The XXI century is the era of scientific technologies. Both creation and application of these technologies place demands to general educational level of people and to the quality of their professional training. Last years this problem was covered in command papers [Presidential Address to Federal Assembly, <http://news.kremlin.ru/news/19825>, retrieved 07.11.2014; On measures of realization of state policy in education and science The Decree of the President # 599, 07.05.2014, <http://www.kremlin.ru/acts/15236>, retrieved 01.11.2014; Draft. Public declaration of aims and tasks of the Ministry of Education and Science of Russian Federation for 2014, <http://xn--80abucjiibhv9a.xn--p1ai/%D1%81/%D0%BF%D0%BB%D0%B0%D0%BD%D1%8B-%D0%B8-%D0%BE%D1%82%D1%87%D0%B5%D1%82%D1%8B/%D0%94%D0%B5%D0%BA%D0%BB%D0%B0%D1%80%D0%B0%D1%86%D0%B8%D1%8F%20%D0%BD%D0%B0%202014%20%D0%B3%D0%BE%D0%B4>, retrieved 13.10.2014], and it remains the subject of scientific discussions of today researchers [1-12; E. Hazelkorn, *Rankings and the Reshaping of Higher Education: The Battle for World-Class Excellence*, 2014, <http://www.palgrave-usa.com>, retrieved 10.01.2014; A.Y.C. Hou, R. Morse and C.-L. Chiang, *An Analysis of Mobility in Global Rankings: Making Institutional Strategic Plans and Positioning for Building World-Class Universities*, <http://www.tandf.co.uk/journals>, retrieved 10.11.2014] and rating agencies [QS World University Ranking, <http://www.topuniversities.com/qs-world-university-rankings>, retrieved 03.09.2014; *Best world universities ranking by QS — information about the research*, Center of humanitarian technologies, <http://gtmarket.ru/ratings/qs-world-university-rankings/info>, retrieved 07.11.2014; SCImago Journal & Country Rank, <http://www.scimagojr.com/index.php>, retrieved 07.11.2014]. While in the middle of the XX century only 20% of workplaces required high qualified personnel, now the share of these workplaces is 60% according to experts and it is increasing. Shift to the new technological level of social production require adequate reaction of the higher education system. That is why some most forward-thinking countries of the world, for example, Japan, are planning the introduction of universal higher education. Growing intellect level of society is caused by the growth of requirements to the quality of human capital. High level high education is a valuable product that is strongly demanded on international market. Leading positions in educational services have the USA and the Great Britain with significant yield of educational services export. V.V. Putin, the President of Russian Federation called "... significantly raise export of quality educational services, create conditions for foreign and Russian students, on first place from CIS countries to be educated in Russian higher educational institutions. It is a valuable instrument of strengthening cultural, intellectual influence of Russia in the world." [<http://news.kremlin.ru/news/19825>]

In addition to tangible contribution, export of educational services in long-term perspective has great impact in foreign policy of a state. Citizens of different countries educated in one university remain members of student community for the rest of their lives. Achieving the level of intellectual and political elite in their countries they have fondest memories of the years of studying and often informal contacts with their university mates; that forms loyal attitude not only to university but to country as a whole. That is why internationalization and globalization of higher education as urgent trends of today world development should be undoubtedly an object of purposeful national policy. The Soviet Union had successfully realized the idea of soft power by forming national elites of friendly countries.

Supporting the quality of national education and improvement of authority of Russian high school is now not only logical patriotic trend but adequate response on challenges of global world. More and more countries are trying to be in line with today realities and take rightful place in global market of educational services and compete for school leavers. Rankings of universities of the world are the instrument of this competition.

Ranking of higher educational institutions is not Russian now-how. The first rating that defined the processes of deepening globalization of higher education was published in 1983 by magazine 'US News & World Report'. Later, not only media but specialized research laboratories started to compile such ratings.

The most influential rating now is *QS World University Ranking*. It is compiled by British company Quacquarelli Symonds (QS), founded in 1990. Today this company is a guide in educational services market. QS is the member of the Observatory on Academic Ranking and Excellence (IREG), regulatory body for organizations that compile ratings of higher educational institutions.

## 2. Data and method

Russian universities were included in international rating *QS World University Ranking* in 2005; 18 Russian universities were in the list in 2013. Governmental authorities pay much attention to rankings of our higher educational institutions. It is an element of national policy in education and science that is aimed in particular to "not less than five Russian Universities entering Top 100 leading world universities in global universities ranking to 2020" [<http://www.kremlin.ru/acts/15236>]. This strategic aim was called 5-100-2020 strategy [<http://xn--80abucjiibhv9a.xn--p1ai/%D1%81/%D0%BF%D0%BB%D0%B0%D0%BD%D1%8B-%D0%B8-%D0%BE%D1%82%D1%87%D0%B5%D1%82%D1%8B/%D0%94%D0%B5%D0%BA%D0%BB%D0%B0%D1%80%D0%B0%D1%86%D0%B8%D1%8F%20%D0%BD%D0%B0%20%14%20%D0%B3%D0%BE%D0%B4>].

Dynamics of total score and ratings of the best Russian universities in last three years is shown in Table 1. (Full list of Russian universities ranked by QS may be founded in the work of D. Rodionov, O.Kushneva and I. Rudskaya [5]).

**Table 1.** Change of Russian universities positions in QS World University Ranking in 2011-2013 compiled based on data of QS World University Ranking [http://www.topuniversities.com/qs-world-university-rankings].

No.	University		2011	2012	2013
1.	Lomonosov Moscow State University	Row No	112	116	120
		Score	61.30	61.79	63.90
2.	Saint-Petersburg State University	Row No	251	253	240
		Score	41.10	41.88	45.90
3.	Bauman Moscow State Technical University	Row No	379	352	334
		Score	30.50	34.13	38.00
4.	Novosibirsk State University	Row No	400	371	352
		Score	29.30	32.94	36.20
5.	Moscow State Institute of International Relations (MGIMO-University)	Row No	389	367	386
		Score	30.00	33.03	33.80
6.	People's Friendship University of Russia	Row No	573	522	495
		Score	17.70	-	28.40

**Table 2.** Indicators for calculation of QS World University Ranking.

No.	Category	Indicator	Share
1	University's track record	Index of university's track record	40%
		Index of track record with employees	10%
2	Education process	Professors and lecturers to number of students ratio	20%
3	Research activity of a university represented by publications in scientific press	Citation index	20%
4	International activity of a university	Share of foreign lecturers	5%
		Share of foreign students	5%

Methodology that accounts for a number of indicators is used to form *QS World University Ranking* [http://gtmarket.ru/ratings/qs-world-university-rankings/info]. These indicators characterize different types of activity of a university: 'business' track record of a university both in academic sphere and in business represented by comments of employees on post-graduate students; quality of education that is assessed as a possibility to study in small groups; level of scientific research of a university; level of international activity of a university (see Table 2).

Score and rating evaluation of listed indicators for Russian and some foreign universities in 2013 are presented in Tables 3 and 4. Six of 18 universities listed in rating are shown in Table 3. These universities will most likely achieve best results in the scope of program 5-100-2020. Only universities certified for all components of rating were accounted for calculation the average score.

**Table 3.** Evaluation of Russian universities by main indicators of QS World University Ranking in 2013 compiled based on data of QS World University Ranking [<http://www.topuniversities.com/qs-world-university-rankings>].

School Name	In ranking	Academic Reputation	Employer Reputation	Faculty Student	International Faculty	International Students	Citations per Faculty	2013
Lomonosov Moscow State University	score	84.1	64.8	99.9	8.7	37.3	6.3	63.9
	position	83	173	17	594	352	664	120
Saint-Petersburg State University	score	49.70	40.30	97.90	5.20	24.30	3.60	45.90
	position	223	387	44	681	451	738	240
Bauman Moscow State Technical University	score	27.8	58.5	100.0	1.00	12.5	1.10	38
	position	458	222	9	788	586	845	334
Novosibirsk State University	score	32.7	24.8	87.3	4.9	35.3	5.2	36.2
	position	395	568	98	689	366	689	352
Moscow State Institute of International Relations (MGIMO-University)	score	15.8	46.0	98.7	8.3	48.7	1.0	33.8
	position	690	324	38	602	271	855	386
People's Friendship University of Russia	score	-	-	84.5	1.7	93.7	1.2	28.4
	position	-	-	114	769	64	830	495
<b>Average score</b>		<b>42.0</b>	<b>46.9</b>	<b>96.8</b>	<b>5.6</b>	<b>31.6</b>	<b>3.4</b>	<b>43.6</b>

### 3. Analysis and results

Lomonosov Moscow State University is the most close to Top 100 but in last three years its indicators became worse and it moved from 112 to 120 position, despite total score grew from 61.3 in 2012 to 63.9 in 2013. But this progress was not enough even to keep in pace. This rating group requires much stronger efforts. For example, University of Alberta (Canada) had occupied position 100 in ranking with 64.50; in 2012 this position was occupied by University of California, Davis with 65.85. In 2013 positions 99-101 were shared between two American and one Japan universities with equal but even higher score – 68.4. Each score and each step higher in ranking means persistent efforts in research and education process that gain approval of global scientific

community. Threshold scores changes for first 400 universities in 2011-2013 are shown in Table 5.

**Table 4.** Evaluation of foreign universities by main indicators of QS World University Ranking in 2013 compiled based on data of QS World University Ranking [<http://www.topuniversities.com/qs-world-university-rankings>].

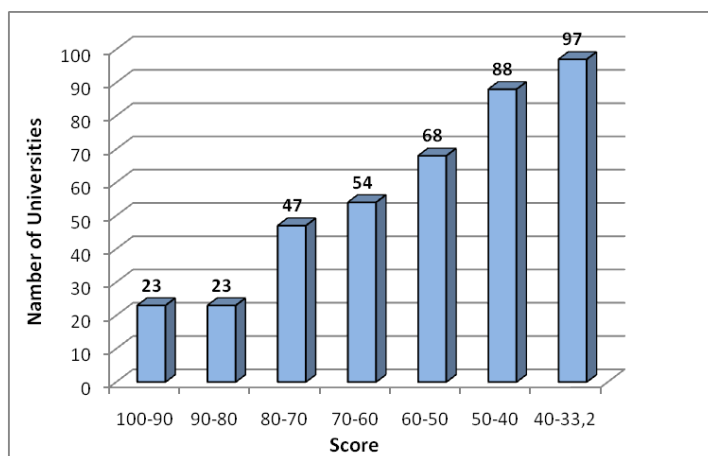
School Name	In ranking	Academic Reputation	Employer Reputation	Faculty Student	International Faculty	International Students	Citations per Faculty	2013
Massachusetts Institute of Technology (MIT)	score	100	100	100	97.6	96.3	99.7	100
	position	6	5	14	49	48	13	1
King's College London (KCL)	score	94.6	93.7	89.9	93.9	96.6	79.3	90.9
	position	49	45	88	75	45	87	19
Ecole Polytechnique	score	74.1	97.5	99.9	72.0	91.4	66.2	81.1
	position	122	34	18	185	76	132	41
KAIST - Korea Advanced Institute of Science & Technology	score	85.1	72.8	90.8	40.7	21.8	64.5	75.8
	position	79	137	82	303	401+	146	60
Uppsala University	score	86.3	70.1	38.6	41	48.9	92.5	72.5
	position	74	143	401+	301	270	48	79
Nagoya University	score	72.3	64.7	94.1	21.8	28.8	57	68.4
	position	133	176	65	401+	401+	206	99
<b>Average score</b>		<b>85.4</b>	<b>83.1</b>	<b>85.6</b>	<b>61.2</b>	<b>64.0</b>	<b>76.5</b>	<b>81.5</b>

**Table 5.** Threshold scores of QS ranking compiled based on data of QS World University Ranking [<http://www.topuniversities.com/qs-world-university-rankings>].

Year	2011	2012	2013	Change (%) 2013/2011
<b>Position in rating</b>	<b>Score</b>			
1	100	100	100	0%
100	64.5	65.85	68.4	6%
200	47.1	49.14	52.4	11%
300	37.2	38.91	40.2	8%
400	29.3	31.32	33.2	13%

So, threshold score of Top 100 increased by 3.9 or by 6% and total score for entering Top 400 universities also by 3.9 that is 13%. If this pattern is preserved to 2020 Top 100 threshold may be higher than 70. It reflects high level

of competition between universities for the honour to be listed not only in Top 100 leading universities but in the first half of QS ranking. Let us see distribution of Top 400 universities by total score (Figure 1).



**Figure 1.** Distribution of universities by total score.

Only 23 universities were able to get more than 90 as it may be seen from Figure 1, that is only 3% of all universities included in QS ranking. 93 higher educational institutions got more than 70 in 2013. With reduction of total score a number of universities in a certain range is growing, and relatively small increase of total score may help to make significant move in lower positions of ranking.

Only one Russian university – Lomonosov Moscow State University – is close to Top 100. Its total score is in the range of 60-70; it is followed by Saint-Petersburg State University that is positioned in last but one range with 45.9. Bauman Moscow State Technical University, Novosibirsk State University, Moscow State Institute of International Relations (MGIMO-University) are positioned in last range with 38.0, 36.2 and 33.8, respectively. People's Friendship University of Russia has increased total score from 17.7 to 28.4 and moved from 573 to 495 position in ranking. It was the best rate of improvement among Russian higher educational institutions.

Two more universities have good potential for move. These are Moscow Institute of Physics and Technology and St. Petersburg Polytechnic University that were included in the QS ranking only in 2013 but get worthy positions for newcomers – 443 and 457 respectively. One may expect that these higher educational institutions with rich scientific tradition will improve their international teach record and move in higher positions. Other Russian universities are deeply behind the leaders and total score was not calculated for these in 2013.

Analysis of ranking dynamics has shown that four Russian universities have had stable growth trend (Figure 2).

But even with existing dynamics of the best Russian higher educational institutions the aim set for high school is impossible as it may be seen from trend shown in Figure 3.

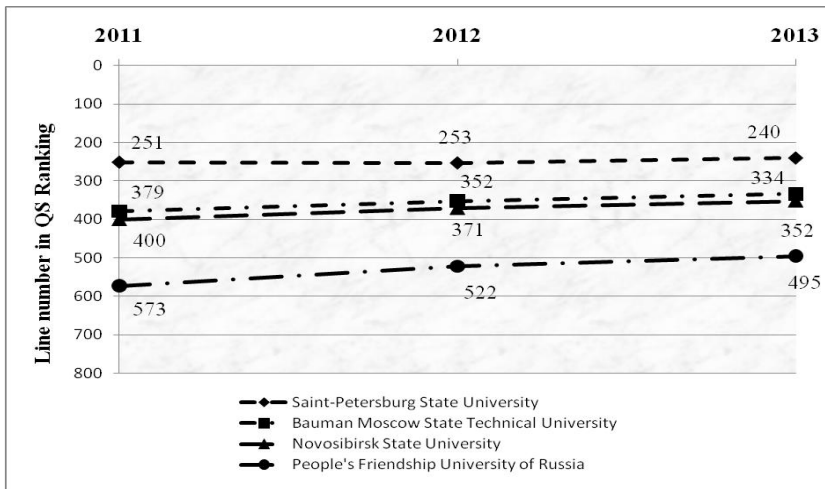


Figure 2. Russian universities ranking dynamics in 2011-2013.

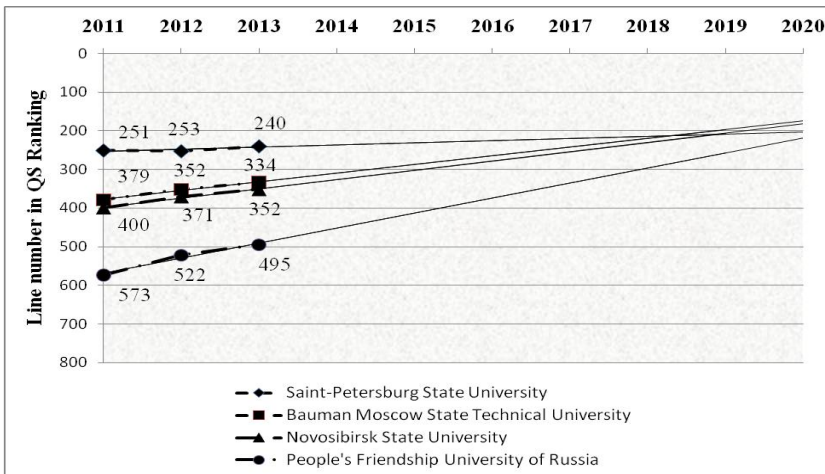


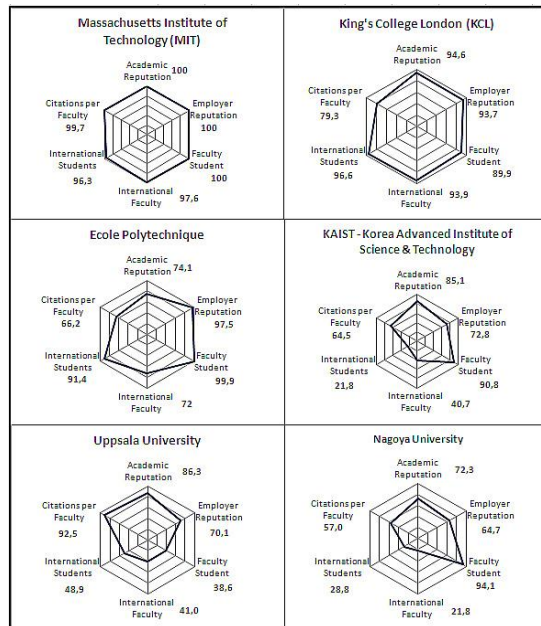
Figure 3. Projection of existing dynamics of analyzed Russian universities in QS ranking to 2020.

Only five Russian higher educational institutions today have been scored in all indicators that form general ranking. All foreign universities analyzed in previous chapter have relatively high score in all indicators.

Diagrams in Figure 4 and 5 visualize comparison of some foreign and Russian universities by QS ranking indicators. Diagram for Massachusetts Institute of Technology (MIT) is almost regular hexagon that is an indicator of balanced development of all indicators. The farther university is from the first place the less is area of relevant figure in diagram.



Authors were not intended to place universities diagram area descending order but that was graphical representation of score by ranking indicators. Forms of diagrams of even best Russian universities shows that they are far from achieving aims set for Russian high school.



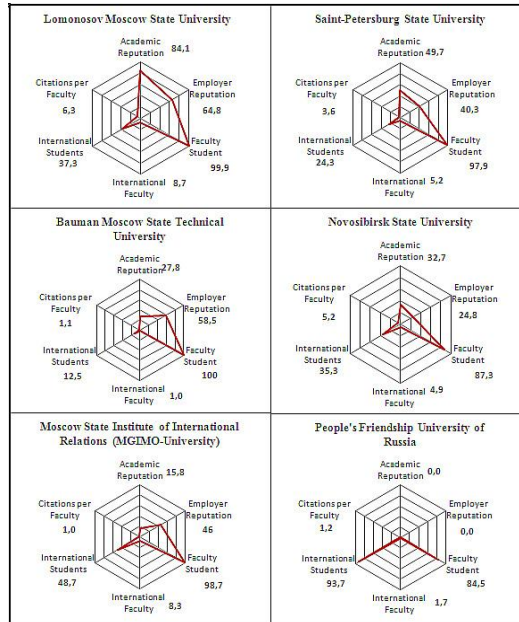
**Figure 4.** Score evaluation of ranking indicators of foreign universities of Top 100.

Figure 6 that is combination of diagrams based on average score of foreign and Russian universities from Tables 4 and 5 gives the most vivid representation of problems of Russian high school in international educational space.

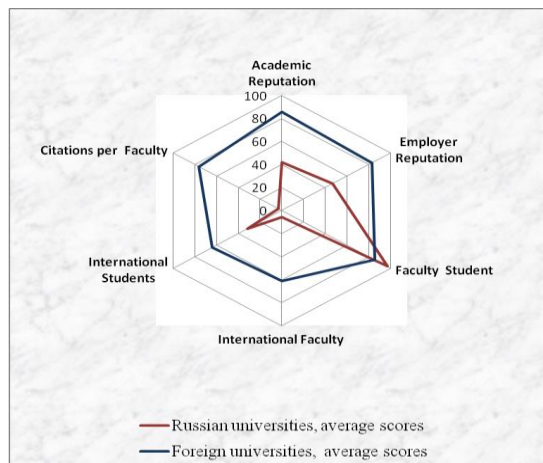
Citation index is weak spot of Russian higher educational institutions. Let us see if it is possible to increase citation index in terms set by Russian government to achieve substantial progress in ranking. We pay attention to this indicator because citation level is scientific metric of timeliness and quality of scientific research and thus it has direct impact on forming the most weighable indicator of QS ranking that is academic track record. This indicator is even more weighable in forming Top 400 of world universities *The World University rankings* [<http://www.scimagojr.com/index.php>]. Citation depends also of such factor as *publishing activity*. It is obvious that the higher publishing activity of an author the more chances he has that his materials will be read and used in work and thus cited in press.

Research group SCImago that provides services of presentation and search for information on the base of Scopus database has launched information resource SCImago Journal & Country Rank (SJR) that allows analyzing publication activity in different dimensions. According to this group, 30 million

of scientific works were added to Scopus database from 1996 to 2012. The USA is a leader in a number of publications (7063329) that is 24.05% of world scientific press; China has second place with 2680395 of articles and 9.12%; Russia is in 12<sup>th</sup> place with 586646 publications and 2.00%.



**Figure 5.** Score evaluation of ranking indicators of best Russian universities.



**Figure 6.** Comparison of average score of indicators of best Russian and foreign universities.

Diagram shows publication activity of 20 leading countries in 2012 (Figure 7). USA has a commanding lead — American authors published 537 308

articles in a year. China is the second and well ahead of other countries with 392164. Russian has 16<sup>th</sup> place with 39776 articles.

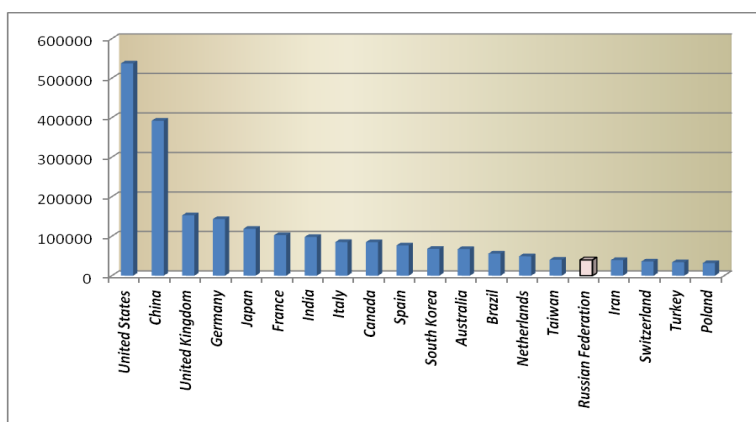


Figure 7. Publishing activity in 2012 by countries.

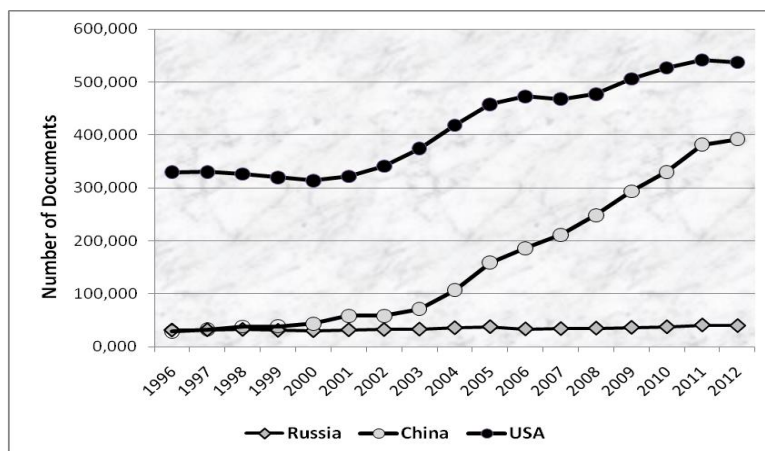


Figure 8. Publication activity dynamics in 1996-2012.

Diagram of growth of a number of publications in 1996-2012 according to SJR is shown in Figure 8 [<http://www.scimagojr.com/index.php>]. Publication activity of the USA, China and Russia is shown in Table 6.

The USA keeps leading position and persistently increases publication activity. Annual number of scientific publications grows in average by 3.2%. Phenomenon of China is interesting and instructive. While in 1996 The Heavenly Empire was behind Russia with 9<sup>th</sup> place by a number of articles in 2006 it was the second. The number of articles has grown more than 6 times. Average growth rate in 1996-2012 was 118.6% and in some periods it was 150%.

Average growth rate of a number of articles in Russia in 1996-2012 was 101.6%. Still in last six years the situation became better and average annual growth rate was 102.9%. But global publication base has been growing by 6.3%

in average so Russia was losing its share in global scientific press. In 1996 this share was 5.52%, but to 2012 it decreased to 1.44% (Table 6).

**Table 6.** Publication activity structure in the USA, China and Russia - compiled by SJR data [<http://www.scimagojr.com/index.php>].

	Number of publications			Share in global scientific press		
	1996	2006	2012	1996	2006	2012
USA	329834	472579	537308	57.77%	24.42%	19.42%
China	28555	186360	392164	5.00%	9.63%	14.17%
Russia	31500	33668	39766	5.52%	1.74%	1.44%

#### 4. Discussion

These results reveal indicators with lower scores of Russian higher educational institutions compared with foreign ones. There are numerous weak spots and track record in global scientific community and among employees is in the first place. Our universities worth some indulgence because they learn about achievements of foreign colleagues in education and research of published articles in respectful titles. But linguistic barrier that appeared in Soviet time does not allow most of Russian researchers issuing articles in English-language magazines and these are magazines read by most scientists of the world. The same reason does not allow employees to evaluate the level of professional training of post-graduate student. Track record is being formed on the base of comments of thousands of respondents from all around the world. But the share of Russian respondents is extremely low due to the same reason — low awareness of our scientists in global community. One should also account for human factor — foreign respondents sometimes form their idea of Russia on the base of thesis media that may also affect objective appraisal of a certain Russian university.

Citation level is the weakest spot of our universities as it is obvious from Figure 6. Low citation indicator is directly connected with insufficient number of English-language publications.

But there is an indicator that allowed most of our higher educational institutions being included in ranking. It is good number of lecturers and students ratio that equals 1:10. It is norm that was approved in the middle of 90s of 20<sup>th</sup> century.

It is necessary to admit that breakthrough in all areas that are considered in forming the ranking requires active support to scientists in publishing their articles in global scientific press. In long-term perspective it requires thorough rethinking of the system of study of English language starting from preschool education and to university.

Linguistic barrier and organizational and financial barriers as well hamper attraction of foreign professors. Possibility to attract professors from other countries to education and research may allow students to get acquainted with different scientific schools and universities' staff — with advanced research

methods. Contact with representatives of world scientific community will support wide global awareness of Russian scientific school.

Ministry of Education and Science set the first objective «to increase the share of publications of Russian researchers in total number of publications in world scientific magazines included in index Web of Science from 2.05% to 2.44% [http://xn--80abucjiibhv9a.xn--p1ai/%D1%81/%D0%BF%D0%BB%D0%B0%D0%BD%D1%8B-%D0%B8-%D0%BE%D1%82%D1%87%D0%B5%D1%82%D1%8B/%D0%94%D0%B5%D0%BA%D0%BB%D0%B0%D1%80%D0%B0%D1%86%D0%B8%D1%8F%20%D0%BD%D0%B0%202014%20%D0%B3%D0%BE%D0%B4]. Is this aim real? Analysis of global experience shows that it is possible to achieve this goal but with persistent purposeful efforts.

‘Great Leap’ of China is the best example of such achievement. It became possible because taking second place by the number of scientific publications was considered as national priority. Significant effect was achieved by such simple measure as big reward for authors for each publication included in Scopus or Web of Science. It is also necessary that more than 50 scientific magazines are being published in China by world famous publishing house Elsevier in English and all materials of these magazines are automatically included in Scopus database.

Such measures of state support are necessary in Russia. One should keep in mind that works of Russian scientists are evaluated by English-language database and very low percent of Russian publications get into it. That is why respondents of surveys about academic track record of universities have as usual rather vague idea about real state and achievements of Russian science. It is necessary to stimulate publication activity in all levels and provide Russian scientists all necessary support in translation and placing of their articles in magazines reviewed by Scopus and Web of Science.

## **5. Conclusions**

We have made conclusion that positions of our higher educational institutions will be around the second hundred to 2020 if rate of move in rating are the same. One should also keep in mind that the higher is position in the list the sharper is competition between universities and this movement in the list becomes slower. To realize set goal our universities should significantly increase rate of ascent in QS ranking.

Russian high school has 6 years to achieve results set by the Government. Analysis of changing of positions of leaders of ranking has shown that movements of universities in both directions are usually small. For example, The Chinese University of Hong Kong in 2007-2013 moved from 38<sup>th</sup> to 39<sup>th</sup> position; Tokio Unioversity became lower — from 17<sup>th</sup> to 32<sup>nd</sup> position; Juristische Fakultät der Ludwig-Maximilians-Universität in 2013 remains in the same place as in 2007 — 65<sup>th</sup>. But there were exceptions to the rules: Erasmus University Rotterdam (the Netherlands) in 6 years moved from 163<sup>rd</sup> to 92<sup>nd</sup>

position moving up gradually from year to year and two Korean universities Pohang University of Science and Technology and Yonsei University managed to move more than 100 positions up.

One may tell to sceptics questioning the possibility to achieve these goals that in six years the city of sports was built in Sochi that is one of the best in the world according to experts. Practice of targeted funding of the most urgent projects covers program 5-100-2020 as well – only in 2013 9 billion rubles were provided to 15 universities of Russia selected by the Ministry of education and science of RF by results of the year. In is planned to provide 40 billion rubles for this purposes to 2016. It is a big sum and the problem is to focus resources in a single strategy.

This research allowed evaluating position of Russian universities in global educational space. Authors stress attention of the Government of Russia to the problem of moving of Russian universities in global rankings. It is proved by additional funding of the program 5-100-2020. Authors have also revealed the reasons of Russian universities falling behind the leaders of ranking and stress the importance of increase of citation index and respectively publication activity of professors and scientists working in universities. And finally necessity of targeted funding is grounded to realize the most perspective tasks.

All these theses are valuable by themselves, but it may be the subject of new research. Necessity of targeted funding is declared while it may be useful to analyze the extent universities' results by main indicators an especially by publishing and citation depend on additional funding in the scope of national program 5-100-2020.

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