

How Key Russian Universities Advance to Become Leaders of Worldwide Education: Problem Analysis and Solving

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Abstract: The paper studies in detail and analyze local rankings by faculty and by subject according to the QS World University Ranking. The paper also suggests a method to clearly display a university status by faculty and by subject. A comparative analysis of leading world universities' performance has been done by faculty and by subject. The ways to increase performance of national universities by faculty and by subject are looked into, as well as the ways for them to advance in the world rankings.

Key words: Ranking • Competitiveness • Performance • Global Education Market

INTRODUCTION

The more intensive the processes of economic and cultural integration are in the world, the stronger competition is in the global market, including in the field of educational services. The world community pays special attention to the higher school as a supplier of qualified workers for the global economic system. At the same time universities provide fee-based services for applicants, master and PhD students, which becomes a considerable revenue item in the countries that lead in the higher education. Championship in the educational market in lots of countries is seen as an important national goal.

Lately, the President, the Government of the Russian Federation, mass media [1, 2, 4, 5, 6, 7, 8, 12] has been paying lots of attention to the issues concerning the return of the prestige that the Russian higher school used to have. In the Soviet period a lot of students came to study in Russian universities from socialist European countries, such as Poland, Bulgaria, Eastern Germany, Czechoslovakia, etc., as well as Asian and African countries: China, Vietnam, India, Pakistan, Algeria and many others. Correspondingly, diplomas of Russian

universities were recognized in these countries (and some others as well!) as documents about full-fledged tertiary education.

Unfortunately, the reforms in 1990s and industrial production crisis caused breaking of the existing connections between enterprises and universities which resulted in sharp reduction of scientific research sectors in Russian universities. Furthermore, by that time educational services had become a very profitable activity for universities whereas university rankings, which were gaining momentum, had turned into a powerful advertising tool.

Vertical Race: Ranking Advancement and Universities'

Fight for Students: Today how attractive a university is for students and how prestigious its diplomas are for employers largely depend on its ranking position. Best universities rankings are regularly worked out by various agencies and posted on the Internet, the most accessible information platform. Russian universities occupy fairly modest positions in these rankings. This contributes to the Russian higher education discredit both on a global and domestic scale.

The Soviet Union used to be ranked number two (after the USA) by number of foreign students, but now Russia is ranked number nine by this category. According to the Organization of Economic Co-operation and Development (OECD), in 2007 the total number of foreign students was 3 million. Russian universities accounted for 2% of this number, whereas the share of the USA was 20% and that of the UK was 12%. Germany and France teach 9% and 8% correspondingly. Moreover, a lot of students study in Australia (7%), Canada (4%) and Japan (4%) [2].

The strategic goals of the national educational policy are:

- To improve attractiveness and competitiveness of the Russian educational system in the global and regional educational sphere;
- To ensure effective participation of Russia in the global and major regional processes of education development.

In order to achieve these goals it is essential, first of all, to advance our best universities (and there are quite a number of those!) in the global rankings.

One of the most reputable rankings is the QS World University Ranking, which is made by the consulting company Quacquarelli Symonds (QS) starting from 2004. To be ranged by this particular agency is not only prestigious but also promises large revenues from teaching foreign students. So universities strive for being noticed by the company QS. This trend is clearly seen in the dynamics of the constantly growing number of universities in the published rankings. If in 2007 619 universities were presented, in 2001 this figure was 724. In 2013 the ranking covered 834 from 76 countries of the world. To select them from about 3000 universities who had applied, 62094 opinions of scientists from various countries and 27957 views of employers were considered [9,10].

Starting from 2005 the rankings included Russian universities. At the beginning there were just 5 of them, but by 2010 their number had grown to 8. It is worth mentioning, that the administration of Russian universities is more and more aware of the importance for a university to be presented in international rankings. It is confirmed by the fact that over the last three years the number of Russian universities in the QS World University Ranking has increased considerably.

As Table 1 shows, the number of universities in the 2013 rankings has more than doubled (from 8 to 18). Even though the positions of several universities are in the rearguard sector (ranking 701+) and they can hardly be considered as stable ones, there is hope that conscious efforts of Russian universities to improve their indices in the ranking will yield.

According to the Russian Federal State Statistics Service (Federal'naya sluzhba gosudarstvennoi statistiki) today, in Russia there are 1046 higher educational institutions [3]. So 1.7% of Russian universities are represented in the QS ranking. In contrast, according to the 2009 data there were 4352 higher educational institutions in the USA and the 2013 ranking comprises 144 universities, i.e. 3.3%.

Performance Analysis of Educational and Scientific Activities of Universities Is the Basis for Their Harmonious Development:

University rankings by educational and scientific faculty developed by the British company «Quacquarelli Symonds» (QS) are very useful, as they let us analyze strengths and weaknesses of multidisciplinary universities. The local ranking is formed by each faculty and includes 400 best universities. Assessment is done by a narrower range of indices: academic reputation, reputation with employers, number of citations per paper published, h-index. It is worth saying that for each faculty the weight of these indices is different (Table 2).

Table 2 shows that combination of academic activity and scientific performance indices by 70-90% defines the position of a university in the ranking by faculty.

Only two universities represent Russia in these local rankings: Moscow State University and St. Petersburg State University. To make the picture complete, let us compare the local rankings of American, French, German, Finnish and Chinese universities, which occupy the best positions among universities of their countries in the major ranking and the indices of our leading universities (Table 3). In our table the USA universities are represented by Massachusetts Institute of Technology (MIT), an absolute world leader according to QS. The French university with the highest position in the ranking is the École normale supérieure, the foremost technical university, whose prestige in France is even higher than that of the famous Sorbonne. One of the best German universities in the ranking is the Technische Universität München, which specializes in exact sciences.

Table 1: Russian universities in the QS World University Ranking 2011-2013

Name of University			2011	2012	2013
1.	Lomonosov Moscow State University	Ranking	112	116	120
		Line	112	116	120
2.	St. Petersburg State University	Ranking	251	253	240
		Line	251	253	240
3.	Bauman Moscow State Technical University	Ranking	379	352	334
		Line	379	352	334
4.	Novosibirsk State University	Ranking	400	371	352
		Line	400	371	352
5.	Moscow State Institute of International Relations (MGIMO)	Ranking	389	367	386
		Line	389	367	386
6.	Moscow Institute of Physics and Technology (State University)	Ranking			441-460
		Line			443
7.	Saint Petersburg State Polytechnical University	Ranking			441-460
		Line			457
8.	The Peoples' Friendship University of Russia	Ranking	551-600	501-550	491-500
		Line	573	522	495
9.	National Research University "Higher School of Economics"	Ranking	551-600	501-550	501-550
		Line	537	550	518
10.	Ural Federal University named after the first President of Russia B. N. Yeltsin	Ranking		451-500	501-550
		Line		469	549
11.	Tomsk Polytechnic University	Ranking	551-600	601+	551-600
		Line	541	616	583
12.	Tomsk State University	Ranking	451-500	551-600	551-600
		Line	451	568	584
13.	Kazan (Volga region) Federal University	Ranking	601+	601+	601-650
		Line	648	697	612
14.	Southern Federal University	Ranking			601-650
		Line			626
15.	Far Eastern Federal University	Ranking		601+	701+
		Line		612	723
16.	N. I. Lobachevsky State University of Nizhny Novgorod	Ranking		601+	701+
		Line		646	740
17.	Plekhanov Russian University of Economics	Ranking		601+	701+
		Line		623	747
18.	Voronezh State University	Ranking			701+
		Line			832

Done According to the Data of the QS World University Ranking [9].

Table 2: Indices for ranking by faculty

Faculty Area	Academic Reputation	Employer Reputation	Citations per Paper	H-index Citations
Arts & Humanities	60%	20%	10%	10%
Engineering & Technology	40%	30%	15%	15%
Life Sciences & Medicine	40%	10%	25%	25%
Natural Sciences	40%	20%	20%	20%
Social Sciences & Management	50%	30%	10%	10%

We have chosen the University of Helsinki because our universities have been actively collaborating with Finnish ones for quite a while. The biggest country in the Asian region is represented by Peking university, which attracts attention due to the harmonious development of all educational and scientific faculties.

Table 3 shows the position of the university in the general ranking and number of the line the university

occupies in the local ranking. These data prove that even the best universities have different performance by various scientific faculties. Normalized coefficients are always more demonstrative for comparison. To assess performance by faculty, a performance coefficient by faculty (C_{per}) can be proposed:

$$K_{res} = \frac{N - (m - 1)}{N} \quad (1)$$

Table 3: Local ranking indices by faculty in 2013 (QS World University Ranking by Faculty 2013)

School Name	QS Rank	Rank by Faculty				
		Arts & Humanities	Life Sciences & Medicine	Social Sciences	Engineering & Technology	Natural Sciences
Massachusetts Institute of Technology (MIT)	1	18	6	7	1	2
Ecole normale supérieure, Paris	28	109	0	0	136	74
Peking University	46	23	101	25	38	21
Technische Universität München	53	0	83	246	17	15
University of Helsinki	69	46	55	75	186	82
Lomonosov Moscow State University	120	0	374	271	199	84
Saint-Petersburg State University	240	0	0	0	0	275

Done According to the Data of the QS World University Ranking [9].

Table 4: Performance of Universities by Faculty

School Name	Rank by Faculty				
	Arts & Humanities	Life Sciences & Medicine	Social Sciences	Engineering & Technology	Natural Sciences
Massachusetts Institute of Technology (MIT)	0.96	0.99	0.99	1.00	1.00
Ecole normale supérieure, Paris	0.73	0.00	0.00	0.66	0.82
Peking University	0.95	0.75	0.94	0.91	0.95
Technische Universität München	0.00	0.80	0.39	0.96	0.97
University of Helsinki	0.89	0.87	0.82	0.54	0.80
Lomonosov Moscow State University	0.00	0.07	0.33	0.51	0.79
Saint-Petersburg State University	0.00	0.00	0.00	0.00	0.32

where,

C_{per} – Performance coefficient by faculty

N – Number of universities in the local ranking;

m – Number of the line the university takes in the ranking.

After the formula, proposed by the authors, have been applied (1), coefficients are obtained which reflect performance of universities by faculty (Table 4).

The data represented in Table 4 are much more convenient both for further analysis and their graphic interpretation (Diagram 1).

The leader of the QS ranking, Massachusetts Institute of Technology, is being harmoniously developed by all faculties, its performance coefficient by faculty (C_{per}) is within the range of 0.96 to 1.00. Both Peking University and the University of Helsinki strive for the same harmonization of their activities. Peking University has C_{per} from 0.75 to 0.95. Having these high indices it takes just the 46th position in the ranking, which show how rigid the competition between leading universities is. The University of Helsinki has the performance indices (C_{per}) within the limits of 0.54 to 0.89. Comprising all faculties, it keeps its position in the first hundred (69 position) of universities by the QS ranking.

Diagram 1 also shows two institutions whose achievements are focused on the limited range of

faculties. These are the institutions which are primarily famous for their success in the field of exact sciences and technology - Ecole normale supérieure, Paris, (28 position) and Technische Universität München (53 position). Strong ranking positions have been reached due to high performance by the chosen faculties of educational and scientific activities.

Although Lomonosov Moscow State University is a multidisciplinary university, the diagram clearly shows that its performance coefficient changes within broad limits: from 0.07 by life sciences & medicine to 0.74 by Natural sciences. It is, of course, honorary to occupy the 120th position in the ranking, but to become a world educational leader and achieve harmonious development by all faculties, our best university will still have to do big system-based work.

The information available allowed QS not only to research the activities of universities by faculty, but also present details by subject. However, local rankings by subject include only 200 best universities. The list of subjects used in the rankings is given in Table 5.

Detailing by subject provides much more material for analysis and helps reveal advantages and drawbacks of scientific and educational activities of a university at large. Table 6 includes information about positions that the afore-mentioned universities occupy in local rankings by subject.

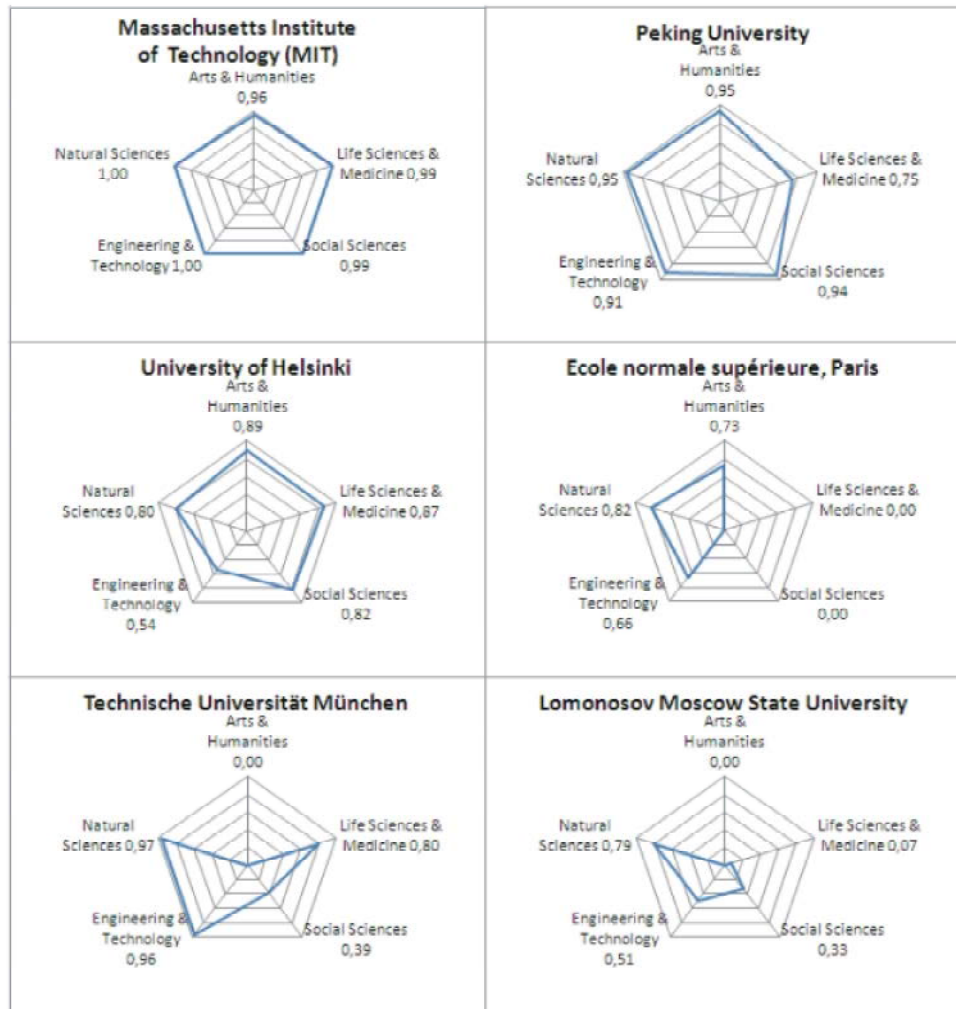


Diagram 1: University performance indices by faculty

Table 5: List of subjects for ranking by subject (QS World University Rankings by Subject)

Number	Subject	Number	Subject
	Arts & Humanities		Law and Legal Studies
1	Philosophy	15	Economics & Econometrics
2	Modern Languages	16	Accounting & Finance
3	Geography	17	Communication & Media Studies
4	History and Archaeology	18	Education
5	Linguistics		Engineering & Technology
6	English Language & Literature	19	Computer Science & Information Systems
	Life Sciences & Medicine	20	Chemical Engineering
7	Medicine	21	Civil & Structural Engineering
8	Biological Sciences	22	Electrical & Electronic Engineering
9	Psychology	23	Mechanical, Aeronautical & Manufacturing Engineering
10	Pharmacy & Pharmacology		Natural Sciences
11	Agriculture & Forestry	24	Physics & Astronomy
	Social Sciences	25	Mathematics
12	Statistics & Operational Research	26	Environmental Sciences
13	Sociology	27	Earth & Marine Sciences
14	Politics & International Studies	28	Chemistry
		29	Materials Sciences

Done according to the data of the QS World University Ranking [9]

Table 6: Indices of universities in rankings by subject in 2013

Subjects	Massachusetts Institute of Technology (MIT)	Ecole normale supérieure, Paris	Peking University	Technische Universität München	University of Helsinki	Lomonosov Moscow State University	Saint-Petersburg State University
Philosophy	6	35	17	-	90	-	-
Modern Languages	21	53	13	-	93	63	-
Geography	-	-	25	-	51	-	-
History and Archaeology	57	-	41	-	92	-	-
Linguistics	2	-	20	-	49	-	-
English Language & Literature	40	-	50	-	92	-	-
Medicine	15	-	64	67	48	-	-
Biological Sciences	2	153	45	67	88	-	-
Psychology	-	-	47	-	92	-	-
Pharmacy & Pharmacology	-	-	60	65	91	162	-
Agriculture & Forestry	-	-	-	41	93	-	-
Statistics & Operational Research	2	106	44	-	190	112	-
Sociology	35	-	64	-	90	-	-
Politics & International Studies	37	-	22	-	89	-	-
Law and Legal Studies	-	-	41	-	132	-	-
Economics & Econometrics	2	-	37	-	185	-	-
Accounting & Finance	5	-	35	-	-	-	-
Communication & Media Studies	12	-	64	-	43	-	-
Education	-	-	65	-	33	-	-
Computer Science & Information Systems	1	55	35	42	140	163	-
Chemical Engineering	1	-	-	39	-	-	-
Civil & Structural Engineering	5	-	-	77	-	-	-
Electrical & Electronic Engineering	1	-	36	34	-	-	-
Mechanical, Aeronautical & Manufacturing Engineering	1	-	36	23	-	-	-
Physics & Astronomy	1	46	29	17	143	64	-
Mathematics	2	50	35	79	145	42	168
Environmental Sciences	3	-	39	124	88	-	-
Earth & Marine Sciences	3	104	69	171	188	109	-
Chemistry	1	-	15	24	142	108	-
Materials Sciences	1	-	20	76	-	168	-

Done according to the data of the QS World University Ranking [5]

By using the aforementioned method, let us present the data from Table 7 in graphics (Diagram 2).

Diagram 2 clearly demonstrates that to be the first, one does not necessarily have to be the first in all things. Even world education leaders show different activeness in scientific and research work by separate subjects.

According to international experts, universities in the Asian region are developing dynamically.

National Scale Problem Is to Increase Russian Universities' Ranking: The present detailed analysis is designed to reveal the secrets of the best world universities' success, help other educational institution, primarily Russian ones, develop a good strategy to increase their competitiveness, reach leading positions in the global education market.

On this way universities badly need national support and that implies more than just funding. A complex scheme has to be developed and implemented to resurrect the university science with the use of government contract system for universities to do real science driven research. To an extent the problem can be solved with the grant system. But one should not forget that successful scientific work should not just end up delivering a

handover act or a completion report to the customer, but it has to be accompanied with a publication in well-established scientific journals, including English language ones. In our opinion, a paper in a peer-assessed foreign title should become a must for grant giving. Only then the world scientific community will know about achievement of Russian universities, relevant databases, which are uses as a basis for international rankings of universities, will be updated and personal status of our scientists will grow.

Every Russian university needs a strategic scheme to advance in rankings. To implement this it will be quite useful:

- To do self-assessment of a university
- With the use of item lists in Table 6, to evaluate, which of these items approach the level of world education leaders;
- On the basis of the analysis conducted, to identify the most promising fields of scientific work;
- To elaborate measures to expand the area for scientific and research work, create working groups with participation of teaching staff, postgraduate students, senior students;

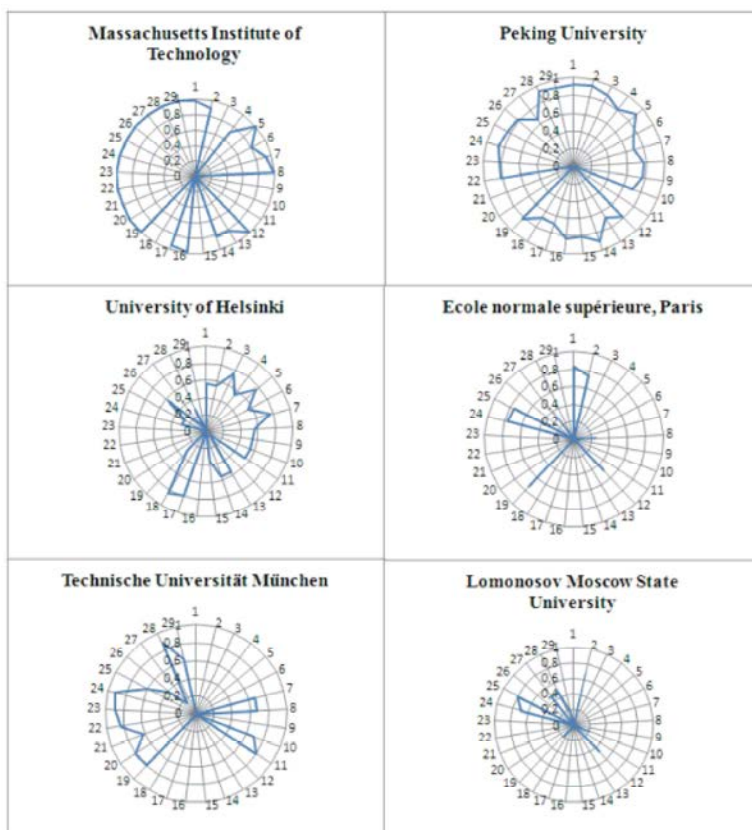


Diagram 2: Performance indices of universities by subject

- To develop a complex of activities directed on increase of publications in peer-assessed titles, in particular:
- To create a special working group whose task will be to select papers for translation and publication;
- To publish selected and translated papers in foreign scientific peer-reviewed journals, contact publishers;
- to develop a system of incentives for those who publish their papers in well-established Russian and foreign titles.

The fifth stage is defining in informing of the world scientific community about achievements of the Russian science and higher school. According to the SJR (Scimago Journal Rank) information base, which has been developed by the Spanish research group Scimago, the total number of scientific publications in the world constantly grows. Thus, in 2007, 2036146 were registered in the database, in 2012 this number was 2766775, i.e. the number of scientific publications grew by 35.88% over six years. The USA and China has been stable leaders in the number of publications. Notably, China is successfully

catching up with the USA by this index. If in 2007 the share of publications of American authors in the total world volume was 22.97%, that of Chinese ones was 10.39%, then in 2012 this correlation was 19.42% American and 14.17% Chinese publications [11].

Since, for Russia, growth in the number of scientific publications is a tool to implement the national policy in the field of education, it is worth using the good experience and, at least in the first instance, making authors of scientific materials free from organizational problems connected with placing the former ones in peer-assessed titles.

Increase in the number of Russian publications in peer-assessed titles results in improved academic reputation of our universities, more citations of articles and, finally, better ranking positions of Russian universities.

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