

THE THREE UNIVERSITY MISSIONS PILOT RANKING METHODOLOGY (DECEMBER 2017)

Moscow International University Ranking is a fundamentally new academic ranking, the first to evaluate all the three key university missions: education, research, and interaction with society. The ranking uses a number of new criteria calculated on the basis of objective data, and does not use any subjective reputation surveys. The initiative of creating the ranking has been supported by leading universities of Russia, China, India, Iran, Japan, and Turkey.

The ranking methodology has had a wide public discussion in Russia and abroad. The first draft of the Moscow International University Ranking methodology has been developed as a result of a wide public discussion with a total of over 100 collective contributors: universities, rector councils, expert associations, and rating agencies.

In the next phase, the ranking model, proposed approaches and criteria were tested using a sample of Russian universities. In February and March 2017 215 Russian higher education institutions from 80 regions completed the questionnaire and provided the data.

After the model had been tested, the list of criteria was submitted for consideration to the ranking's International Expert Council. The council is composed of 25 renowned higher education experts from the United States, United Kingdom, Brazil, China, India, South Africa, Iran, Italy, Belgium, Turkey, Poland, and Russia. The council has held physical meetings on 8th and 9th June 2017 in Lomonosov Moscow State University; after which expert discussions were carried on individually. As the result of the model testing and joint work with international experts the original list of indicators was amended.

Due to many of the criteria being innovative, it was highly probable that the universities would not have part of the requested data in their record keeping systems. Therefore the pilot ranking has been based on the 17 criteria which are remotely observable and in many cases obtainable from sources, independent from universities. This has made it possible to provide equal conditions for all of the participating universities. However, in the future it will be possible to expand the list of indicators for better compliance with the structure of criteria the international experts have approved.

Selection of Participants

The principles used for selection of Moscow International University Ranking participants are as follows. The short list includes top 100 institutions of international rankings THE WUR and QS WUR, leaders of national rankings listed in the IREG Inventory of National Rankings and higher education institutions that have individually stated their willingness to participate in the ranking. Furthermore, narrow-focused higher education institutions, i.e. those without educational programmes in at least two of 6 areas of knowledge according to the OECD classification, were excluded from consideration.

Information Sources

The pilot ranking uses only objective criteria approved by the international experts. Reputation surveys are entirely excluded from consideration. The ranking is based on data from official websites of universities and independent international sources: Data and metrics from InCites and Global Institutional Profiles Project (GIPP), provided by Clarivate Analytics; Elsevier's abstract and citation database Scopus; massive online education platforms Coursera and edX; Wikipedia, the free multilingual online encyclopedia; search engines Google, Yandex, Baidu; Twitter social network; websites of international student contests.

RANKING CALCULATION

The overall weight of indicators per group is: 45% for Education, 25% for Research, and 30% for University and Society.

The score of each participating higher education institution was calculated as a ratio of the institution's value to the difference the maximum and minimum values of the entire sample.

The calculation was done by the formula:

$$x_i = \frac{a_i - a_{min}}{(a_{max} - a_{min})},$$

where

x_i – the score of the i -th indicator;

a_i – the value of the i -th indicator;

a_{max} – the maximum value of the i -th indicator;

a_{min} – the minimum value of the i -th indicator.

In case linear calculation was hardly applicable, a normalisation method was used to make the distribution of evaluations more even.

The scores gained by higher education institutions in each of the indicators were multiplied by the respective indicator coefficients. The weighted scores in each of the indicators were then summed:

$$f = \sum_{i=1}^{n_x} x_i v_i ,$$

where

f – the ranking score

x_i – the score of the i -indicator

n_x – the number of ranking indicators

v_i – the weight of the i -th indicator

MOSCOW INTERNATIONAL UNIVERSITY RANKING "THE THREE UNIVERSITY MISSIONS" PILOT VERSION CRITERIA

No.	Name	Parameters measured	Weight	Criterion meaning and justification	Information source	Details
I. Criteria group: Education						
1.	Wins in International Student Contests by Students	Student competitiveness	5	<p>Unlike common scientometric indicators, which measure achievements of university staff, the innovative criterion of the Moscow Ranking makes it possible to measure students' competitiveness. The criterion demonstrates the amount of knowledge, skills and competence students obtain, as well as their ability to use these resources to solve complex tasks. The number of winners of international student olympiads and other prestigious international contests cannot be big, but, nevertheless, the number of winners and awardees of prestigious contests can show in a focused way the effectiveness of education and students' aptitude for breakthrough scientific research.</p>	Data from websites of international contests	<p>Personal and team wins in the 12 international student contests from 2013 to 2016 were calculated in a similar way as Olympic 'medal standings' (contest winners and awardees were considered). Each contest was given a weight depending on the number of countries covered (ACM ICPC, which brings together students from over 100 countries has the maximum weight, 1.00; Belgrade Business International Case Competition with participants from as few as 9 countries has a weight of 0.09). The weighted values were then summed.</p> <p>Contests considered:</p> <ul style="list-style-type: none"> - ACM International Collegiate Programming Contest - The Philip C. Jessup International Law Moot Court Competition - The World Universities Debating Championships - SIAM Student Paper Competition & SIAM Student Paper Prizes - International Mathematics Competition for University Students - Network of International Business Schools Worldwide Case & Business Plan Competitions - Green Brain of the Year Contest - The University Physics Competition - McGill Management International Case Competition - The Mathematical Contest in Modeling - John Molson Undergraduate Case Competition - Belgrade Business International Case Competition
2.	International students to overall student headcount ratio	Attractiveness for international students	10	<p>This indicator demonstrates the proportion of international students in the total number of students and is widely used by existing academic rankings.</p>	Data from university websites	<p>International intramural students of all programmes that lead to a degree of Bachelor, Master, and equivalent degrees who spent at least 3 months on campus in the reported year (compared with total intramural students of all programmes that lead to a degree of Bachelor, Master, and equivalent ISCED-2011 Levels 6 & 7 degrees).</p>

Table (continued)

No.	Name	Parameters measured	Weight	Criterion meaning and justification	Information source	Details
3.	University budget to student ratio	Financial resources	15	The criterion measures the level of the university's financial well-being. The higher the indicator, the wider the range of the university's opportunities to implement the three main missions: education, research, and contribution to society.	Data from university websites	Due to the fact that the cost of products and services may vary significantly from country to country, the budget was converted into PPP defined by OECD (in case the necessary value not present, using the World Bank PPP). Intramural students of all programmes that lead to a degree of Bachelor, Master, and equivalent ISCED-2011 Levels 6 & 7 degrees were considered.
4.	Student to academic staff ratio	Human resources	15	The indicator actually demonstrates the sufficiency of the university's human resources. More faculty and research staff per student mean more attention that university staff can afford to pay to each student, and, as a result, better conditions in the university.	Data from university websites	The academic staff value, which includes faculty staff and research staff, was calculated in full time equivalent. For the number of students, intramural students of all programmes that lead to a degree of Bachelor, Master, and equivalent ISCED-2011 Levels 6 & 7 degrees were considered.
II. Criteria group: Research						
5.	IREG List awards won by university academic staff and alumni	Outstanding scientific achievements	5	This metric is the developed approach proposed by the Shanghai ranking. Calculating the number of laureates of prestigious prizes to evaluate the scientific potential of the university is fundamentally correct. However, considering the Nobel Prizes and the Fields Medal significantly limits university evaluation opportunities. Therefore we used the IREG List of International Academic Awards, which includes world's 99 most prestigious scientific awards (providing the opportunity to prolong the prize list later).	Data from websites of international awards	Awards from the IREG List of International Academic Awards a university's staff and alumni won during the period from 1997 to 2016. Only permanent university staff members as of the date of prize giving were considered. Alumni included those successfully completed a programme that leads to a degree of Bachelor, Master, PhD, and equivalent degrees. Each prize was given the weight defined by IREG Observatory on Academic Rankings and Excellence, the biggest association of academic ranking compilers and users (Nobel Prizes have the maximum weight of 1.00). The weighted values were then summed.
6.	Normalised Citation Impact (global level), according to Scopus	Quality of scientific publications (international level)	5	The normalised citation impact quantitatively shows how much better or worse than world average a particular publication is cited compared with publications of the same type, area of knowledge, and year. The indicator demonstrates global relevance of the university's research activities within the academia, reflecting its acuteness and quality. Normalised citation indicators are widely used by academic rankings.	Scopus	Papers published during the period from 2012 to 2015 were considered. The normalised citation impact is calculated separately for 6 broad areas of knowledge according to OECD classification: Natural Sciences, Engineering and Technology, Medical Sciences, Agricultural Sciences, Social Sciences, and Humanities). The scores gained in each area of knowledge were then summed.

Table (continued)

No.	Name	Parameters measured	Weight	Criterion meaning and justification	Information source	Details
7.	Normalised Citation Impact (global level), according to Web of Science	Quality of scientific publications (international level)	5	The normalised citation impact quantitatively shows how much better or worse than world average a particular publication is cited compared with publications of the same type, area of knowledge, and year. The indicator demonstrates global relevance of the university's research activities within the academia, reflecting its acuteness and quality. Normalised citation indicators are widely used by academic rankings.	Web of Science	Papers published during the period from 2012 to 2015. The normalised citation impact is calculated separately for 6 broad areas of knowledge according to OECD classification (Natural Sciences, Engineering and Technology, Medical Sciences, Agricultural Sciences, Social Sciences, and Humanities). The scores gained in each area of knowledge were then summed.
8.	Normalised Citation Impact (national level), according to Scopus	Quality of scientific publications (national level)	1	The indicator demonstrates global relevance of the university's research activities within the academia of the university's home country. Introducing this criterion contributes to better consideration of achievements of national science schools and more accurate measurements in humanities.	Scopus	Papers published during the period from 2012 to 2015 were considered. This indicator is different from indicator 6 is different in the fact that for each of the 6 areas of knowledge a ratio of a university's normalised citation impact to its country's respective value is calculated. The scores gained in each area of knowledge were then summed.
9.	Normalised Citation Impact (national level), according to Web of Science	Quality of scientific publications (national level)	1	The indicator demonstrates global relevance of the university's research activities within the academia of the university's home country. Introducing this criterion contributes to better consideration of achievements of national science schools and more accurate measurements in humanities.	Web of Science	Papers published during the period from 2012 to 2015 were considered. This indicator is different from indicator 6 is different in the fact that for each of the 7 areas of knowledge a ratio of a university's normalised citation impact to its country's respective value is calculated. The scores gained in each area of knowledge were then summed.
10.	Research income per academic staff member	Staff involvement in research and development	5	The indicator actually shows the amount of R&D finance per staff member. The higher the amount of finance per staff member, the more relevant is the university's research. For those universities which collect the expense data instead of income, the indicator is calculated as expenses (budget) per academic staff member.	Data from university websites	The funds a university attracted for academic research and development were considered. This sum does not include other components, such as income from education activities, investment, commercialisation, etc. In case country-specific features or other peculiarities do not allow to calculate the research income, research budget as fund spent on research are used. The indicator was calculated using PPP defined by OECD (in case the necessary value not present, using the World Bank PPP). The academic staff value, which includes faculty staff and research staff, was calculated in full time equivalent.

Table (continued)

No.	Name	Parameters measured	Weight	Criterion meaning and justification	Information source	Details
11.	Field-weighted views impact (according to Scopus)	Relevance of scientific publications	3	The indicator evaluates how relevant a university's scientific publications are for wide audience of Scopus users. The necessity for this indicator is that it shows the popularity of a paper amongst users, including those whose work output cannot be evaluated through citation impact values: students, journalists, analysts, science communicators and writers, researchers, whose papers are not included in Scopus, and others interested in modern science.	Scopus	The indicator was calculated as an average field-weighted views impact (FWVI) of all of the considered papers of a university published during the period from 2012 to 2015. Like normalised citation impact, this indicator is calculated by comparing each publication with those of the same type, area of knowledge, and year.
III. Criteria group: University & Society						
12.	University's online courses published on the biggest global online platforms	University's contribution to affordable online education	6	This innovative indicator has never been used in global academic rankings before. It measures the university's activity in the area of massive open on-line courses. There is a clear public demand for open online courses, and the fact that this education activity is rapidly developing is beyond doubt. The more courses published on global on-line platforms, the wider is the knowledge transferred by the university via the internet, and the more significant a university's contribution to education affordability worldwide is.	Online platforms: Coursera & edX	Total number of online courses published on the global online platforms Coursera and edX and available for users as of the data collection moment (October 2017).
13.	University's share in its country's total university publications	University's contribution to the country's scientific research	4	This innovative ranking criterion measures national significance of universities for scientific development in their respective countries. The higher a university's proportion in its country's total university publications, the bigger is its contribution to research in the country, and consequently, the more important and valuable such a university is for society.	Scopus	The ratio a university's scholarly output during the period from 2012 to 2015, indexed by Scopus, to its home country's university scholarly output.
14.	Total pages of a university's website indexed by biggest search engines	Web presence	4	This indicator reflects a number of important aspects of a university's communication with society: openness, transparency, information accessibility, university's commitment to information exchange.	Search engines: Google, Baidu, Yandex	The number of web pages of a university's official domain indexed by search engines was measured by standard domain search syntactical operators of the respective search engines. To compensate the index fluctuations, which are caused by a number of factors, three measurements were performed in September and October 2017, after which an average index was calculated. The highest result of the three search engines, Google, Baidu, and Yandex, was used as the final value.

Table (end)

No.	Name	Parameters measured	Weight	Criterion meaning and justification	Information source	Details
15.	University's Wikipedia page views	Web popularity	2	Along with the official website a university's page on Wikipedia is an important source of information. A high number of views of the university's page show the university's societal impact. The criterion will cover the number of views during the year preceding the ranking compilation year.	Wikipedia	Total views of a university's Wikipedia pages in English and (if applicable) in the official national language (languages) in 2016.
16.	University's Twitter account followers	Social network communication	2	Twitter is one of the most prompt means of communication between a university and stakeholders. Although its popularity varies from country to country, a significant number of universities are using Twitter to keep public informed of their activities.	Twitter	Total number of a university's Twitter account followers as of October 2017.
17.	University's alumni with an individual article on Wikipedia	Alumni impact on society	12	High-quality education consists to a large extent of incommensurate phenomena, among other things it can be measured by university's impact on society. One of the most effective ways to measure it is to count the number of alumni successful in various areas (politics, science, art, business, charity) with an individual article on Wikipedia about them. The indicator quantitatively evaluates the university's impact on society.	Wikipedia	Total number of university alumni with an individual page on Wikipedia meeting the threshold values: alumnus date of birth: not earlier than 1947; page views: at least 1000 in 12 months before the date of calculation (September 2017). Thus, the pages which are not often visited by the users, are excluded from calculation. Of 177 thousand alumni pages, 50 thousand surpassed the threshold values.