Academic Ranking of World Universities and the Performance of East Asian Universities

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Introduction

The first multi-indicator ranking of world universities, "Academic Ranking of World Universities (ARWU)", was published by the Institute of Higher Education of Shanghai Jiao Tong University in June 2003. Although the initial purpose of ARWU was to find the global standing of top Chinese universities, it has been attracting world-wide attention from governments, universities, media, and the public in general. Professor Ellen Hazelkorn of Dublin Institute of Technology recently wrote that "ARWU marked the era of global rankings, despite being developed to highlight the position of Chinese universities vis-a-vis competitor universities and being focused on research, it has effectively become the 'Gold Standard'"(Hazelkorn, 2014).

Nearly one year and a half after the first publication of ARWU, the Times Higher Education Supplement and Quacquarelli Symonds published their "World University Rankings" in November 2004. Up to now, more than a dozen global university rankings have been published. The latest development is the Best Global Universities Rankings published by US News and World Report in October 2014.

Although the major global rankings use very different methodologies, the majority of their top 100 universities are the same, and the percentage is significantly higher for the top 20 universities. Different ranking methodologies may result in very different, sometimes conflicting, ranking results, depending on

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the dimensions measured by the ranking methodologies. Large variation of ranking positions of a particular institution in different rankings indicates the unbalanced performance of the institution in different dimensions measured.

Although controversial, global university rankings are widely used by various stakeholders and have a profound impact on world higher education. Professor Simon Marginson of the University College of London (UCL) Institute of Education recently wrote "Since the first Shanghai Academic Ranking of World Universities in 2003 global rankings have transformed higher education" and "Since the emergence of global rankings, universities have been unable to avoid national and international comparisons, and this has caused changes in the way universities function" (Marginson, 2014).

The story of ARWU

Strategic planning for building a world-class university

Building world-class universities has been the dream of generations of Chinese. At the 100th anniversary of Peking University in May 1998, the then president of China declared that the country should have several world-class universities, resulting in the "985 Project", which is specially designed to build world-class universities in China.

In 1998, Shanghai Jiao Tong University was selected by the Chinese government to be among the first group of nine universities in the "985 Project". At that time, many top Chinese universities developed their strategic goals as world-class universities, and most of them established time tables. Shanghai Jiao Tong University was no exception. As a professor and Vice-Dean of the School of Chemistry and Chemical Engineering of the university, the author was accidentally involved into the strategic planning process of building Shanghai Jiao Tong University into a world-class university.

During the process, questions arose, including: what is the definition of and criteria for a world-class university? How many world-class universities should be there in the world? What are the positions of top Chinese universities in the world higher education system? How can top Chinese universities reduce their gap with world-class universities? In order to answer the above questions, top Chinese universities were benchmarked with world-class universities and eventually ranked the world universities.

Positioning of Chinese universities in the world

From 1999 to 2001, work proceeded on the project of benchmarking top Chinese universities with four groups of United States universities, from the most prestigious to less famous research universities. Main conclusions included that top Chinese universities were estimated to be in the position of 200-300 in the world. The benchmarking results were used in the strategic planning process of Shanghai Jiao Tong University. Eventually, a consultation report was written and provided to the Ministry of Education of China. Positive comments were received from some top officials.

Since the publication of the benchmarking report, there were numerous positive comments. Many of them asked the possibility of making a real ranking of world universities instead of a rough estimation of positions by benchmarking. During the time, many visiting foreign scholars, who were in China for other purposes, learned about the benchmarking study and also encouraged the development of a ranking of world universities. They reminded us that not only Chinese but also universities, governments, and other stakeholders from the rest of the world were interested in the ranking of world universities. Therefore, it was decided to do a ranking of world universities, and work continued for another two years until the Academic Ranking of World Universities was completed in early 2003.

The ranking was first published in June 2003 on the website[1]. Although about 1,200 institutions from all over the world have been actually ranked, only the list of top 500 institutions has been published on the website. Considering the significance of differences in the total score, the ranking results are published in groups of 50 institutions in the range of 100-200 and in groups of 100 institutions in the range of 200-500. Institutions within the same group are listed alphabetically.

Ranking by broad subject fields and subject fields

Ever since its publication, ARWU has been attracting attentions from all over the world. Numerous requests have been received, asking to be provided with a ranking of world universities by broad subject fields or by schools and colleges. In response to these requests, world universities have been ranked by broad subject fields, the results were first published on the website in 2007. The five broad subject fields include Natural Sciences and Mathematics, Engineering/Technology and Computer Sciences, Life and Agriculture Sciences,

[1] http://www.shanghairanking.com/, formerly http://www.arwu.org

Clinical Medicine and Pharmacy, and Social Sciences.

Arts and humanities were not ranked because of the technical difficulties in finding internationally comparable indicators with reliable data. Psychology and other cross-boundary disciplines were not included in the ranking because of their multi-disciplinary characteristics.

In addition to broad subject rankings, rankings of selected subject fields including Mathematics, Physics, Chemistry, Computer Sciences and Economics/Business were first published on the website in 2009.

Although about 1,200 institutions from all over the world have been actually ranked, only the lists of top 200 institutions have been published on the website. Considering the significance of differences in the total score, the ranking results are published in groups of 25 institutions in the range of 50-100 and in groups of 50 institutions in the range of 100-200. Institutions within the same group are listed alphabetically.

ARWU methodologies

ARWU ranking methodologies are transparent. Only objective indicators are used, no subjective measures such as questionnaire survey are taken. There is a clear definition for every indicator. Only internationally comparable third-party data are used, no data is needed from individual institutions. Because of the above mentioned transparent methodologies, the ranking results of ARWU may be verified by comparing the performance of an institution in a particular indicator with that of its peer institutions and their raw data from the third party sources. Furthermore, ARWU methodology has been kept stable since 2004, so that comparison throughout the years is possible.

Methodologies of ARWU

ARWU considers every university that has any Nobel Laureates, Fields Medalists, Highly Cited Researchers, or papers published in Nature or Science. In addition, universities with significant amount of papers indexed by Science Citation Index-Expanded and Social Science Citation Index are also included. In total, more than 1200 universities are actually ranked and the best 500 are published on the website.

Universities are ranked by several indicators of academic or research performance, including alumni of an institution winning Nobel Prizes and Fields Medals (*Alumni*, 10%); staff of an institution winning Nobel Prizes and Fields

Medals (*Award*, 20%); highly cited researchers in 21 broad subject categories (*HiCi*, 20%); papers published in Nature and Science (*N&S*, 20%); papers indexed in Science Citation Index-expanded and Social Science Citation Index (*PUB*, 20%); and the per capita academic performance of an institution (*PCP*, 10%). For institutions specialized in humanities and social sciences such as London School of Economics, the indicator of N&S is not considered, and the weight of N&S is relocated to other indicators.

For each indicator, the highest scoring institution is assigned a score of 100, and other institutions are calculated as a percentage of the top score. The distribution of data for each indicator is examined for any significant distorting effect; standard statistical techniques are used to adjust the distribution if necessary. Scores for each indicator are weighted to arrive at a final overall score for an institution. The highest scoring institution is assigned a score of 100, and other institutions are calculated as a percentage of the top score. An institution's rank reflects the number of institutions that sit above it.

The definition for indicators of ARWU is as follows.

Alumni: The total number of the alumni of an institution winning Nobel Prizes and Fields Medals. Alumni are defined as those who obtain bachelor, Master's or doctoral degrees from the institution. Different weights are set according to the periods of obtaining degrees. The weight is 100% for alumni obtaining degrees in 2001-2010; 90% for alumni obtaining degrees in 1991-2000; 80% for alumni obtaining degrees in 1981-1990; and so on, and finally 10% for alumni obtaining degrees in 1911-1920. If a person obtains more than one degrees from an institution, the institution is considered once only.

Award: The total number of the staff of an institution winning Nobel Prizes in physics, chemistry, medicine and economics and Fields Medal in mathematics. Staff is defined as those who work at an institution at the time of winning the prize. Different weights are set according to the periods of winning the prizes. The weight is 100% for winners after 2011; 90% for winners in 2001-2010; 80% for winners in 1991-2000; 70% for winners in 1981-1990; and so on, and finally 10% for winners in 1921-1930. If a winner is affiliated with more than one institution, each institution is assigned the reciprocal of the number of institutions. For Nobel prizes, if a prize is shared by more than one person, weights are set for winners according to their proportion of the prize.

HiCi: The number of Highly Cited Researchers selected by Thomson Reuters. Thomson Reuters had issued two lists of Highly Cited Researchers: the old list was first issued in 2001, it identified more than 6,000 researchers and the number of Highly Cited Researcher of an institution on that list was used in

ARWU from 2003 to 2013. In 2014, Thomson Reuters developed a new list of Highly Cited Researchers with some 3,000 names based on a different methodology. In order to have a relatively smooth transition to the new list of Highly Cited Researchers and avoid too much fluctuations of ranking results due to the methodological change in developing Highly Cited Researchers list, both the old Highly Cited Researchers list and the new Highly Cited Researchers list are used in the calculation of *HiCi* indicator in ARWU 2015, and they are equally weighted. The score on *HiCi* of an institution in ARWU 2015 is the sum of its score for the old list and that for the new list. An institution's *HiCi* score for the old list is the same as its *HiCi* score in ARWU 2013, and an institution's *HiCi* score for the new list depends on its number of Highly Cited Researchers on the new list. It is worth noting that, upon the suggestion of many institutions and researchers including some Highly Cited Researchers, only the primary affiliations of new Highly Cited Researchers are considered in the calculation of an institution's *HiCi* score for the new list.

N&S: The number of papers published in Nature and Science between 2010 and 2014. To distinguish the order of author affiliation, a weight of 100% is assigned for corresponding author affiliation; 50% for first author affiliation (second author affiliation if the first author affiliation is the same as corresponding author affiliation); 25% for the next author affiliation; and 10% for other author affiliations. Only publications of 'Article' type is considered.

PUB: The total number of papers indexed in Science Citation Index-Expanded and Social Science Citation Index in 2014. Only publications of 'Article' type is considered. When calculating the total number of papers of an institution, a special weight of two is introduced for papers indexed in Social Science Citation Index.

PCP: The weighted scores of the above five indicators divided by the number of full-time equivalent academic staff. If the number of academic staff for institutions of a country cannot be obtained, the weighted scores of the above five indicators is used. For ARWU 2015, the numbers of full-time equivalent academic staff are obtained for institutions in USA, UK, France, Canada, Japan, Italy, China, Australia, Netherlands, Sweden, Switzerland, Belgium, South Korea, Czech, Slovenia and New Zealand etc.

Methodologies of ARWU-FIELD

Institutions are ranked according to their academic or research performance in each broad subject field. Ranking indicators include alumni and staff of an

institution winning Nobel Prizes and Fields Medals; highly cited researchers in 21 broad subject categories; papers indexed in Science Citation Index-expanded and Social Science Citation Index; the percentage of articles published in the top 20% journals of each field; and engineering research expenditures for the ranking of engineering field. Detailed indicators and weights for each field are provided in Table 1.

For each indicator, the highest scoring institution is assigned a score of 100, and other institutions are calculated as a percentage of the top score. The distribution of data for each indicator is examined for any significant distorting effect and standard statistical techniques are used to adjust the indicator if necessary.

Scores for each indicator are weighted to arrive at a final overall score for an institution. The highest scoring institution is assigned a total score of 100, and other institutions are calculated as a percentage of the top total score. The scores are then placed in descending order.

The definition for indicators of ARWU-FIELD is as follows.

Alumni: The total number of the alumni of an institution winning Nobel Prize in physics, chemistry, medicine and economics and Fields Medals in mathematics. Alumni are defined as those who obtain bachelor, Master's or doctoral degrees from the institution. Different weights are set according to the periods of obtaining degrees. The weight is 100% for alumni obtaining degrees in 2001-2010; 80% for alumni obtaining degrees in 1991-2000; 60% for alumni obtaining degrees in 1981-1990; 40% for alumni obtaining degrees in 1971-1980; and finally 20% for alumni obtaining degrees in 1961-1970. If a person obtains more than one degrees from an institution, the institution is considered once only. Nobel Laureates in Physiology or Medicine are used in both LIFE and MED ranking.

Award: The total number of the staff of an institution winning Nobel Prizes in physics, chemistry, medicine and economics and Fields Medals in mathematics. Staff is defined as those who work at an institution at the time of winning the prize. Different weights are set according to the periods of winning the prizes. The weight is 100% for winners after 2011; 80% for winners in 2001-2010; 60% for winners in 1991-2000; 40% for winners in 1981-1990; and finally 20% for winners in 1971-1980. If a winner is affiliated with more than one institution, each institution is assigned the reciprocal of the number of institutions. For Nobel Prizes, if a prize is shared by more than one person, weights are set for winners according to their proportion of the prize. Nobel Laureates in Physiology or Medicine are used in both LIFE and MED ranking.

Table 1. Indicators and weights for ARWU-FIELD

	Weight	SCI	ENG	LIFE	MED	SOC
Alumni	10%	Alumni of an institution winning Fields Medals in mathematics and Nobel Prizes in Chemistry and Physics since 1961	Not Applicable	Alumni of an institution winning Nobel Prizes in Physiology or Medicine since 1961	Alumni of an institution winning Nobel Prizes in Physiology or Medicine since 1961	Alumni of an institution winning Nobel Prizes in Economics since 1961
Award	15%	Staff of an institution winning Fields Medals and Nobel Prizes in Chemistry and Physics since 1971	Not Applicable	Staff of an institution winning Nobel Prizes in Physiology or Medicine since 1971	Staff of an institution winning Nobel Prizes in Physiology or Medicine since 1971	Staff of an institution winning Nobel Prizes in Economics since 1971
HiCi	25%	Highly cited researchers in 5 categories: ♦ Mathematics ♦ Physics ♦ Chemistry ♦ Geosciences ♦ Space Sciences	Highly cited researchers in 3 categories: ♦Engineering ♦Computer Science ♦Materials Science	Highly cited researchers in 8 categories: ♦Biology & Biochemistry ♦Molecular Biology & Genetics ♦Microbiology ♦Immunology ♦Neuroscience ♦Agricultural Sciences ♦Plant &Animal Science ♦Ecology/ Environment	Highly cited researchers in 3 categories: ♦Clinical Medicine ♦Pharmacology ♦Social Sciences, General (Partly)	Highly cited researchers in 2 Categories: ♦Social Sciences, General (Partly) ♦Economics/ Business
PUB	25%	Papers Indexed in Science Citation Index-Expanded in SCI fields	Papers Indexed in Science Citation Index-Expanded in ENG fields	Papers Indexed in Science Citation Index-Expanded in LIFE fields	Papers Indexed in Science Citation Index-Expanded in MED fields	Papers Indexed in Social Science Citation Index in SOC fields
TOP	25%	Percentage of papers published in top 20% journals of SCI fields to that in all SCI journals	Percentage of papers published in top 20% journals of ENG fields to that in all ENG journals	Percentage of papers published in top 20% journals of LIFE fields to that in all LIFE journals	Percentage of papers published in top 20% journals of MED fields to that in all MED journals	Percentage of papers published in top 20% journals of SOC fields to that in all SOC journals
FUND	25%	Not Applicable	Total engineering-related research expenditures	Not Applicable	Not Applicable	Not Applicable

Note: **SCI** for Natural Sciences and Mathematics, **ENG** for Engineering/Technology and Computer Sciences, **LIFE** for Life and Agriculture Sciences, **MED** for Clinical Medicine and Pharmacy, **SOC** for Social Sciences

HiCi: The number of highly cited researchers in twenty subject categories defined and provided by highlycited.com. These highly cited researchers are assigned to five broad subject fields. If a researcher is listed in more than one subject category, his/her weight for each category is the reciprocal of the number of categories listed. Specifically, researchers who are listed in Social Sciences - General category are checked one by one, and they are reclassified into three groups according to their affiliated colleges/departments. People worked at health-related units such as medical school, school of public health and school of nursing are grouped for MED ranking, people affiliated to psychology/psychiatry departments are not considered for the ranking, other individuals in this category are totaled for SOC ranking.

PUB: The total number of papers indexed by Science Citation Index-Expanded and Social Science Citation Index in 2013 and 2014. Only publications of 'Article' type is considered. Each paper published by an institution is assigned into one of the six broad subject fields according to journals in which the paper was published (Classification of Journal Categories), including above-mentioned five broad subject fields and Interdisciplinary and Multidisciplinary Sciences. If a paper is published in a multi-assigned journal (which is assigned to more than one ISI category), it is divided into related groups.

TOP: The percentage of papers published in the top 20% journals of each broad subject field. Top 20% journals are defined as their impact factors in the top 20% of each ISI category according to Journal Citation Report. Papers in the top journals of each ISI category are then aggregated into the six broad subject fields and the *TOP* is calculated as the number of papers in the top 20% journals of a particular broad subject field to that in all journals of the field. A threshold was set for the minimum number of papers in each broad subject field for calculating *TOP* indicator. The threshold was defined as 10% of the average number of papers by the top three institutions in each broad subject field. If the number of papers of an institution does not meet the minimum threshold, the *TOP* indicator is not calculated for the institution and its weight is relocated to other indicators. Only publications of 'Article' type is considered.

FUND: The total engineering-related research expenditures. This indicator is only used for ENG ranking. If the data for all institutions of a country cannot be obtained, the FUND indicator will not be considered for the institutions and its weight will be relocated to other indicators. For this ranking, the amounts of engineering-related research expenditures are obtained only for institutions in the United States and some institutions in Canada.

Methodologies of ARWU-SUBJECT

Institutions are ranked according to their academic or research performance in each subject field. Ranking indicators include alumni and staff winning Nobel Prizes, Fields Medals and Turing Awards, Highly Cited Researchers, papers indexed in Science Citation Index-Expanded and Social Science Citation Index, the percentage of papers published in the top 20% journals of each subject. Detailed indicators and weights for each subject are provided in Table 2. Definitions for indicators of ARWU-SUBJECT are similar to those of ARWU-FIELD.

Table 2. Indicators and weights for ARWU-SUBJECT

	Weight	Mathematics	Physics	Chemistry	Computer Science	Economics/ Business
Alumni	10%	Alumni of an institution winning Fields Medals in Mathematics since 1961	Alumni of an institution winning Nobel Prizes in Physics since 1961	Alumni of an institution winning Nobel Prizes in Chemistry since 1961	Alumni of an institution winning Turing Awards in Computer Science since 1961	Alumni of an institution winning Nobel Prizes in Economics since 1961
Award	15%	Staff of an institution winning Fields Medals in Mathematics since 1971	Staff of an institution winning Nobel Prizes in Physics since 1971	Staff of an institution winning Nobel Prizes in Chemistry since 1971	Staff of an institution winning Turing Awards in Computer Science since 1971	Staff of an institution winning Turing Awards in Computer Science since 1971
HiCi	25%	Highly cited researchers in Mathematics category.	Highly cited researchers in Physics and Space Science category.	Highly cited researchers in Chemistry category	Highly cited researchers in Computer Science category	Highly cited researchers in Economics/ Business Category
PUB	25%	Papers Indexed in Science Citation Index-Expanded in Mathematics	Papers Indexed in Science Citation Index-Expanded in Physics	Papers Indexed in Science Citation Index-Expanded in Chemistry	Papers Indexed in Science Citation Index-Expanded in Computer Science	Papers Indexed in Social Science Citation Index in Economics/ Business
TOP	25%	Percentage of papers published in top 20% journals of Mathematics to that in all Mathematics journals	Percentage of papers published in top 20% journals of Physics to that in all Physics journals	Percentage of papers published in top 20% journals of Chemistry to that in all Chemistry journals	Percentage of papers published in top 20% journals of Computer Science to that in all Computer Science journals	Percentage of papers published in top 20% journals of Economics/ Business to that in all Economics/ Business journals

For each indicator, the highest scoring institution is assigned a score of 100, and other institutions are calculated as a percentage of the top score. The distribution of data for each indicator is examined for any significant distorting effect and standard statistical techniques are used to adjust the indicator if necessary.

Scores for each indicator are weighted to arrive at a final overall score for an institution. The highest scoring institution is assigned a total score of 100, and other institutions are calculated as a percentage of the top total score. The scores are then placed in descending order.

Data sources

Only internationally comparable third-party data are used. No data is collected from individual institutions. Cleanup of data is always performed whenever necessary. Main third party data sources are provided in Table 3.

Table 3. Third party data sources

Data	Sources
Nobel laureates	http://www.nobelprize.org/
Fields Medals	http://www.mathunion.org/index.php?id=prizewinners
Turing awards	http://awards.acm.org
Highly cited researchers	http://www.highlycited.com/
Papers published in Nature and Science	http://www.webofknowledge.com/
Papers indexed in Science Citation Index-Expanded and Social Science Citation Index	http://www.webofknowledge.com
Journal Citation Report	http://www.webofknowledge.com
Engineering-related research expenditures	http://profiles.asee.org/
Number of academic staff	Data is obtained from national agencies such as National Ministry of Education, National Bureau of Statistics, National Association of Universities

Performance of East Asian universities in ARWU

Performance by number of institutions in the top lists

The United States dominates the list of top universities in ARWU 2015, particularly the top 20 and top 100 list. As indicated in Table 4, Japan leads the Asian countries with four universities in the top 100 list of ARWU 2015, while China performs well in the lists of top 200 and top 500 universities.

When considering GDP and population of a country (Table 5), both Japan and South Korea are doing reasonably well, whereas China is lagging behind particularly in the top 100 list.

The picture looks very similar in ARWU-FIELD (Table 6 & 7) and in the top 20 list of ARWU-SUBJECT (Table 8). China outperforms Japan in the top

100 list of ARWU-SUBJECT (Table 9), particularly in mathematics and computer science.

Table 4. Number of top institutions in ARWU 2015

Region	Top 20	Top 100	Top 200	Top 300	Top 400	Top 500
Americas	16	55	86	121	150	176
Europe	4	35	80	122	158	205
Japan	**0**	**4**	**7**	**9**	**12**	**18**
China	**0**	**0**	**10**	**19**	**37**	**44**
South Korea	**0**	**0**	**1**	**5**	**8**	**12**

Table 5. Performance in ARWU 2015 compared with GDP and population

Country	% of Top 100	% of Top 500	% of GDP	% of Population
United States	51.0	29.2	22.4	4.5
United Kingdom	9.0	7.4	3.4	0.9
Germany	4.0	7.8	4.7	1.2
France	4.0	4.4	3.6	0.9
Canada	4.0	4.0	2.5	0.5
Australia	4.0	4.0	2.1	0.3
Switzerland	4.0	1.4	0.9	0.1
Japan	**4.0**	**3.6**	**8.2**	**1.8**
China	**0.0**	**8.8**	**12.4**	**19.6**
South Korea	**0.0**	**2.4**	**1.6**	**0.7**

Table 6. Number of institutions in the top 20 list of ARWU-FIELD 2015

Region or Country	SCI	ENG	LIFE	MED	SOC
Americas	14	14	16	16	17
Europe	4	3	3	4	3
Japan	**2**	**0**	**1**	**0**	**0**
China	**0**	**1**	**0**	**0**	**0**
South Korea	**0**	**0**	**0**	**0**	**0**

Table 7. Number of institutions in the top 100 list of ARWU-FIELD 2015

Region or Country	SCI	ENG	LIFE	MED	SOC
Americas	48	42	57	54	67
Europe	37	19	36	38	23
Japan	**6**	**4**	**3**	**2**	**0**
China	**3**	**20**	**0**	**0**	**2**
South Korea	**1**	**4**	**0**	**0**	**0**

Table 8. Number of institutions in the top 20 list of ARWU-SUBJECT 2015

Region or Country	Mathematics	Physics	Chemistry	Computer Science	Economics/ Business
Americas	13	13	14	17	17
Europe	6	5	5	1	3
Japan	**0**	**2**	**1**	**0**	**0**
China	**0**	**0**	**0**	**0**	**0**
South Korea	**0**	**0**	**0**	**0**	**0**

Table 9. Number of institutions in the top 100 list of ARWU-SUBJECT 2015

Region or Country	Mathematics	Physics	Chemistry	Computer Science	Economics/ Business
Americas	43	45	44	53	69
Europe	33	40	24	19	23
Japan	**2**	**6**	**8**	**0**	**0**
China	**14**	**3**	**14**	**18**	**2**
South Korea	**1**	**1**	**2**	**1**	**0**

Performance by ARWU indicators

As shown in Table 10, the average performance of seven Japanese "Imperial" universities by ARWU indicators are very close to the average of top 100 universities in the world.

Top 9 Chinese "985" universities have been making huge progress in the past ten years both by ranking positions and by performance in indicators such as *PUB, N&S,* and *HiCi*. Their average number of publications is higher than the average of top 100 universities.

Table 10. Average performance by ARWU indicators

Indicator	*Alumni*	*Award*	*HiCi (old)*	*HiCi (new)*	*N&S*	*PUB*
Top 100	3.15	1.42	30.0	12.6	57.3	4800
101-200	0.50	0.11	6.9	3.7	13.9	3160
201-300	0.20	0.03	3.3	1.7	7.1	2180
301-400	0.20	0.01	1.9	1.0	3.6	1760
401-500	0.08	0.02	1.4	0.7	2.7	1250
7 "Imperial" University of Japan	**1.74**	**0.40**	**14.3**	**6.3**	**35.0**	**4680**
Top 9 "985" University of China	**0.04**	**0.00**	**0.3**	**3.3**	**10.4**	**5770**
Top 5 University of South Korea	**0.00**	**0.00**	**0.6**	**1.6**	**6.9**	**4510**

The future of ARWU

Updating the rankings annually

As the first multi-indicator ranking of global universities, ARWU has been providing reliable and scientific performance comparison of universities in the world for the past 12 years. ARWU, ARWU-FIELD and ARWU-SUBJECT will be updated annually based on the transparent and stable methodologies, so that one can compare the performance of particular universities or countries throughout the years.

Improving the ranking methodology

ARWU endeavored to rank research universities in the world by their academic or research performance based on internationally comparable third-party data that everyone could check. Nevertheless, there are still many methodological and technical limitations. Feasibility studies have been carried out to explore the possibilities of including more international scientific awards, more internationally renowned scholars, more internationally renowned alumni, and more types of research outputs for social sciences.

Diversifying the ranking

Possibilities of providing more diversified ranking lists are being explored, for example, ranking of more subjects or disciplines such as chemical engineering and political sciences, ranking by regions of special interests such as Greater China, Central Asia and the Middle East, and rankings considering the history, budget, and the size of higher education institutions.

Profiling research universities

The Global Research University Profile (GRUP) project, which aims to develop a database on the facts and figures of around 1,200 global research universities ranked by ARWU annually, has been conducted since 2011. The number of universities participating in the project has been very encouraging so far. Benchmarking and interactive analysis of selected groups of world research universities based on GRUP are provided.

Contributing to the ranking community

Theoretical research on rankings in general is being done, to contribute to the better understanding of the phenomenon of ranking. Additionally there has been active participation in IREG - International Observatory on Academic Ranking and Excellence[2] and in providing professional services.

Final comments on ranking

Any ranking is controversial and no ranking is absolutely objective. Nevertheless, university rankings have become popular in almost all major countries in the world. Whether universities and other stakeholders agree with the various ranking systems, ranking systems clearly are here to stay. The key issue then becomes how to improve ranking systems and how to use ranking results properly. Ranking methodologies should always be read carefully before looking at any ranking lists and ranking results should be used with caution.

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[2] http://www.ireg-observatory.org

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