



RANKING OF UNIVERSITIES

Engr Muhammad Ismail,
Director Quality Assurance,

National University of Sciences and Technology, Islamabad – Pakistan



Air Commodore (R) Muhammad Ismail is currently working as Director Quality Assurance at National University of Sciences & Technology Islamabad. He joined PAF after getting his Master's degree in Physics from Government College Lahore. Later, he received education for BE (Aerospace Engg) at PAF College of Aeronautical Engineering and MS (Aerospace Engg) at University of Oklahoma (Norman Campus), USA. Besides serving at various training units of PAF, Air Cdre Ismail had a teaching spell of about 11 years at CAE in three tenures. He served at King Faisal Air Academy as Officer Incharge of Planning and Programs. Air Cdre Ismail also carries experience of the Principal of a Fazaia College, Director of Studies PAF Academy, Director of Education PAF, and Assistant Chief of the Air Staff (Education). Besides other honors and awards, he is the recipient of Sitara-e-Imtiaz (Military) for his meritorious services to the PAF. In his present capacity, he is dealing with the matters concerning policies and programs for quality assurance / enhancement in higher education. He is approved external reviewer of Oman Accreditation Council.



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ABSTRACT

During recent years, university rankings have gained a considerable importance not only among the academia but also amongst students, parents, industry and businesses. Common stakeholders, the students and their parents, may not be aware of the intricacies of ranking processes and elements/criteria of rankings but they are definitely keen to know the position of the university of their interest in the ranking lists. University management and faculty are the most concerned stakeholders of rankings. The students are also directly affected by the university rankings, although the impact on them may not be always positive. The paper will review the interests and concerns of the stakeholders of higher education institutions and describe various quantitative / qualitative criteria used to determine the rankings. It will be observed that some of the criteria used by different agencies may be common in nature. The ranking agencies ask the competing institutions for provision of data or use their web domains for the comparison. The process involves various surveys besides using statistics and rankings are conducted on national, regional and global levels for institutions, departments, schools or specific academic programs. The benefits derived by the stakeholders from these rankings will be described along with the criticism drawn by the processes and the criteria employed by different ranking agencies. It is opined that although university rankings are considered inherently controversial for not being absolutely objective and definitive, they are still used as reference to assist in making certain crucial decisions.

INTRODUCTION

The emergence of ranking systems can be traced back in 1865 to European studies that aimed to define whether environment or heredity was the determining factor in producing man of genius. It was attempted to assess the quality of institutions and affiliated scholars in science and medicine. The results influenced the thinking of educators regarding quality assessment. During twentieth century several evaluation and ranking systems for educational institutions appeared from time to time. Present form of ranking the educational institutions was originally introduced by *US News and World Report* over two decades ago in order to publish transparent comparative data about the institutions. With the passage of time, more and more systems of ranking kept emerging with different aims and objectives. Currently, there are roughly 50 major ranking systems in use around the world which use hundreds of different indicators. These indicators broadly fall into eight categories, namely characteristics of the student body, financial inputs, staff inputs, student experiences, learning outcomes, financial outcomes, research metrics and reputation.

The university rankings are lists of the academic institutions in order of their positions determined on the basis of some defined combination of factors (the criteria). They are subjectively perceived as indicative of quality of the institutions based on some combination of the empirical data or opinion derived from different surveys of scholars, academics, alumni, present & prospective students, employers of the institutional graduates, research publications

and their citations etc. Ranking lists are prepared for the institutions, departments, programs, specific subjects or fields etc.

Stakeholders

Several observers and users may (or should) be interested in methodologies and results of rankings on the local and global levels. These include current students, prospective students and their parents, faculty and research staff, university administrators, alumni, businesses and industry, government, political leaders, and all those (perhaps everyone) who understand that the intellectual and economic standing of the society depends on a competitive and thriving university sector.

Despite criticism and methodological concerns, ranking are tools to build reputations, visibility and brand. Students (and parents) use rankings to make choices for getting admission in the universities. Stakeholders such as government, industry and businesses use rankings for deciding funding, sponsorship and employment. Political leaders can use ranking results to frame education policies in the country. University administrators can use these rankings as evidence to seek support and funding etc. High rankings are expected to attract more benefits and advantages.

Significance of University Rankings

Rankings become a highly significant process for universities with many receivers of its results (the stakeholders). University administration that engages in institutional goal setting and operation is influenced by their results. They affect the process of academic internationalization that encourages the mobility of faculty and students and hence stresses the need for global comparability of higher education systems, study programs and degrees. The rankings have proved to enhance international competition of universities in order to create attractive educational multi-cultural environments and the trend towards university collaboration and most importantly the opportunity to improve and eliminate institutional weaknesses.

Who Conducts the Rankings?

Rankings are generally conducted by newspapers and magazines (media) such as Times Higher Education Supplement (THES), Newsweek, US News & World Report etc, academic institutions like Shanghai Jiao Tong University (SJTU), Wuhan University and others or governmental agencies such as Higher Education Commission (HEC) of Pakistan, accrediting bodies like Higher Education Evaluation and Accreditation Council of Taiwan (HEEACT) and non-governmental organizations such as QAA UK, Organization of Islamic Countries (OIC), Google, etc. and academics themselves.

The Ranking Systems

There are some systems which rank the universities on global basis while others rank them on regional or national level. Some of the renowned global (world) ranking systems alongwith regional and national systems are listed below:

Ranking of World Universities

- The Times Higher Education - QS World University Rankings
- Academic Ranking of World Universities by SJTU
- Top 100 Global Universities by Newsweek
- Webometrics: World Universities' Ranking on the Web by Cybermetrics Lab
- G-Factor International University Rankings by Google Search
- Professional Ranking of World Universities by MINES Paris Tech
- Performance Ranking of Scientific Papers for World Universities by HEEACT
- Global University Ranking by Wuhan University, China

Besides rankings of the universities at world level, numerous rankings are conducted at regional and national levels.

Regional Rankings

- Universities Ranking in European Union was conducted by European Commission in 2003 (updated 2004), wherein a list of 22 European Universities was prepared in terms of the impact of their scientific output.
- Academic Rankings of Universities in the OIC Region 2007:
 - *Single-Factor Ranking of the Universities* based on the number of published articles covered by ISI in Science Citation Index (SCI), Science Citation Index Expanded (SCI-Expanded) and Social Science Citation Index (SSCI)
 - *Ranking by Composite Index* based on number of published articles per faculty member and average number of citations per paper

National Rankings

- The countries, which conduct rankings of universities, departments or programs at national levels, include Australia, Canada, China, France, Germany, Hong Kong, India, Ireland, Italy, Pakistan, Spain, Switzerland, UK, Ukraine, US, etc. These countries have diverse systems of ranking based on different criteria covering indicators related to students, faculty, research publications, research funding and grants, alumni donations, graduation rates, social mobility, ethics of service to country, peers, finances, infrastructure, reputation, etc.
- In *United States*, several ranking systems, as listed below, are in vogue
 - U.S. News & World Report College and University rankings
 - Center for College Affordability & Productivity (CCAP) College and University rankings
 - Faculty Scholarly Productivity rankings
 - The Top American Research Universities
 - Vanguard College Rankings
 - Washington Monthly College rankings
 - Other rankings of US universities

Ranking systems of American colleges and universities have drawn criticism from many universities including the highly prestigious institutions such as MIT and Stanford University. Criticism was mainly based on dissatisfaction about peer assessment survey and the diverse (unacceptable) format of the ranking database. U.S. News and World Report responded to the criticism and argued that the peer assessment survey has significant value because it allows measuring the "intangibles" of a college that can't be measured through statistical data and can provide a level playing field for private and public colleges. In reference to the database, it was claimed that the efforts had been made to present data in a common format which was not an easy task in the context of ensuring comparability and functionality.

Global University Rankings

It is assumed that while proposing the topic, the organizers of ICAQHE-2008 would also have global rankings in their mind. Even if this is not the case, the limitation on the length of the conference paper does not allow details of all the national, regional and global ranking systems. Therefore, only the global ranking system will be discussed below in some detail.

THE TIMES HIGHER EDUCATION – QS WORLD UNIVERSITY RANKINGS

Times Higher Education Supplement, a British magazine in association with Quacquarelli Symonds, annually publishes the THES-QS World University Rankings. Major motivation behind the THES-QS Rankings has been the growing trend of students towards study abroad for higher education. While free provision of education, all around world, is almost ending, the students are tempted to seek out best university education for obvious reasons of quality and future employability. Over the recent years mobility of international students has increased significantly (unprecedented in case of Pakistani graduate students).

Ranking Criteria and Weights

In order to develop an overall evaluation of universities for comparison of institutions across the borders, THES-QS identified four major criteria, namely; research quality, graduate employability, international outlook and teaching quality. Within these criteria, universities are ranked by several indicators of academic and research performance as listed in Table–1.

Table – 1: Ranking Criteria and Weights for THES – QS Ranking

Criteria	Indicator	Brief Description	Weight
Research Quality	Peer Review	Composite score drawn from peer review (which is divided into five subject areas).	40%
	Citations per Faculty	Score based on research performance factored against the size of the research body.	20%
Graduate Employability	Recruiter Review	Score based on responses to recruiter survey.	10%
International Outlook	International Faculty	Score based on proportion of international faculty	5%
	International Students	Score based on proportion of international students	5%
Teaching Quality	Student Faculty	Score based on student/faculty ratio	20%

Scoring Procedures

For each indicator, the highest scoring institution is assigned a score of 100 and scores of 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 awarded scores as a percentage of the top total score. The scores are then placed in descending order.

Data Collection

In order to evaluate the universities for ranking, the interested institutions are asked to fill-in an online questionnaire to provide the requisite information / statistics for the first time and update the same for subsequent years. Some of the information / statistics provided by the institutions are not used for ranking but they are collected and displayed online for the interest of general public. THES also requires the detailed lists of the recruiters / employers of the university graduates for conducting a survey without involving the universities. Peers' review is also conducted by THES independently with no information or reference to the universities being ranked. Since year 2007, THES has shifted from ISI Web to Scopus for getting the information about number of published research papers and their citation. In order to account for all the published papers with different versions of their reference, even under different names of the same university, THES asks for all the relevant university 'Affiliation Identifiers' as available in the Scopus.

Criticism and Improvements

THES-QS has been criticized for its more subjective nature of assessment criteria, which are pre-dominantly (40%) based on a peer review system of about 4000 selectors and academics in various fields. Simon Marginson considers this aspect as biased towards certain countries. He acknowledges that research-strong universities also have strong reputations and that shows up strongly in the THES ranking. However, measures employed in 2007 ranking in this regards are expected to help satisfying the critics. Whilst there has been no evidence to suggest that some peer reviewers have completed the questionnaire to favour their own universities, yet it has been decided to eliminate reviewers' own universities from the lists they are presented with the questionnaire.

These Rankings were first published in October, 2004. Over the years, the project has assimilated a great deal of new ideas and had evolved into a stronger and more robust measure of comparative international university quality. Inclusion of the employer review in 2005 and the increased response to the peer review questionnaire are examples of these improvements.

For the 2006 rankings, time period for citation counts was reduced from 10 years to 5 years in response to suggestion that the rankings should be a more contemporary measure of university status.

Another improvement measure is switching to *Scopus* website from *ESI (Thomson)* for verifying the data regarding the number of published papers and their citations. In 2004, when

the rankings began the only reputable source of citation data was Thomson's Web of Science. Scopus, also initiated in 2004, has rapidly evolved since that time. In 2007, Scopus has been able to answer many of the questions left unanswered in three years of working with ESI. It is now possible to find data for many institutions that have not been represented in this indicator in the past. Scopus database has a less pronounced bias towards the US and covers a larger number of papers and journals leading to greater representation from lesser known universities and explores more sources in languages other than English. The general consensus in published reviews of both systems (Scopus and ESI) seems that they both have their merits and can be used to complement each other.

ACADEMIC RANKING OF WORLD UNIVERSITIES (ARWU)

ARWU first published in 2003, is conducted by Shanghai Jiao Tong University (SJTU) and results are generally cited by The Economist magazine in ranking world universities. It was primarily initiated to conduct independent ranking of Chinese universities and determine the gaps between the Chinese and 'world class' universities.

ARWU claims to use internationally comparable objective criteria and publically accessible and verifiable data. The ranking team belongs to School of Education of SJTU which conducts ranking for their academic interest. Ranking lists are prepared for world and regional universities alongwith their statistics. Unlike some other ranking agencies, ARWU data is not requested from the contesting universities but it is collected from their websites. Those universities are selected, which have any Nobel Laureates, Field Medals, Highly Cited Researchers, papers published in 'Nature and Science' Journal or significant number of papers indexed by Citation Indexes by Thomson.

Ranking Criteria and Weights

ARWU is based on several indicators of academic or research performance including quality of education, quality of faculty, research output and size of the institutions as described in Table-2. Scores for ranking are calculated in the similar manner as in case of THES-QS ranking.

Table-2: Ranking Criteria and Weights for ARWU

Criteria	Indicator	Code	Weight
Quality of Education	Alumni of an institution winning Nobel Prizes and Fields Medals	Alumni	10%
Quality of Faculty	Staff of an institution winning Nobel Prizes and Fields Medals	Award	20%
	Highly cited researchers in 21 broad subject categories	HiCi	20%
Research Output	Articles published in Nature and Science*	N&S	20%
	Articles in Science Citation Index-expanded, Social Science Citation Index	SCI	20%
Size of Institution	Academic performance with respect to the size of an institution	Size	10%
Total			100%

* For institutions specialized in humanities and social sciences such as London School of Economics, N&S is not considered, and the weight of N&S is relocated to other indicators.

Data Sources

Data regarding indicators for this ranking process is collected from the following sources:

Nobel laureates. <http://www.nobelprize.org>.

Fields Medals. <http://www.mathunion.org/medals/>.

Highly cited researchers. <http://www.isihighlycited.com>.

Articles published in Nature and Science. <http://www.isiknowledge.com>.

Articles indexed in Science Citation Index-expanded and Social Science Citation Index.
<http://www.isiknowledge.com>

ARWU – FIELD

Since 2007, ARWU has also been conducted on the basis of Broad Subject Fields, annually which is termed as ARWU – FIELD. Broad subject fields comprise Natural Sciences and Mathematics (SCI), Engineering/Technology and Computer Sciences (ENG), Life and Agriculture Sciences (LIFE), Clinical Medicine and Pharmacy (MED), and Social Sciences (SOC). Arts and humanities are not ranked because of the technical difficulties in finding internationally comparable indicators with reliable data. Psychology/Psychiatry is not included in the ranking because of its multi-disciplinary characteristics.

ARWU - FIELD includes every institution that has any Nobel Laureates, Fields Medals, and Highly-Cited Researchers. In addition, major universities of every country with significant amount of articles indexed by Science Citation Index-Expanded (SCIE) and Social Science Citation Index (SSCI) are also included. In total, more than one thousand institutions have been actually ranked in each broad subject field.

Ranking indicators comprise alumni and staff winning Nobel Prizes and Fields Medals, Highly Cited Researchers, articles indexed in Science Citation Index-Expanded (SCIE) and Social Science Citation Index (SSCI). Additionally, two new indicators have been introduced, namely; the percentage of articles published in the top 20% journals of each field and the other is the engineering research expenditure.

Data Sources

Data for ARWU – FIELD indicators is collected from the following sources:

Nobel laureates. <http://www.nobelprize.org>

Fields Medals. <http://www.mathunion.org/medals/>

Highly cited researchers. <http://www.isihighlycited.com>

Articles indexed in Science Citation Index-expanded, Social Science Citation Index.
<http://www.isiknowledge.com>

Journal Citation Report, 2006. <http://www.isiknowledge.com>

Engineering-related research expenditures by school, 2006. ASEE: Engineering College Profiles and Statistics

Problem in ARWU

Professor Nian Cai Liu of Institute of Higher Education and Center for World-Class Universities Shanghai Jiao Tong University, China has very candidly discussed various methodological and technical problems faced in carrying out ARWU.

As far as methodological problems are concerned, he accepts that it is impossible to rank the quality of education due to the huge differences among the national systems and to obtain internationally comparable indicators and data. While a university specialized in social sciences and humanities and having Nobel Laureates in economics and Highly Cited Researchers in social sciences should have good standing, many such well-known institutions are ranked relatively low. English is the language of international academic community. Any ranking based on academic performance will be biased towards institutions in English-speaking countries. This problem can be solved if papers published in non-native languages are offered a special weight or through normalization of total articles by the proportion of journal editors of each country. In the context of awards and Alumni, the new universities and disciplines not related to the awarding fields do not get fair chance. In terms of per capita performance, the weight of the 'size' indicator is rather low. Large institutions have relatively high positions in the ranking. However, it's difficult to obtain internationally comparable data on the number of academic staff in terms of their types i.e. purely teaching staff, teaching and research staff, purely research staff and the ranks of academic staff such as professor, associate professor, lecturer, research scientist etc.

In technical terms, exact attribution of credit becomes difficult because of more than one name of same university due to translation of the name from one language to other, abbreviation of names and authors' references without the name of universities. Sometimes recognition of institutions become a problem due to improper nomenclature such as university systems, status of affiliated institutions and research organizations, teaching and affiliated Hospitals etc. The rankers also face difficulty in awarding the credit to the deserving institution due to merging, splitting, inheriting, discontinuing, name-changing of institutions.

Criticism of ARWU

As with all rankings, the ARWU methodology draws many criticisms, one being its bias towards the natural sciences over other subjects and sciences journals. The criticism is based on the inclusion of criteria such as number of Nobel Prize winners (which are mostly physical scientists) and Field Medalist (which are mathematicians) or number of articles published in Nature and Science journal (which is in English devoted to natural sciences). The critics feel that Nobel and Field medals are skewed indicators because data shows that beyond top 10 universities, these indicators don't discriminate academic performances.

Moreover, perceiving ARWU as global ranking is incorrect, since it is meant to measure scientific competence only. It is felt that the relationship between academic/ teaching performance and efficiency at meeting the economy needs should be elaborated. The academic indicators included for ranking are related to 'reputation', hence ARWU, in a way, reinforces the initial reputation instead of helping detect good practices.

Another criticism highlights that most indicators are absolute numbers, hence ARWU favours big size. But, are all the bigs better than smalls? - no absolute answer. However, if size is considered on per capita basis, ARWU will become less biased on size.

ARWU results have inherited limitations because it does not take into account other functions of the institutions such as education and social service. Besides, the diversity of the institutions, disciplinary characteristics and size are not properly reflected by this ranking.

Besides all the criticism on ARWU, Simon Marginson accepts the STJU ranking as valid and realistic. He defends the higher ranking status of large size universities because they spend much more on education as compared to others having smaller size. Marginson is not ready at all to accept THES rankings as valid mainly due to the reason that 40% weightage reserved for peers' review does not lead to realistic results, since the percentage of the response by peers is too low (~ 3%).

NEWSWEEK – TOP 100 GLOBAL UNIVERSITIES

In view of the self realized globalization of the universities in seeking students from around the world, who carry different values and represent diverse cultures and sending their own students abroad for preparing them to take-up global careers, study interconnected courses and undertake collaborative research, the Newsweek conducted ranking of universities to account for their openness and diversity alongwith distinction in research.

The ranking by Newsweek utilized some of the criteria employed by THES and SJTU as given in Table - 3:

Table – 3: Ranking Criteria and Weights for Ranking by Newsweek

Reference	Description of Criteria	Weight
SJTU	<ul style="list-style-type: none">• Number of highly cited researchers in various academic fields• Number of articles in Nature and Science Journal• Number of articles listed in ISI Social Sciences and Arts & Humanities indices	50%
THES	<ul style="list-style-type: none">• Percentage of international faculty• Percentage of international students• Citation per faculty members (using ISI data)• Faculty to student ratio	40%
Newsweek	<ul style="list-style-type: none">• Library holdings (number of volumes)	10%

This ranking includes some useful indicators in line with two well known ranking systems, that is, THES-QS and ARWU along with evaluation of library holdings. However, it ignored peers' and recruiters' reviews. Hence, it does not account for the public reputation of the universities; hence the impact of this ranking also remains limited.

WEBOMETRICS: WORLD UNIVERSITIES' RANKING ON THE WEB

Webometrics Ranking of World Universities is product of Cybermetrics Lab (CINDOC - Centro de Información y Documentación) a unit of National Research Council (CSIC), the largest public research body in Spain. The ranking system was initiated in 2004 and is updated every January and July.

These rankings are intended to motivate the researchers to publish more and better scientific information on the web for the use of other people. The system aims at convincing academic and political communities of the importance of web publications in disseminating the academic knowledge (the contents) and measuring scientific activities, performance and impact. Such ranking reflects the whole picture, as many other activities of professors and researchers are showed by their web presence.

The web indicators used for ranking are based and correlated with traditional scientometric and bibliometric indicators. Webometrics rankings scan the database of over 15000 universities and more than 5000 research centers. Main (global) list includes 4000 top universities of the world, while many more are covered in regional lists. Regional lists help institutions from the developing countries to know their position at regional/national level.

The Web covers not only formal (e-journals, repositories) but also informal scholarly communication. Web publications are cheaper, maintaining the high standards of quality of peer review processes. It could also reach much larger potential audiences, offering access to scientific knowledge to researchers and institutions located in developing countries and also to third parties (economic, industrial, political or cultural stakeholders) in their own community.

The Webometrics ranking has a larger coverage than other similar rankings. The ranking intends to encourage both institutions and scholars to have a web presence that reflects accurately their activities. It requires that if the web performance of an institution is below the expected position according to their academic excellence, university authorities should reconsider their web policy, promoting substantial increases of the volume and quality of their electronic publications.

Methodology

For ranking purpose, only those universities or research centers are considered which have independent web domain(s). In order to cater to multi-dimensional activities of the universities, ranking is determined by combining a group of indicators that measure these different aspects. Web Impact Factor (WIF) is based on link analysis that combines the number of external inlinks and the number of pages of the website, a ratio of 1:1 between visibility and size. Two more indicators to the size component are also added before ranking. These are; number of documents measured from the number of rich files in a web domain and number of publications being collected by Google Scholar database. Four indicators obtained from qualitative results provided by the main search engines are as follows:

Size (S). Number of pages recovered from four engines: Google, Yahoo, Live Search and Exalead.

Visibilty (V). The total number of unique external links received (inlinks) by a site can be only confidently obtained from Yahoo Search, Live Search and Exalead.

Rich Files (R). After evaluation of their relevance to academic and publication activities and considering the volume of the different file formats, the following were selected: Adobe Acrobat (.pdf), Adobe PostScript (.ps), Microsoft Word (.doc) and Microsoft PowerPoint (.ppt).

Scholar (Sc). Google Scholar provides the number of papers and citations for each academic domain. These results from the Scholar database represent papers, reports and other academic items.

For each engine, results are log-normalized to 1 for the highest value and then combined to generate the rank. Rank / position of a university being ranked is obtained with the help of following formula:

$$\text{Webometrics Rank (Position): } 4*\text{RankV} + 2*\text{RankS} + 1*\text{RankR} + 1*\text{RankSc}$$

Criticism

This Ranking draws the basic criticism on two counts. First, its traditional linguistic bias as more than half of the internet users is English-speaking people. Second is new disciplinary bias since the technology gets more coverage in the web-world as compared to biomedical and some other disciplines. Although Webometrics ranking correlates well with quality of education provided and academic prestige, but other non-academic variables need to be taken into account.

G-FACTOR INTERNATIONAL UNIVERSITY RANKINGS BY GOOGLE SEARCH

G-Factor ranking methodology is a refined but limited Webometrics approach. The G-Factor Ranking of the universities is based on the number of links made to their websites from the websites of other leading international universities. This number is G-Factor. It is determined on the premises that universities create and disseminate knowledge and are productive sources of web content. Website becomes the reflection of the university knowledge and G-factor is therefore search (through the Google Search Engine) on every leading university's website for links to the websites of other leading universities and count the total number of such links to get the G-Factor. The G-Factor is, therefore, indicator of the importance or relevance of the university from the combined prospective of all of the leading universities of the world. It is thus considered an objective form of peer review.

G-Factor actually takes a view of the university system through Google's eye. In order to make the search meaningful, Google only indexes web pages that, as per its proprietary algorithms, contain actual content. Hence, G-Factor counts only those links on web pages that Google itself deems to be 'content' implying that if anything is not on Google, it does not exist. Although this approach is disturbing for some but is reality for the others, for whom the web has provided an extensive knowledge environment.

Criticism

An observation is that G-Factor gives an unfair advantage to larger universities or those with larger websites. While the organizers accept the fact but at the same time they defend themselves by arguing that G-Factor tends to measure the importance of a university in terms of its web presence, so it is implicit. There is another criticism that G-Factor only measures Google, and does not consult other search engines. The response claims that some 'web metrics' do combine like counts from multiple search engines but there is a need to intelligently normalize their count as the ways in which those search engines index the pages and count links

differ. It is, however, insisted that Google remains most interesting search engine for these purposes due to its unique approach to identifying the indexing web content.

PROFESSIONAL RANKING OF WORLD UNIVERSITIES

Initiated in 2007 by École des Mines de Paris (Mines Paris Tech) measures the efficiency of each university on a professional basis. The criterion of this ranking is “The number of alumni holding a Chief Executive Officer (CEO) position in one of the leading worldwide companies” as measured by revenue. The ranking takes into account the performance of universities in terms of their training programs, based on professional future of their graduates (the alumni).

The 500 leading enterprises are identified on the basis of the “*Global Fortune 500*”, based on the criterion of the turnover and conducted by Fortune magazine. Information about the higher education institutions attended by the CEOs of these companies was gathered from Internet (in the bibliographical articles of online encyclopedias, and on the relevant company website) to find how many CEOs had been among the 500 trained by each of these institutions. Where a CEO attended several higher education institutions, the points scored were shared between the institutions. The performance of the best institutions was rated 100, while that of other institutions was awarded percentage of that best performance. It is interesting to note that information about academic career of 13% of the 500 CEOs could not be found from the Internet but no effort was made to get the information from other sources. Most of such CEOs belonged to European and Asian companies, hence European and (mostly) Asian universities remained at a disadvantage as compared to their North & South American counterparts. A comparison of Professional ranking with ARWU showed that only 56% of the institutions are common in both the ranking lists. Both the rankings can be considered as complementary and not exclusive due to the non-commonality of the ranking criteria.

PERFORMANCE RANKING OF SCIENCE PAPERS FOR WORLD UNIVERSITIES

Higher Education Evaluation and Accreditation Council of Taiwan (HEEACT) published *2007 Performance Ranking of Science Papers for world Universities* on the basis of bibliometric references. The selection of top 500 Universities for the purpose of ranking is based on information obtained from the Essential Science Indicators (ESI). Top 700 institutions sorted by the numbers of published journal articles are selected. The non-university institutions and universities not included in other ranking programs are excluded from the primary list. Data used to assess the performance of the universities is taken from ISI’s ESI, Web of Science (WOS), which includes Science Citation Index (SCI), Social Science Citation Index (SSCI) and Journal Citation Reports (JCR).

The performance measures include nine indicators representing three different criteria of scientific papers performance: research productivity, research impact and research excellence. The indicators and their respective weightings are show in Table – 4.

Table – 4: Ranking Criteria and Weights for Performance Ranking of Science Papers

Criteria	Indicators	Weighting	
Research Productivity	Number of articles in the last 11 years	10	20
	Number of articles in the current year	10	
Research Impact	Number of citations in the last 11 years	10	30
	Number of citations in the last 02 years	10	
	Average number of citations in the last 11 years	10	
Research Excellence	H-index of the last 2 years	20	50
	Number of Highly Cited Papers	10	
	Number of articles in high-impact journals in the current year	10	
	Number of subject fields where the university demonstrates excellence	10	

It is claimed by the organizers of the ranking that number of articles published in peer-review journals is true and appropriate indicator of research productivity of an institution. In order to fairly encompass the on-going and current research productivity the ranking employs two indicators; the number of articles published in last 11 years and the number of articles in the current year.

Universities research impact is included in the ranking process by including the number of citations in the last eleven years, the number of citations in the last two years and average number of citation in the last eleven years. Eleven years' citations statistics is drawn from ESI while number of citations in last two years is taken from SCI and SSCI at WOS, which include statistics from update to the date of retrieval.

The university's research excellence is assessed by the indicators such as h-index of last two years, the number of highly cited papers from ESI, the number of articles in high-impact journals (from JCR) in the current year (Hi-Impact Journal articles), and the number of subject fields out of 22 fields, where the university shows excellence and included in the ESI's Citation Rankings Lists.

Score for each university is calculated on the basis of abovementioned nine indicators. For each indicator, the university with highest number receives the maximum points (100); the other universities' numbers are subdivided by the highest number and are converted decimally into their respective scores.

GLOBAL UNIVERSITY RANKING BY WUHAN UNIVERSITY

Research Centre for Chinese Science Evaluation of Wuhan University China carries out ranking of global university on the basis of Essential Science Indicators (ESI). ESI provides the data of article publication counts and citation frequencies in over 11,000 journal of the world in 22 research fields. The scores are awarded on the basis of 45 indicators the largest numbers compared to any other ranking process. Much of the information about this ranking methodology, including criteria & weights is still in Chinese; therefore it is not possible to give many details.

The Chinese college ranking system was created by Shanghai Jiao Tong University. The ranking is 90 percent based on research. Wuhan University ranking system has about half of that based on research. The research reports quality depends largely on the numbers of papers that have been cited in their bibliographies. Status for universities is measured in conferences, publishing and memoranda of understanding signed with foreign universities. But the aspects like student outcomes and placement of student into the workforce are missing from the ranking criteria.

Impact of Institutional Size on Rankings

Five of the eight categories (indicators) mentioned above are biased towards size. Four, that is, financial inputs, staff inputs, research metrics and reputation are biased towards larger institutions and one, student experiences, is biased towards smaller institutions. Faculty and staff inputs and research can be normalized if common data standards for counting staff and students are available. However, student experiences and reputation are perhaps impossible to normalize. Financial inputs are generally adjusted for the size of the student body.

It has been observed that smaller institutions receive higher scores for student satisfaction and engagement but they remain at disadvantage, of being remained unnoticed, in international ranking hence get lower grades for ‘reputation’. The reputation is predominantly affected adversely by size of the institution in terms of network node effect and research. We can not do much to normalize this bias. It is also highlighted that teaching cannot generate reputation since universities are taking the role of engines of economy; hence their international status becomes significant.

An Overview of Criteria of Significant Ranking Systems

Having reviewed various global university rankings, a comparison of criteria for the four ranking systems is presented in Table – 5.

G-Factor and Professional ranking systems have not been included in the above comparison due to their very limited coverage (single criterion) and significance. Criteria and coverage of the ranking conducted by Wuhan University also don't appear in the comparison, because of very limited knowledge available in English on the web. Newsweek ranking is essentially based on a blend of criteria used by THES-QS and STJU ranking systems.

Table - 5: Criteria and coverage of the four ranking systems

CRITERIA	WR (Webometrics)	ARWU (SJTU)	Performance (HEEACT)	Broad based (THES-QS)
Universities Analyzed	15000	3000	3500	2000
Universities Ranked	5000+	500	500	566
Quality of Education		Alumni Nobel & Field (10%)		Students / staff ratio (20%)
Internationalization				Int'l Students (5%) Int'l Staff (5%)
Size	Web Size (20%) Rich Files (15%)	Size of Institution: 10% Nature & Science: 20%		
Research Output	Scholar (15%) (Google)	SCI & SSCI 20%	Research Productivity 20%	
Impact	Visibility (50%) (external inlinks) <i>Detail:</i> <i>Size (we pages): 20%</i> <i>Rich Files : 15%</i> <i>Scholar : 15%</i>	Highly Cited Res'chers (20%)	Research Impact 30%	Citations (20%) Acad Reputation (40%)
Prestige		Staff Nobel & Field (20%)	Research Excellence 50%	Reputation Empl'ers (10%)

Rank Comparison of Top 20 Universities

It would be interesting to see the positions of different universities in the selected ranking systems. Table–6 shows the World Top 20 Universities as ranked in four systems.

Out of 20 top universities as ranked by THES-QS (numbered in superscript), 13 are present in ARWU by STJU (65%), 15 in Newsweek ranking (75%) whereas only 7 appear in Webometrics rankings (35%). Harvard has maintained its 'top' position in all the four ranking systems. Stanford 19th in THES ranking is 2nd and 3rd in the other three systems reflecting lack of conformity of their criteria to those of THES. Cambridge and Yale Universities could not get a place in Webometrics Top 20 while they occupy high positions in other three rankings. This is the paradox of the diversity of the criteria of various ranking systems while all these ranking systems claim to rank the quality of education and research in the universities. It is therefore imperative to note that rankings are information tools for different purposes. Their methodologies must be read carefully before reporting or using their results and they should be used with cautions.

Table – 6: Lists of World Top 20 Universities in year 2007

THES-QS	ARWU	Newsweek	Webometrics
Harvard University ¹	Harvard University ¹	Harvard University ¹	Massachusetts Institute of Technology ¹⁰
University of Oxford ²	Stanford University ¹⁹	Stanford University ¹⁹	Harvard University ¹
University of Cambridge ³	University California - Berkeley	Yale University ⁴	Stanford University ¹⁹
Yale University ⁴	University of Cambridge ³	California Institute of Technology ⁷	University of California Berkeley
Imperial College London ⁵	Massachusetts Inst Tech (MIT) ¹⁰	University of California at Berkeley	Pennsylvania State University ¹⁴
Princeton University ⁶	California Institute Tech	University of Cambridge ³	University of Michigan
California Institute of Technology ⁷	Columbia University ¹¹	Massachusetts Institute Technology ¹⁰	Cornell University ²⁰
University of Chicago ⁸	Princeton University ⁶	Oxford University ²	University of Minnesota
University College London (UCL) ⁹	University Chicago ⁸	University of California at San Francisco	University of Wisconsin Madison
Massachusetts Institute of Technology ¹⁰	University Oxford ²	Columbia University ¹¹	University of Texas Austin
Columbia University ¹¹	Yale University ⁴	University of Michigan at Ann Arbor	University of Illinois Urbana Champaign
McGill University ¹²	Cornell University ²⁰	University of California at Los Angeles	University of Pennsylvania
Duke University ¹³	University California - Los Angeles	University of Pennsylvania ¹⁴	University of Washington
University of Pennsylvania ¹⁴	University California - San Diego	Duke University ¹³	Carnegie Mellon University
Johns Hopkins University ¹⁵	University Pennsylvania ¹⁴	Princeton University ⁶	Columbia University New York ¹¹
Australian National University ¹⁶	University Washington – Seattle	Tokyo University ¹⁷	Purdue University
University of Tokyo ¹⁷	University Wisconsin – Madison	Imperial College London ⁵	University of California Los Angeles
University of Hong Kong ¹⁸	University California - San Francisco	University of Toronto	University of Florida
Stanford University ¹⁹	Johns Hopkins University ¹⁵	Cornell University ²⁰	University of Chicago ⁸
Cornell University ²⁰	Tokyo University ¹⁷	University of Chicago ⁸	University of Maryland

Impact of Ranking on Institutions and Stakeholders

It has been seen that ranking systems have significantly influenced the higher education institutions and their stakeholders. The reliability of many institutions and their senior management has been affected due to the emergence of ranking systems. Rankings have impacted governments in allocation of funding. They have also influenced staff's approach in selecting a university as an employer of choice.

There is agreement among many ranking researchers and university administrators that ranking systems affect students' thinking in selecting a higher education institution. Domestic students in many countries depend on local information and national rankings but are also influenced by international rankings to some extent for international mobility. However, international students, in particular at postgraduate level, seem highly influenced by global rankings, supposedly for the quality of the education and future employability. Marguerite Clarke, however, concluded from a survey that for most of the students, rankings don't play a very important role in their choice of university or a program. However, students likely to be the high-achievers and those from affluent families or having college-educated parents found the ranking highly important. She also highlights a relationship between the perceived status of the degree-granting institutions and employment and earning outcome for graduates and suggests that the impact is temporary for most of the students but can be longer for low-income students and graduates of professional programs. She is appreciative of the fact that the rankings systems are helping to inform prospective students in many countries about the available institutional choices including information about the quality and cost of the education. Rankings, as an adverse effect, are also expected to limit the chance of general body of students to get admission (student-selectivity indicator) in high-ranking institutions, which may prefer to lure the high-achievers for maintaining or improving their ranking status.

Rankings, despite all the criticisms about their criteria and methodologies, nevertheless seem to be shaping the behaviour of institutions. They are definitely influencing the decision-making and planning processes within higher education institutions. Marginson noted that universities will adopt policies and strategies in order to optimize their position in ranking systems whether they like it or not. In an effort to get better position in the ranking list, universities have increased emphasis on improving academic performance and research outputs. This has led to signing the contracts on the basis of performance, new salary and tenure arrangements and hunting of high-achievers. On the other hand, under-performers are identified on the basis of rankings. In high ranking institutions, faculty is conferred social and professional recognition and staff demonstrates higher morale. Most of the ranked institutions, took organizational, managerial, academic, and strategic decisions on the basis of the ranking results. High ranking institutions used the results to set future goals to extend research presence and talent – catching capability. Low ranking institutions focused on improving upon the indicators with low scores.

Conclusions

Rankings are inherently controversial and no ranking is entirely objective and definitive. The controversy is based on the fact that absolute quality of an educational institution can not be measured by numerical indicators only. In every performance evaluation approach, there are some issues critical for reliability and success that need to be addressed.

The ranking through selection of a particular set of indicators, and allotting a weight to each indicator, results in imposing a specific definition of quality on the competing institutions. Whereas, there may be some other valid indicators, which might have been ignored in the ranking process.

The global rankings can only make sense if the indicators are appropriate, otherwise intuitions and governments will jeopardize transforming their higher education system and

institutions and undermine other policy objectives, to conform to metrics designed by rankers for other purpose.

Rankings are deemed to measure national and international competitiveness. Although they are drawing criticism on various counts, still the number of universities being drawn into the rankings is on rise whether they are willing to get in or not.

The ranking culture is driving up intuitional performance and providing some public accountability and transparency, reshaping higher education by aligning national and international priorities in education and research, creating sense of urgency and accelerating modernization agenda, and challenging governments, universities and the public to think higher education and how and what should be measured.

It is very important for the ranking agencies to improve ranking systems to make them comprehensive and plausible as per the defined aims and objective of the ranking process.

Finally, prospective students should not use this data as the sole guide for choosing a university, but they should look for additional information before making a selection of institution.

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