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University Ranking, an Important Quality-Assurance Tool

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Abstract: "University Rankings" - or "League Tables", as they are known in the United Kingdom – have in a short period of time become an important feature in policy-making and practice in higher education. They are now a global phenomenon serving different purposes for different and varied audiences. Even if they are not necessarily universally appreciated, there is an increasing understanding that they have become the "third arm of the quality-assurance tool, together with accreditation, government regulation and licensing" and they are clearly here to stay. Indisputably university ranking has changed the way higher education institutions and their activities are being presented, perceived and assessed at the institutional, local, national and international levels.In our research we will try to answer some questions concerning this topic: is university ranking an inflexible tool, which favors traditional universities, with resources and experience?; what types of performance indicators, procedure and ethical considerations should be included in a conceptual framework or typology for higher education ranking systems?

Keywords: ranking; universities; quality; indicators

1. Introduction

Rankings and league tables of higher education institutions (HEIs) and programs are a global phenomenon. For the many purposes that HEIs serve, they have become a part of the framework of national accountability and quality assurance processes, allowing more nations to see the development of future rankings. Given this trend, producing rankings and league tables hold HEIs accountable for quality in their own data collection, methodology, and dissemination.

Ranking approaches and systems, like higher education institutions, vary extensively and are often tied to the unique higher education context of a nation. However, each system or approach tends to include a logical set of elements. Data is first either collected from existing data sources or original data is collected. Following this, the type and quantity of variables are selected from the information gathered. Next, the indicators are standardized and weighted from the selected variables. Finally, the calculations are conducted and comparisons are made so that institutions are sorted into "ranking order." These rankings are often controversial and heavily debated in some local, national, and now increasingly international contexts. Whether or not colleges and universities agree with the various ranking systems and league tables findings is insignificant; ranking systems clearly are here to stay. When U.S. News and World Report began its annual ranking of "America's Best Colleges" in 1983, publishers in other countries quickly followed with their own hierarchical measures of providing consumer information and institutional marketing while attempting to impact the quality of higher education.

The issue then becomes not whether ranking systems should exist, but rather how these higher education ranking systems might best be constructed. In other words; what types of performance indicators, procedures, and ethical considerations should be included in a conceptual framework or typology for higher education ranking systems?

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Current methodologies exhibit various strengths and weaknesses. Different rankings/league tables include indicators that students may overlook when thinking about an institution's quality. These rankings allow institutions to distinguish themselves based on who they are and what they do for consumers of higher education. Similarly, rankings methodologies indirectly impact quality in higher education because of their ability to promote competition.

Nevertheless, the inherent weaknesses of these rankings/league table methodologies often overshadow their strengths. Rankings/league tables' major flaw may be their continual changes in methodology. For instance, although institutions may not actually change in a significant way, ratings can fluctuate year-to-year because the weights assigned to different indicators have changed. Likewise, many rankings come up with a single number that summarizes the overall ranking of an academic institution. This practice makes it difficult for students to distinguish among institutions based on the characteristics they find most important. Additionally, much of the objective data used in the rankings/league tables is self-reported by the institutions. Continuing such a practice without external validation of data could lead to difficulties for rankings/league tables in the future as institutions place more stakes in rankings' ability to influence behavior.

"Rankings of higher education institutions should reflect the healthy balance between universal global values and local characteristics of cultures, societies, and educational systems. It should be reflected in ranking methodologies leading to international comparisons and stimulating the search of excellence in the international educational space."(Koźmiński, 2002)

As the provision of higher educational opportunities becomes increasingly international, so the need for reliable means of international institutional comparison becomes more prescient. Where, at the turn of the century, no truly international ranking of higher education institutions existed, a number of organizations now compile and publish annual global university rankings. The two most frequently cited of theses rankings are the Academic Ranking of World Universities, compiled by researchers from the Institute of Higher Education at Shanghai Jiaotong University, and the Times Higher University World Rankings, complied by employees from the Times Higher Education Supplement, based in London.

These two rankings currently represent the most comprehensive efforts to compare universities across borders, although it should be noted that in specific fields such as business administration, top schools have been ranked by a number of different publications for some time. Business Week started the trend in 1988, and the Economist, Forbes, The Wall Street Journal, and The Financial Times have all since followed suit.

2. The Academic Ranking of World Universities (ARWU)

The Academic Ranking of World Universities (ARWU) was first published in June 2003 by the Center for World-Class Universities and the Institute of Higher Education of Shanghai Jiao Tong University, China, and then updated on an annual basis.

The original goal of the Shanghai Jiaotong University (SJTU) ranking was to discern what kind of research gap existed between Chinese and 'world-class' universities, and was conducted as an academic exercise rather than an act of consumer advocacy for international consumption. In response to requests from international colleagues, SJTU researchers have since agreed to publish their findings on the World Wide Web.

More than 1000 universities are actually ranked by ARWU every year and the best 500 are published on the web.

Although the initial purpose of ARWU was to find the global standing of Chinese top universities, it has attracted a great deal of attention from universities, governments and public media worldwide.

A survey on higher education published by The Economist in 2005 commented ARWU as "the most widely used annual ranking of the world's research universities"[1]. Burton Bollag, a reporter at Chronicle of Higher Education wrote that ARWU "is considered the most influential international ranking"[2].

One of the factors for the significant influence of ARWU is that its methodology is globally sound and transparent. The EU Research Headlines reported the ARWU work on 31st December 2003: "The universities were carefully evaluated using several indicators of research performance."[3] Chancellor of Oxford University, Chris Patten, said "the methodology looks fairly solid ... it looks like a pretty good stab at a fair comparison."[4] Professor Simon Marginson of University of Melbourne commented that one of the strengths of "the academically rigorous and globally inclusive Jiao Tong approach" is "constantly tuning its rankings and invites open collaboration in that" (Marginson, 2007).

The ARWU and its content have been widely cited and employed as a starting point for identifying national strengths and weaknesses as well as facilitating reform and setting new initiatives. Bill Destler, the president of the Rochester Institute of Technology, drew reference to the ARWU to analyze the comparative advantages that the Western Europe and US have in terms of intellectual talent and creativity in his publication in the journal Nature (Destler, 2008). Martin Enserink referred to ARWU and argued in his paper published in Science that "France's poor showing in the Shanghai ranking ... helped trigger a national debate about higher education that resulted in a new law... giving universities more freedom"(Enserink, 2007).

Starting from 2009, the ARWU has been published by Shanghai Ranking Consultancy, a fully independent organization. Besides ARWU, the Consultancy is going to provide various global comparison and in-depth analysis on research universities, supporting relevant decision making by national governments and universities in global context.

ARWU uses six objective indicators to rank world universities, including:

- the number of alumni, 10%;
- the number of staff winning Nobel Prizes and Fields Medals, 20%;
- number of highly cited researchers 20%;
- number of articles published in journals of Nature and Science 20%;
- number of articles indexed in Science Citation Index - Expanded and Social Sciences Citation Index, 20% and
- per capita performance with respect to the size of an institution, 10%.

Table 1. Definitions of measures used in the 2009 Annual Ranking of World Universities (ARWU) Top 500 rankings.

Measure	Weight	Definition
Alumni	10%	The total number of the alumni of an institution winning Nobel Prizes and Fields Medals. Alumni are defined as those who obtain bachelors, masters 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 after 1991, 90% for alumni obtaining degrees in 1981-1990, 80% for alumni obtaining degrees in 1971-1980, and so on, and finally 10% for alumni obtaining degrees in 1901-1910. If a person obtains more than one degree from an institution, the institution is considered once only.
Award	20%	The total number of the staff of an institution winning Nobel

[1] A world of opportunity. (2005). The Economist, Vol. 376. Issue 8443, p. 14-16.
[2] Group endorses principles for ranking universities. (2006, June 9). Chronicle of Higher Education.
[3] Chinese study ranks world's top 500 universities. (2003, December 31). European Commission<Research<Headlines.
[4] Chris Patten's speech. (2004, February 5). Guardian.

		Prizes in Physics, Chemistry, Medicine and Economics and Field 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 2001, 90% for winners in 1991-2000, 80% for winners in 1981-1990, 70% for winners in 1971-1980, and so on, and finally 10% for winners in 1911-1920. 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.
HiCite	20%	The number of highly cited researchers in 21 subject categories. These individuals are the most highly cited within each category. The definition of categories and detailed procedures can be found at the website of Thomson Reuters.
Nature & Science (N&S)	20%	The number of papers published in the journals Nature and Science between 2004 and 2008. 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' and 'Proceedings Paper' types are considered
Publications (PUB)	20%	Total number of papers indexed in Science Citation Index-Expanded and Social Science Citation Index in 2008. Only publications of 'Article' and 'Proceedings Paper' types are considered. When calculating the total number of papers of an institution, a special weight of two was introduced for papers indexed in Social Science Citation Index.
Per capita	10%	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.
Overall	100%	

Source: www.arwu.org

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.

To generate a final ranking, the performance of each university in each measure is expressed as a percentage of the top-performing university. Then, the weightings shown in Table 1 are applied to these relative measures and a total score calculated. To obtain the final ranking, each university score is then expressed as a percentage of the score achieved by the top university. For example, a score of 80 means that the overall weighted performance of that university was 80 percent that of the top performing university.

There are two key points to note about the measures used in the ARWU rankings. First, the ARWU indicators measure the research performance of a university, with no indicators of teaching performance.

Second, five of the six measures are totals of either people or research outputs. Only one indicator is calculated on a per academic staff member basis. This means that the AWRU is, to a certain extent, a measure of volume of research, with larger institutions at an advantage.

Of the specific measures used in the ARWU rankings, the inclusion of Nobel prize winners is controversial as it is largely science-based and can be subject to politicking (Marginson 2007). It also means that institutions earn points from people who may have long since ceased to be associated with that institution through a halo effect. This historic nature also applies to the HiCite measure, which examines citations of individuals between 1981 and 1999 (Holmes 2006).

The ARWU compiles an overall ranking, but it also breaks out each university's performance in five subject fields (math, physics, chemistry, computer science, and economics/business) as well as in five broader fields (natural sciences and math, engineering/technology and computer sciences, life and agriculture sciences, clinical medicine and pharmacy, and social sciences).

Although the Shanghai rankings are perhaps the most frequently cited of international rankings, the methodology is certainly not without its critics. the quality of an academic institution be open to the same type of evaluation?

Among the most vocal (and visible) critics of the Shanghai rankings has been the Times Higher Education Supplement. The flaws perceived by the British newspaper led it to produce its own annual international ranking of universities. In an editorial that accompanied its inaugural report in 2004, the publication questioned the validity of using the number of prizewinners among faculty and alumni as a criterion for gauging the overall quality of a university, especially in an historical context. Why credit a university for enrolling a prizewinner 40 years ago? Furthermore, why credit only the university at which the original research was conducted and not the institution that currently pays the prizewinner's salary? All valid questions considering the Shanghai rankings allot a 30 percent weighting to the faculty and alumni prizewinner categories. In response THES sought to produce a ranking that took into account a broader spectrum of criteria on which to judge the academic quality of universities worldwide.

Despite its popularity, the Shanghai rankings have come under some criticism regarding both their methodology and choice of variables (Liu and Cheng, 2005 and Van Raan, 2005). Vincke (2009) notes that using an averaged score to measure performance has a determining influence on the ranking. With respect to the choice of variables, Shanghai University uses only a limited set of criteria, which measure academic performance solely in terms of research excellence, to rank a wide range of universities. This "one size fits all approach" fails to capture the specific characteristics of a university and ignores the objectives an institution pursues outside of research, such as education and a social mission. In terms of its criteria, the ranking is biased in favor of science and technology and almost totally disregards other fields such as the arts and humanities.

Thus, schools with strong scientific departments fare much better in the rankings than schools that specialize in the arts, humanities or social sciences. The ARWU also favors English-speaking universities as English is the predominant language of academic publications. Van Raan (2005) points out these biases and warns against the misuse of overly simple bibliometric indicators. Finally, the ARWU does not take into account the effect of size on performance. Zitt (2007) notes that ninety percent of criteria used in rankings are size-dependant. Indeed, the Shanghai rankings essentially measure overall production and not efficiency, an approach that favors large universities. And while they do include one variable to this effect ("PCP"), it is rendered almost useless as it is only computed for the universities which survive pre-selection based on their performance with respect to the other criteria.

3. Times Higher Education Supplement (Thes)

The first THES rankings were published in 2004 and were designed to inform readers of the THES about the comparable performance of the world's universities through measuring a number of

dimensions of university performance. Up to and including 2009, the THES rankings were compiled by QS Quacquarelli Symonds Ltd.

Building on its criticism of the SJTU rankings and its experience producing domestic league tables, the THES has sought to produce a ranking that is "current, rather than historical," and finds suitable "proxies for excellence in teaching and research." With this in mind, the THES methodology places great stock (70%) on peer review.

The measures used to compile the 2009 THES rankings include: survey results from academics and employers that captures the perceptions of the quality of a university, measures of class size, research impact and the proportions of international faculty and students at an institution (see Table 2). A key point to note is that the THES is heavily reliant on surveys about the perceived quality of universities, with the academic and employer survey contributing 50 percent of the weighted performance score.

From 2007, the THES rankings have been calculated in a way that reduces the dispersion in performance in the various measures, reducing the impact of outliers. This process involves the use of z scores[1] to calculate the relative performance of universities compared to the top performing university. The weightings in Table 2 are then applied to the score in each measure to arrive at a relative score, which is then expressed as a percentage of the top performing university. This overall score is then used to determine the rankings.

Table 2. Definitions of measures used in the 2009 Times Higher Education Supplement (THES) Top 200 rankings.

Measure	Weight	Definition
Academic Peer Review ***(Acad PR)***	40%	Composite score drawn from peer review survey (which is divided into five subject areas). There were 9,386 responses in 2009 (6,354 in 2008).
Employer Peer Review ***(Emp PR)***	10%	Score based on responses to employer survey. There were 3,281 responses in 2009 (2,339 in 2008).
Faculty Student Ratio ***(EFTS/FTE)***	20%	Score based on student faculty ratio. A lower number of students to staff is treated as representing higher quality of teaching.
Citations per Faculty member ***(Cites/FTE)***	20%	Score based on research performance factored against the size of the research body. The citations are sourced from the bibliometric database SCOPUS and represent the total for the last five years.
International Faculty ***(Int faculty)***	5%	This measure captures international reputation and is measured by the proportion of international faculty at a university. A higher proportion is treated as representing better performance.
International Students ***(Int students)***	5%	This measure captures international reputation and is measured by the proportion of international students at a university. A higher proportion is treated as representing better performance.
Overall	100%	
Source: www.topuniversities.com		

Marginson (2007) argues that the large weighting applied to survey responses (50 percent) captures how a university is perceived, not how they actually perform. The result is that universities are being judged on credentialism and not actual learning and research outcomes. In addition, he argues that there is a lack of transparency in these measures and a problem with regional bias. Marginson argues

[1] A"z" score indicates how many standard deviations an observation is above or below the mean value.

that universities in the UK and USA will have better name recognition. This is compounded by a low response rate (around 1 percent) for the academic peer review measure.

Marginson has also criticized the use of the number of students to academic staff as a proxy for teaching quality, with a lower ratio supposedly reflecting higher quality. Marginson argues that teaching quality cannot be accurately assessed using a resource quantity indicator such as this.

Though the ranking authors suggest that the proportion of international students reflects the prestige with which an institution is viewed, Marginson argues it simply rewards volume building. This measure will also favor universities in English speaking countries and those in countries where there is a centrally mandated export education policy.

Many of the criticisms leveled against the Shanghai rankings could also be applied to the THES rankings. However, the THES does attempt to reduce the emphasis on scientific and technological fields of study in composing its ranking. Nonetheless, the somewhat arbitrary nature of choosing and weighting criteria — often termed the "weight-and-add" approach, and common to the SJTU, THES and a majority of university rankings around the world — leaves the THES ranking open to criticism, after all there are far more than six factors and interactions within those factors that decide the overall environment of a campus.

4. Case Study – Romania

There are 56 public higher education institutions in Romania, 28 accredited private higher education institutions, 21 private higher education institutions certified to provisionally operate and 5 private higher education institutions certified to provisionally operate in the process of accreditation.

A total of 110 higher education institutions and none of them is to be found in the best 500 universities published by the Academic Ranking of World Universities (ARWU).

University of Bucharest (UB) and Babes-Bolyai University (BBU), Cluj-Napoca are the only institutions in Romania that have managed to be included in the 2009 edition of Times Higher Education - QS World University Rankings, of the best centers higher education in the world.

The two institutions were not ranked among the top 500. University of Bucharest ranged overall between 500 and 600 places in the rankings after consecutive three years stood at 400 and 500 seats category. UB ranked 288 in Natural Sciences. In turn, BBU, placed after the location 600, is mentioned for the first time this international ranking.

"Times Higher Education", ranking based on votes of the academics and alumni worldwide, includes 39 European universities in the top 100, three more than last year. Instead, Americans are in decline, with 36 higher education institutions, six fewer than in 2008.

Romanian universities are missing from all hierarchies made worldwide, whether based on criteria like popularization of the institutions or their web sites, the number of awards received by students or teachers or the number of results in research.

In 2005, it was realized a research (Florian, 2006) concerning the Romanian universities and the ARWU ranking. This research was an attempt to estimate the score that Romanian universities would obtain in this ranking, as none of them entered the top 500 of world universities.

The data presented suggested that the results of the Shanghai ranking are irreproducible. At least the data concerning the SCI indicator suggested that the authors of the Shanghai ranking deviated from the official published methodology when computing the scores of the universities. It is understandable that the values of some of the indicators used are hard to reproduce, as in the case of the Size indicator, where data about universities' personnel are hard to obtain and inconsistent, and sometimes requires using educated guesses, or as in the case of the N&S indicator, where the necessity of weighting as a function of author importance may require an error-prone automated counting method. It is less acceptable that the values for an objective indicator such as SCI cannot be reproduced using the

published methodology. These findings undermine the relevance of the Shanghai ranking and adds to other critiques of its methodology and results. The conclusion of the paper was that the results are irreproducible, given the currently published methodology. The inconsistencies found here may be clarified if the authors of the Shanghai ranking will publish also the un-normalized values that they used for the indicators, and the actual transformations they performed on data. It would be useful if they would insure the transparency of their results, or at least implement on their website the possibility that the public compute automatically the score of any university, given raw data.

When taking into account the ARWU criteria, the following observations were made. Romanian universities have one graduate winner of Nobel Prize - George Emil Palade, who graduated in 1940 Faculty of Medicine, University of Bucharest, Faculty which is now part of UMF Carol Davila. Graduation Year corresponds to a score of 0.4, according to the weighting methodology as Shanghai. Romanian universities have not graduates winners of the Fields Medal, or Nobel prize winning professors.

According to ISI Highly Cited[1], in 2005 it was one single researcher „highly cited" from România: Ionel Ciucanu, West University of Timisoara, Agricultural Sciences. In 2010, there are two, prof. Ciucanu and Gheorghe Paun, Institute of Mathematics of the Romanian Academy, Computer Science.

The articles published by researchers from Romania (till 2005) in prestigious journals Nature and Science were around 11.

Since obtaining Nobel Prizes or Fields is relatively unlikely in the short term, the way how the Romanian universities could increase their ranking scores in Shanghai is by increasing the number of ISI articles, and especially in the Humanities, and improving quality publications science, which could lead to increased presence in prestigious journals Science, Nature or index Researchers "highly cited".

The estimation shows that even the best universities in Romania must increase its score by at least 2 times to enter the top 500 universities in the world.

The number of ICI articles, absolute or related to personnel, represents the main source of points for the Romanian universities according to the Shanghai methodology.

5. Conclusions

Each year, the release of the Times Higher Education Supplement (THES) Top 200 and the Annual Ranking of World Universities (ARWU) Top 500 university rankings generates significant interest around the world.

As well as generating media interest, it appears that international university ranking systems have achieved some degree of public and policy credibility in a number of countries (Marginson 2007). This is due, in part, to the impact of rankings on the choice of destination of international students, an important source of revenue for higher education institutions. Research suggests that international students are among those most likely to look at league tables when making their decision about where to study (HEFCE 2008).

Given that international university rankings systems appear to be here to stay, it is important that the information provided by these rankings is fully understood. The analysis shows that delving beyond the overall ranking and understanding the limitations and scope of the ranking systems is key to assessing the performance of the world universities in the right context.

Regardless of the prestige of such lists, college academic rankings should be taken with a grain of salt. The greatest criticism and controversy surrounding ranking lists involves questions of methodology. Additionally, because each publisher uses slightly different factors for ranking schools, the lists of rankings are not necessarily comparable. However, many students and parents still consider such

[1] http://isihighlycited.com/

rankings to be useful when selecting a college to attend, which attests to the continued popularity of ranking lists like the ARWU or the THES.

European Union will create a new global system for classifying universities, in an attempt to improve the European universities and to improve the economic power of Europe.

National rankings of universities have become a common practice in the 1990s, however, as higher education has gained a global dimension, more and more students choosing to study abroad, it has developed a tendency to draw up global rankings of universities, reports EUObserver.

This means that the classification system receives an increasing attention for various reasons: the students use them to restrict their list of options, public and private institutions decide to allocate funds to universities according to their position in these rankings, universities use them to promote themselves and some politicians to give them as achievements or national aspirations.

Although the number of rankings increases every year, there are two major university rankings - and rival: Times Higher Education Supplement in the UK and Shanghai Jiao Tong University Academic Ranking of World Universities in China.

Both classifications are prepared from mid-2000 and in general both show that American universities are far ahead of those in continental Europe.

In the last six SJTU rankings, 17 American universities were among the 20 universities of the world, the only European higher education institutions in the top 20 were Cambridge and Oxford. At the same time, THES included in the top 20 only 12 American universities, four British and, occasionally, one French.

European Commission and some Member States have criticized the way these rankings are prepared, saying they are very biased and "not accurately reproduce diverse and multifunctional nature of universities and their research activities.

"The Commission believed that many of the current rankings really do not fulfill their purpose, for example, because they focused more on research than on the aspect of teaching and the institutions in their entirety, and not on programs or departments," says executive The Brussels when asked to create a new classification system for universities.

France calls for a long time to create a European alternative to the current classification systems, arguing that the current selection criteria favor Anglo-Saxon institutions of higher education and disadvantage on the French or other European countries.

According to the European Commissioner for Education, Maros Sefcovic, the European project of drawing up a new "multidimensional" ranking create "a better balance between research and the indicators for quality education."

The plan to develop a European system of classification of universities is part of wider EU efforts to modernize higher education, as part of an overall strategy for economic growth.

In the end, it still remains a good question: Can be the quality of academic research accurately captured by a single aggregated measure such as a ranking?

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