



University Ranking by Academic Performance (URAP) Press Release (02/02/2016)

Introduction

As globalization drives rapid change in all aspects of research & development, international competition and collaboration have become high priority items on the agenda of most universities around the world. In this climate of competition and collaboration, ranking universities in terms of their performance has become a widely popular and debated research area. All universities need to know where they stand among other universities in the world in order to evaluate their current academic performance and to develop strategic plans that can help them strengthen their organization and sustain their progress.

In an effort to address this need, several ranking systems have been proposed since 2003, including ARWU-Jiao Tong (China), Leiden (The Netherlands), TIMES (United Kingdom), Webometrics (Spain), SCImago (Spain), and HEEACT (Taiwan) which rank universities worldwide based on various criteria. The use of bibliometric data obtained from open-access and credible information resources such as ISI (Information Sciences Institute) and Google Scholar has contributed to the objectivity of these ranking systems. Nevertheless, most ranking systems

cover up to top 500 universities around the world, which mostly represents institutions located in developed countries. Universities from other countries around the world also deserve and need to know where they stand among other institutions at global, regional, and national levels. This motivated us to develop a ranking system that is more comprehensive in coverage, so that more universities will have a chance to observe the state of their academic progress at global and national levels.

The **University Ranking by Academic Performance (URAP)** laboratory was established as part of the **METU Informatics Institute** in an effort to conduct scientific research on university performance evaluation and ranking methodologies. URAP has an interdisciplinary research team who actively investigate academic performance metrics to rank universities around the globe. URAP's ranking of Top 2000 World Universities has been announced annually since the First International URAP Symposium held at METU, Ankara, Turkey in 2010. In 2011, URAP began to announce the Top 1000 Universities in 6 different scientific areas, namely Engineering, Agriculture/Environmental Sciences, Medicine, Life Sciences, Natural Sciences and Social Sciences. In 2013, the field rankings were extended to 23 scientific fields of research based on the Australian and New Zealand Standard for Research Classification¹.

The most recent version of the world ranking will be announced on December 21st, 2015. The general ranking can be reached at <http://www.urapcenter.org>

Aim and Scope

The URAP ranking system's focus is on academic quality. URAP has gathered data about 2,500 Higher Education Institutes (HEI) in an effort to rank these organizations by their academic performance. The overall score of each HEI is based upon its performance over several indicators which are described in the next section. The study includes HEIs except for governmental academic institutions, e.g. the Chinese Academy of Science and the Russian Academy of Science, etc. Data for 2,500 HEIs have been processed and top 2,000 of them are scored. Thus, **URAP covers approximately 10% of all HEIs in the world**, which makes it one of the most comprehensive university ranking systems in the world.

¹ <http://www.arc.gov.au/applicants/codes.htm#FOR>

Definitions of the Indicators

URAP's ranking of Top 2000 world universities is based on 6 academic performance indicators. Since URAP is an academic performance based ranking, publications constitute the basis of the ranking methodology. Both quality and quantity of publications and international research collaboration performance are used as indicators. The indicators, the data sources, and the duration of coverage are summarized in Table 1 below.

Table 1 URAP indicators and data sources for the general ranking of world universities

Indicator	Objective	Coverage	Source
Article	Scientific Productivity	2014	InCites
Citation	Research Impact	2012-2014	InCites
Total Documents	Scientific Productivity	2012-2014	Web of Science
Article Impact Total	Research Quality	2012-2014	InCites
Citation Impact Total	Research Quality	2012-2014	InCites
International Collaboration	International Acceptance	2012-2014	InCites

Further descriptions of these indicators are provided below:

Number of Articles is a measure of current scientific productivity, which includes articles published in 2014 and indexed by Web of Science and listed in InCites. Article number covers articles, reviews and notes. The weight of this indicator on the overall ranking is %21.

Total Document is the measure of sustainability and continuity of scientific productivity. The total document count covers all scholarly literature provided by the Web of Science database, including conference papers, reviews, letters, discussions, scripts in addition to journal articles published during 2012-2014. The weight of this indicator is %10.

Citation is a measure of research impact and scored according to the total number of citations received in 2012-2014. The effect of citation on the overall ranking is %21.

Article Impact Total (AIT) is a measure of scientific productivity adjusted by the ratio of institution's citation-per-publication (CPP) with the world CPP in 23 subject areas between 2012 and 2014. The ratio of the institution's CPP and the world CPP indicates whether the institution is performing above or below the world average in that field. This ratio is multiplied by the number of publications in that field and then summed across the 23 fields, which is summarized in the following formula:

$$AIT = \sum_{i=1}^{23} \left(\frac{CPP_i}{CPP_{World_i}} \right) * Articles_i$$

This indicator aims to adjust the institution's scientific productivity according to its performance with respect to world CPPs in each field. The weight of this indicator is %18.

Citation Impact Total (CIT): is a measure of research impact corrected by the institution's normalized CPP with respect to the world CPP in 23 subject areas between 2012 and 2014. The ratio of the institution's CPP and the world CPP indicates whether the institution is performing above or below the world average in that field. This ratio is multiplied by the number of citations in that field and then summed across the 23 fields, which is summarized in the following formula:

$$CIT = \sum_{i=1}^{23} \left(\frac{CPP_i}{CPP_{World_i}} \right) * Citations_i$$

This indicator aims to adjust the institution's scientific impact according to its performance with respect to world CPPs in each field. The contribution of this indicator to the overall ranking is %15.

International Collaboration: is a measure of global acceptance of a university. International collaboration data, which is based on the total number of publications made in collaboration with foreign universities, is obtained from InCites™ for the years 2012-2014. The weight of this indicator is %15 in the overall ranking.

Data Collection

Data is gathered from Web of Science, InCites and other sources which provide lists of HEIs. 2500 HEIs with highest number of publications were initially considered, and 2000 of them were ranked after data processing. Field based bibliometric data is obtained through Thomson Reuters' InCites™ research analytics service², which provides an interface to the Web of Science database. The 23 fields used in the ranking are based on the discipline classification matrix developed by the Australian Research Council for journals indexed in Web of Science³. In contrast to previous year's ranking, articles with more than 1000 authors and 1000 citations were excluded from the dataset due to the reasons described in the discussion section.

Scoring, Weighting & Aggregation

The raw bibliometric data underlying our ranking indicators exhibit highly skewed distributions. Therefore, the indicator values above and below the median are linearly scored in two groups. The Delphi system was conducted with a group of experts to assign weights to the indicators. A total score of 600 is distributed to each indicator as follows:

- Number of Articles: % 21
- Total Document Count: % 10
- Citation: %21
- Article Impact Total: %18
- Citation Impact Total: %15
- Collaboration: %15

² <http://researchanalytics.thomsonreuters.com/incites/>

³ <http://www.arc.gov.au/pdf/ERA15/ERA%202015%20Discipline%20Matrix.pdf>

Discussion

Starting last year with the URAP-TR National Ranking for Turkish Universities, URAP started to exclude articles with more than 1000 authors and 1000 citations from analysis due to the unfair advantage these special articles bring to a large number of universities in the ranking system. The number of multi-author articles have increased within the past decade, particularly in the fields of medicine and more recently in high energy physics. In particular, the discovery of the Higgs Boson in 2012 caused some multi-author articles to appear with more than 2800 authors. For instance, the article titled "Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC" published in Physics Letters B by the ATLAS group includes 2918 authors from 267 institutions, and has accrued 3015 citations as of January 2016. Similarly, the article "Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC" published in the same journal has 2860 authors from 228 institutions, and has accrued 2857 citations in the past three years. The numbers of citations received by these articles in 2012 were not included in 2012 world university rankings. However, in later years the citations to these papers have exponentially increased, and almost doubled the citation per publication (CPP) values, for universities with small number of publications. Therefore such articles bring an unfair advantage to such universities, especially if the ranking system uses citation per publication as a ranking indicator. Such articles have also been excluded from URAP's ranking of Top 2000 World Universities this year. The implications of this change to the URAP case in particular and to other global ranking systems in general are discussed in the following sections.

The Impact of Articles with Large Number of Authors on Rankings

Several Turkish Universities have been ranked lower than previous years, especially in the 2015-2016 THE (Times) Ranking. The main reason for this change is the exclusion of articles with more than one thousand authors such as CERN articles and a few large-scale studies published in Medical journals, which accrue an unusual number of citations. Until last year such special high impact articles with 500-3000 co-authors were included in the rankings, which caused a 100% increase in some institution's raw citation counts in a single year. Due to this boost in citation counts, some of the universities from developing nations were ranked higher than usual in the world rankings. This was especially the case for the previous edition of the THE Ranking where citation per publication (CPP) constituted %30 of the total ranking score. A group of universities that have lower number of publications doubled their citation impact scores due to the increase in the number of citations accrued by the CERN papers, some of which even scored higher than Harvard University in the citation impact category.

In an effort to eliminate the unfair advantage brought by such cases, 3 articles that have more than 1000 authors and 1000 citations were excluded from the 2015-2016 URAP Top 2000 World Universities Ranking. These articles include the two CERN articles published by the CMS and ATLAS groups in 2012, as well as an article in the field of medicine. In the last 3 years, the two CERN papers accrued more than 5000 citations, whereas the medicine article accrued about 1000 citations. More than 500 universities are among the institutions participated, in any one of these

three articles, 21 of which are located in Turkey. For instance, one such university obtained 75% of its 3500 citations from the CMS paper that has over 2800 co-authors. The exclusion of the three abovementioned articles caused this university to lose (slide) 150 places in the current URAP ranking.

THE and QS ranking systems have employed similar strategies for their most recent rankings where they excluded articles with unusually high number of co-authors.

The Impact of Using Different Indicators on Global Rankings

Existing university rankings differ in terms of their choice of ranking indicators. Some of the rankings emphasize scientific publications and publication quality, whereas others favor scores obtained from reputation surveys. Therefore, the same universities may be ranked very differently by different ranking systems. There are instances where a university is ranked in top 300 in one ranking system, whereas it does not even make it to the top 1000 in another ranking. In other cases, an institution that was ranked as one of the top universities in one year, may be ranked in a much lower spot in the following year. Such deviations are more likely to occur in ranking systems that rely on reputation surveys, which makes it difficult to make valid judgments about the position of that university among other world universities. For that reason, the URAP Top 2000 World Universities ranking is solely based on bibliometric indicators of scientific productivity and quality.

The goal of world university rankings should be to enable institutions to compare their performance against other universities. All universities aim to improve their academic performance to qualify as one of the best universities in the world. For that reason, ranking systems that rely on academic performance indicators are especially useful for making comparisons across institutions and devising strategies for further development.

The goal of the URAP ranking system is not to label universities as the best or the worst. Our intention is to help universities identify potential areas of progress with respect to specific academic performance indicators. Similar to other ranking systems, the URAP system is neither exhaustive nor definitive, and is open to new ideas and improvements. The current ranking system will be continuously upgraded based on our ongoing research and feedback from our colleagues.

Acknowledgements

We would like to express our gratitude to the advisory committee members Prof.Dr. Nusret Aras, Prof.Dr. Tunçalp Özgen, Prof.Dr. Engin Ataç, Prof.Dr. Ülkü Bayındır, Prof.Dr. Attila Aşkar, Prof.Dr. Yaşar Sütbeyaz, and to our project team members Prof.Dr. Nazife Baykal, Prof.Dr. Ayşen Akkaya, Prof.Dr. Canan Çilingir, Assoc.Prof.Dr. Sevgi Özkan, Asst.Prof.Dr. Murat Perit Çakır, Asst.Prof.Dr. Cengiz Acartürk, Dr. Serkan Alkan, Oğuzhan Alaşehir, Buket Aran, Nuray Baltacı, Pelin Canbaz, Murat Koçak, Fatih Ömrüzun, İlker Koç and Çağatay Taşçı for their contributions to this work.

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