University Ranking by Academic Performance (URAP)

Press Release

October 14, 2016

Introduction

Since the announcement of the first global university rankings in 2003, university rankings have attracted increasing interest from multiple stakeholders including academics, policy makers, news media outlets and students as well as families. 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 credible information resources such as Web of Science, Scopus and Google Scholar has contributed to the objectivity of these ranking systems. These ranking systems serve an important role especially for informing university administrators about where their institutions stand among other universities in the world, which enables them to evaluate their current academic performance and to develop strategic plans for strengthening their organization. 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 **U**niversity **R**anking by **A**cademic **P**erformance (**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 is a non-profit research laboratory whose members voluntarily participate in the development of rankings. 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 2016, the field rankings were extended to 41 scientific fields of research based on the Australian and New Zealand Standard for Research Classification[1]. The reason for this expansion is the frequent requests from URAP users and colleagues for more detailed sub-field coverage in the URAP World Field Rankings.

The most recent version of the world ranking was announced on October 14th, 2016, during the Fourth URAP International Symposium. 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 3,500 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 3,500 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.

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. All bibliometric data used in the URAP ranking were gathered from the InCites™ database of Clarivate Analytics (formerly Thomson Reuters IP & Science division). Both quality and quantity of publications and international research collaboration performance are used as indicators. The indicators and the duration of coverage are summarized in Table 1 below.

Table 1 URAP indicators for the general ranking of world universities

Indicator	Objective	Coverage
Article	Scientific Productivity	2015
Citation	Research Impact	2011-2015
Total Documents	Scientific Productivity	2011-2015
Article Impact Total	Research Quality	2011-2015
Citation Impact Total	Research Quality	2011-2015
International Collaboration	International Acceptance	2011-2015

Further descriptions of these indicators are provided below:

[1]http://www.abs.gov.au/Ausstats/abs@.nsf/Latestproducts/4AE1B46AE2048A28CA25741800044242?opendocument

Number of Articles is a measure of current scientific productivity, which includes articles published in 2015 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 InCites™ database, including conference proceedings, book chapters, reviews, letters, discussions, scripts in addition to journal articles published during 2011-2015. 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 2011-2015. 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 41 subject areas[2] between 2011 and 2015. 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 41 fields, which is summarized in the following formula:

$$AIT = \sum_{i=1}^{41} \left(\frac{CPP_i}{CPP\_World_i} \right) * Articles_i$$

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 41 subject areas between 2011 and 2015. 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 41 fields, which is summarized in the following formula:

$$CIT = \sum_{i=1}^{41} \left(\frac{CPP_i}{CPP\_World_i} \right) * Citations_i$$

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 universities abroad, is obtained from InCites™ for the years 2011-2015. The weight of this indicator is %15 in the overall ranking.

[2] The 41 subject areas used in the calculation of AIT and CIT indicators are based on Australia ERA FoR Level 1 and 2 subject categories provided in InCites™

Data Collection

Data is gathered from the InCites™ bibliometric data analytics service[3], which provides institutional level data obtained from the Web of Science database. 5914 HEIs in the InCites database were first filtered to identify those HEIs offering four-year undergraduate degree programs. 3556 such HEIs were identified, where 2442 of them published 50 or more papers in the year 2015. The data for these 2442 institutions were processed and 2000 of them were ranked to produce this year's URAP World Ranking. Field based bibliometric data is also obtained through InCites™. The 41 fields used in the ranking are based on the discipline classification matrix developed by the Australian Research Council for journals indexed in Web of Science[4]. In accordance with the previous year's ranking, articles published in collaboration with CERN 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

Discussion

Starting in 2013 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 has 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 3462 citations as of October 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 3286 citations in the past 5 years. A more recent paper published in 2015 titled "Combined Measurement of the Higgs Boson Mass in pp Collisions at root s=7 and 8 TeV with the ATLAS and CMS Experiments" includes

[3] http://researchanalytics.thomsonreuters.com/incites/

[4] http://www.arc.gov.au/sites/default/files/filedepot/Public/ERA/ERA%202015/ERA_2015_Discipline_Matrix.pdf

5154 authors from 499 different institutions, which have already accrued 119 citations since its publication in 2015.

The number of such articles especially increased in high-energy physics in the past year, together with the increase in citations for the other highly cited papers published by multi-author groups such as CMS and ATLAS at CERN. Such articles constituted 10% or more of the total article output (max:80%, median:17%), and 30% or more of the total citations (max:97%, median:49%) for 126 of the 2442 institutions processed in this year's URAP ranking. Moreover, among the 773 institutions affiliated with CERN, the percent of CERN related articles and citations constituted less than 3% of the total output. Therefore, the impact of these special articles on the ranking has grown further for about 100 institutions. For this reason, articles affiliated with large groups within CERN are excluded from this year's URAP World Ranking in order not to cause an unfair advantage to these 126 institutions. Although this adjustment implies the removal of some publications with far less number of authors than typical CMS or ATLAS papers, the adjustment primarily influenced those institutions that obtained a larger percentage of their total article and citation counts from CERN publications.

Other ranking systems such as QS and THE have made similar adjustments to mitigate the unfair advantage brought by multi-author publications. For instance, The THE ranking first decided to eliminate articles with 1000 or more co-authors in 2015, and then employed a fractional counting method to include such papers in their most recent ranking. In the 2016 ranking, THE also replaced their citation per publication (CPP) based impact indicator, since such indicators are highly sensitive to the presence of outlier cases like CERN publications, especially for those institutions that get the majority of their articles and citations due to their CERN affiliation.

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 slot in the following year due to changes in ranking indicators and inclusion/exclusion criteria. Such deviations are more likely to occur in ranking systems that rely on CPP and survey based indicators, which makes it difficult to make valid judgments about the position of that university among other world universities. For that reason, the URAP World Ranking is based on solely bibliometric indicators that aim to balance total 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, Asst.Prof.Dr. Murat Perit Çakır, Asst.Prof.Dr. Cengiz Acartürk, Dr. Serkan Alkan, Oğuzhan Alaşehir, Buket Aran, Fatih Ömrüuzun, Murat Koçak, İlker Koç, Çağatay Taşcı, Ece Çağlayan, Elif Akça and Ali Kantar for their contributions to this work.

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