

## **The importance of research in university's webometric ranking: UNIOSUN case study**

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### **Abstract**

**Objective:** Cybermetrics or webometrics is an emerging discipline concerned with the quantitative analysis of the internet and web contents related to ranking of the World Universities which from an academic and scientific point of view are very important and informative. The aim of the study is to elucidate the role of research in the webometric ranking of Universities.

**Methods:** A review of literature was conducted.

**Results:** Websites are the most efficient and cheapest way for boosting all the three academic missions: teaching, research and technology transfer. Web indicators are used for ranking purposes; they are not based on number of visits or page design but on the global performance and visibility of the universities. The current composite indicator include impact variable (50%) based on link visibility of the University and web activity (50%) on a ratio 1:1. The activity variable comprises of web presence, openness and excellence. Clearly, the research mission plays a central role in the definition of World-class university status; academic papers published in high impact international journals are very important in the ranking. Many indicators serve the purpose of ranking, but most observers know that research matters more than anything else in defining the best institutions.

**Conclusion:** A large web presence is made possible only with the effort of a large group of authors. All academic staff should be involved in quality research activities. Availability of infrastructure, scientific collaborations at all levels are most important in increasing the capacity of scientific productivity and visibility which are the major components in ranking.

**Keywords:** Research, role, webometrics, UNIOSUN, universities.

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# **L'importance de la recherche dans le classement de l'université webometric: UNIOSUN étude de cas**

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## **Résumé**

**Objectif:** Cybermetrics ou webométrie est une discipline émergente concerné avec l'analyse quantitative du contenu Internet et Web liés à classement des universités mondiales qui, d'un point de vue académique et scientifique sont très important et instructif. L'objectif de l'étude est d'élucider le rôle de la recherche dans le classement webometric des universités.

**Méthodes:** Une revue de la littérature a été effectuée.

**Résultats:** Les sites Web sont le moyen le plus efficace et le moins cher pour stimuler tous les trois missions académiques: enseignement, recherche et transfert de technologie. indicateurs de Web sont utilisés aux fins de classement; ils ne sont pas basés sur le nombre de visites ou de la conception de page, mais sur la performance globale et la visibilité des universités. L'indicateur de courant composite comprend une incidence variable (50%) sur la base du lien visibilité de l'Université et de l'activité de bande (50%) à un rapport 1: 1. La variable d'activité comprend de présence sur le web, l'ouverture et l'excellence. De toute évidence, la mission de recherche joue un rôle central dans la définition du statut d'université de classe mondiale; documents universitaires publiés dans des revues internationales à fort impact sont très importants dans le classement. De nombreux indicateurs ont pour but de classement, mais la plupart des observateurs savent que la recherche est plus important que toute autre chose dans la définition des meilleures institutions.

**Conclusion:** Une grande présence sur le web est rendue possible que par l'effort d'un grand groupe d'auteurs. Tout le personnel académique devrait être impliqué dans des activités de recherche de qualité. Disponibilité de l'infrastructure, des collaborations scientifiques à tous les niveaux sont les plus importants dans l'augmentation de la capacité de la productivité scientifique et la visibilité qui sont les principaux composants dans le classement.

**Mots-clés:** recherche, le rôle, webométrie, UNIOSUN, universités.

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## INTRODUCTION

A new discipline called Cybermetrics or Webometrics is emerging and it is concerned with the quantitative analysis of the materials that are on the internet and Web especially material contents that deal with the processes of generation and scholarly communication of scientific knowledge. The term webometric is formed by combining two words, "web" and "metric." The word web is a short form of World Wide Web. Web is defined by the Dictionary of Science as: "a hypermedia system...that allows users to view and retrieve information from "documents" containing links\*, while metrics deals with counting or measurement. Furthermore, metrics is defined by Webster's Comprehensive Dictionary of English Language defined as "the mathematical theory measurement." Webometric therefore describes measurement of web resources in mathematical value and the extent of Web usage for research. Since the web allows documents to be linked together, the measurement of these links forms the fabrics of webometric (1). The National Universities Commission's (NUC) definition of webometric used the web characteristics or presence on the Internet as yardsticks (2).

Until recently, many websites of even distinguished institutions were small, devoid of much relevant information and added value but this has changed and the top-level universities now are having large websites which are exhibiting large volumes of published pages produced by their departments, research teams and scholars. More and more scholars are turning to the internet to find scientific information and academic institutions are devoting more and more resources to improving their presence on the web. It is therefore of paramount importance to take into consideration web publication not only as a primary tool for scholarly communication but as a true reflection of the overall organization and performance of universities/research centers.

Given the huge and diverse audiences that web contents could reach even in developing countries at a very modest cost, enhancing also the social role of the scientists; the academic web is a global source of expertise and also a means of communicating scientific and cultural achievements (3). The impact of electronic publications is far larger than that obtained by traditional journals and books on paper. Websites are the most efficient and cheapest way for boosting all the three academic missions: teaching, research and technology transfer. A website has been described as a sort of window into how an organization operates.

### Historical Perspectives

The concept and idea of ranking universities began in the middle ages. Then classification of universities into ranked categories resulted naturally from competition for scholars and funding; however the institutional ranking system existing now was yet to be merged. Recently, there was development of different types of ranking methods (4):

Times Higher Education-QS Ranking (5) - The rankings published jointly by Times Higher Education and Quacquarelli Symonds (QS) between 2004 and 2009 is referred to as Times Higher Education-QS World University. After the dissolution of their collaboration, the methodology for these rankings continued to be used by its developer Quacquarelli Symonds under a new name; the QS World University Rankings. Then in 2010, a new partnership was formed between Times Higher Education and Thomson Reuters with another ranking methodology. This is now known as the Times Higher Education World University Rankings.

Academic Ranking of World Universities (ARWU) (6) - This is also referred to as Shanghai Ranking. It is published annually by Shanghai Ranking Consultancy. The

Shanghai Jiaotong University originally compiled and issued the league table in 2003. This was the first global ranking with multivarious indicators. The publication is now made up of the world's overall and subject league tables, the Independent regional Greater China Ranking and Macedonian Higher Education Institutions (HEIs) Ranking. ARWU's strong point is its objective methodology and alongside QS World University Rankings and Times Higher Education World University Rankings, the three form the most influential and widely observed university measures.

Professional Ranking of World Universities (7) – This was started in 2007 by "École nationale supérieure des mines de Paris" and it utilizes only a single indicator- the number of alumni holding a post of chief executive officer or equivalent in one of the 500 leading international companies as reported in Fortune Global 500.

Newsweek Ranking - This was started in August 2006 by Newsweek, the American weekly news magazine. It is called the "Top 100 Global Universities". The criterion used is the combination of selected indicators from two rankings (Academic Ranking of World Universities by Shanghai Jiao Tong University and the Times Higher Education), plus the addition of library holdings (number of volumes).

Performance Ranking of Scientific Papers for World Universities (8) – This began in 2007. Bibliometric methods were utilized to analyze and rank the scientific papers of the top 500 universities in the world in its production by the Higher Education Evaluation and Accreditation Council of Taiwan.

#### Webometric Ranking

This will be the focus of this paper. It is also known as Ranking Web of Universities. This ranking system utilizes a

composite indicator that incorporates the volume of the Web contents (number of web pages and files) and the visibility and impact of these web publications according to the number of external in-links (site citations) they received. The Cybermetrics Lab, a research group of the Spanish National Research Council- Consejo Superior de Investigaciones Científicas (CSIC) located in Madrid is the publisher. Since 2004, the Ranking Web publication is bi-annually (January and July), covering thousands of Higher Education Institutions worldwide (9,10).

From an academic and a scientific point of view, the webometric rankings of World's top Universities and Research Centers are very important and informative. Since Web presence is a measurement of the activity and visibility of the institutions, it serves as a good indicator of the impact and the prestige of Universities/Research Centers. Ranking summarizes the global performance of the Universities/Research Centers and showcases their commitment to the dissemination of scientific knowledge. Thus it is a veritable source of information for potential students, patients, researchers, physicians, managers, scholars and citizens in general. On the other hand, it has been muted that the lack of visibility on the web is leading to a worrying level of academic digital divide (11, 12).

Web publication is however frequently questioned for the quality of the contents, not taking into account that besides research results published in prestigious journals, the same authors develop a wide range of activities reflected on the web pages. Teaching materials, raw data, drafts, slides, software, bibliographic or link lists are also relevant and inform about the commitment of professors to their students. The structure, composition, and all kinds of administrative information provided by the institution itself are very valuable. When this information is made publicly available through the web, it

speaks of the high academic level of the university. The web is providing a comprehensive way to describe this wider range of activities where scientific publications are only one of components to be found on a website (11). A strong web presence informs of a wide variety of factors that are clearly correlated with the global quality of the institution; widespread availability of computer resources, global internet literacy, policies promoting democracy and freedom of speech, competition for international visibility or support of open access initiatives etc. Other ranking methods based their

categorization on only a few relevant aspects, especially research results, but web indicators based ranking reflects better the whole picture because it incorporates many other activities of professors and researchers as shown by their web presence. The Web covers both the formal (e-journals, repositories) and the informal scholarly communication. Web publication is cheaper, can reach a much larger audience, offers access to scientific knowledge to researchers and institutions located in developing countries and also to third parties (economic, industrial, political or cultural stakeholders) however it is not always easy to maintain high standards of quality of peer review processes. The Webometrics ranking has a larger coverage than other similar rankings (Table 1).

**Table 1: Comparison of the Main World Universities' Rankings**

CRITERIA	WR (webometrics)	ARWU (Shanghai)
Univ's Analyzed	15000	3000
Univ's Ranked	5000+	500
Quality of Education		Alumni Nobel & Field 10%
Internazionalization		
Size	Web Size 20%	Size of Institution 10%
	Rich Files 15%	Nature & Science 20%
Research Output	(Google) Scholar 15%	SCI & SSCI 20%
Impact	(Link) Visibility 50%	Highly Cited Res'ers 20%
Prestige		Staff Nobel & Field 10%

Source: [www.webometric.info](http://www.webometric.info)

The webometric ranking reflects better the global quality of the scholars and research institutions worldwide because its criteria are not only focused on research results but also on other indicators. Web indicators are very useful for ranking purposes as they are not based on number of visits or page design but on the global performance and visibility of the universities. Webometric ranking can be equated to the quality of education provided in the institution and its academic prestige.

### **The aims of the Webometric Ranking of World's Universities**

The initial aim of the ranking is to promote web publication and thereby support Open Access initiatives giving electronic access to scientific publications and to other academic material that otherwise will be inaccessible. The encouragement and motivation of institutions and scholars to have a web presence that reflects accurately their activities are part of the intended objectives of the webometric ranking (13). However, if the web performance of an institution is below the expected position according to their academic excellence, it is advised that university authorities reconsider their web policy, and revise it towards promoting a substantial increment in the volume and quality of their electronic publications.

### **The importance of Web presence for universities**

Increment in the mobility of professors and alumni, international competition for human resources and funding, prestige and visibility in the digital world are dividends of a strong web presence in the new academic global market. Web is the best showcase for Universities; all missions (teaching, research, transfer of technology and knowledge) are covered. It leads to freedom of teaching, self-organization and maturity, access to

resources in the form of formal and informal scholarly publications and ultimately the universal target groups; peers and colleagues, prospective students, investors and economic stakeholders globally are made aware of the universities presence.

### **METHODS**

The factors used by the Cybermetrics Lab in the Webometric ranking of the Worlds universities include metrics such as web size, rich files, Google Scholar and link (visibility). Webometrics theoretical and practical aspects are strongly rooted in those from bibliometrics, where major tool is citation analysis. Similarly, link analysis is a powerful tool for designing a composite indicator that can describe overall performance of the institution. The model is built on a ratio 1:1 between activity, the volume of information provided by the institution in its websites, and visibility or impact, a virtual referendum among third-party webmasters about the quality and interest or usefulness of the university web contents. For descriptive purposes this ratio 1:1 is expressed as weighting percentages of 50%:50% in the composite indicator building. Figure 1 shows the composite indicator model of the ranking web.

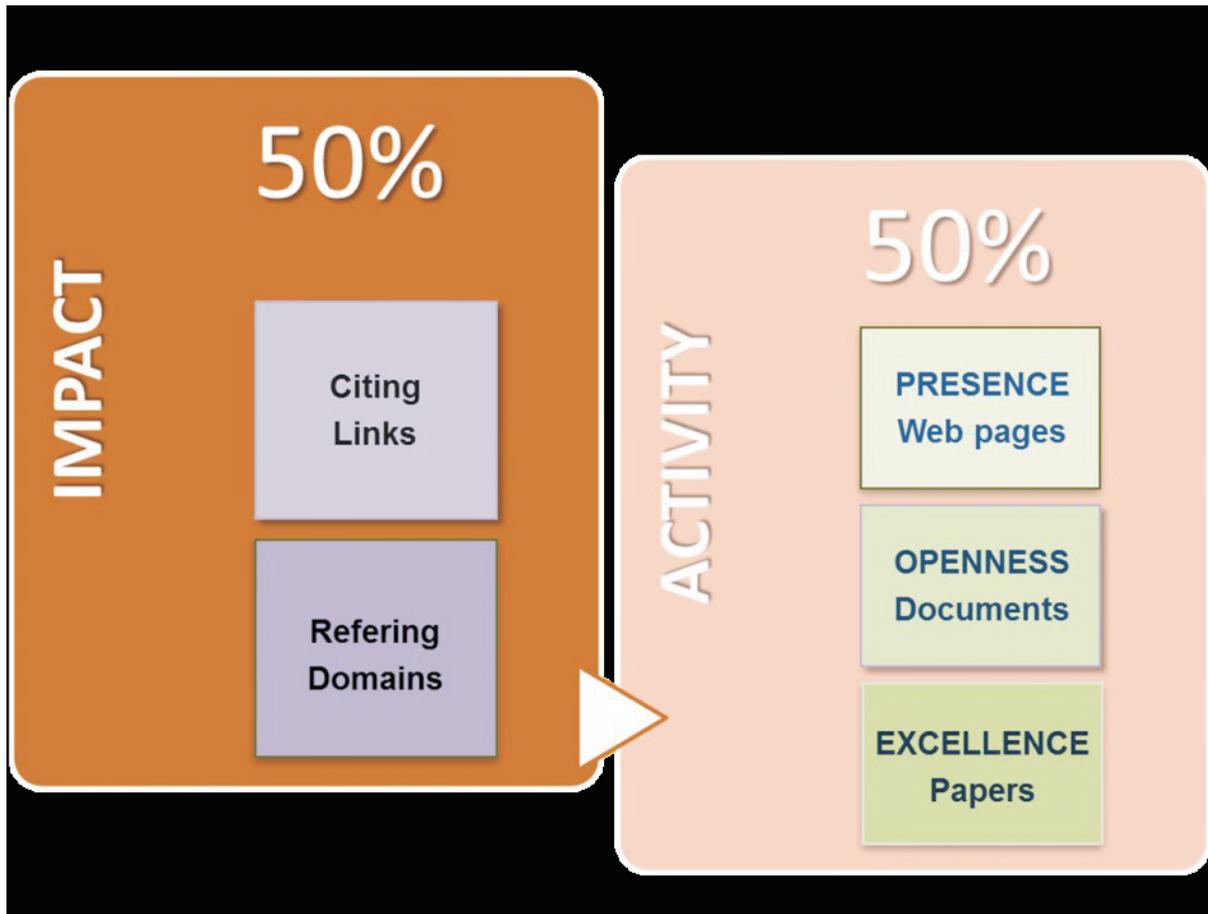


Figure 1. Composite indicator model of the ranking web.

### **Composition of the current composite indicator (14). Visibility (50%)**

**IMPACT** - The Impact variable (50%) is based on link visibility. This considers that a third party links to the main institutional one or a specific webpage recognizes the qualities of the organization or the contents provided. Link visibility (number of links) is a far more powerful indicator than popularity (number of visits) that apart from being strongly correlated with size cannot be derived from an informed decision. Counting links coming from huge audiences allow a "virtual referendum", where the institutional prestige, the academic performance, the value of the information, and the usefulness of the services are satisfying the criteria of millions of web editors from all over the world. The link visibility data is collected from the two most important providers of this information: Majestic SEO and ahrefs. Both use their own crawlers, generating different databases that should be used jointly for filling coverage gaps or correcting mistakes. The procedure involves extracting both total number of external in links (also called backlinks) and the number of webdomains that are the origin of these links (referring domains) from each source. For avoiding strong interlinking from local sources (pseudo-external domains for/from sports, clubs, blogs, city...) or gaming the system contracting link farms, the 10 top linking domains and their corresponding backlinks are excluded. The final indicator is obtained from the product of square root of the number of backlinks and the number of domains originating those backlinks (favoring link diversity). This is a light version of the Google PageRank algorithm. The maximum of the two sources for each university is finally chosen, this is the impact indicator. All the variables are log-normalized for avoiding problems linked to power-law distributions, common to other rankings.

### **Activity (50%)**

Regarding activity, counting web pages is insufficient for reflecting the diverse nature of the contents, as the different missions should not have the same relative importance. Clearly, the research mission is playing a central role in the definition of World-class university status, but an indicator is needed that includes not only research intensive institutions. This was solved using two different levels of research evaluation; one taking into account the amount of scientific output that was openly available (valid for about 90% of the institutions) and the other recognizing only research excellence (with values larger than zero for about 25% of the population). The current composition (July 2014) of the activity section (50%) consists of three indicators whose sources, calculation methods and weighting is described below:

#### **Presence**

The web presence is measured by the total number of web pages hosted in the main web domain (including all the sub domains and directories) of the university according to how they are indexed by Google which is the largest commercial search engine. It counts every webpage, but excludes the rich files (file types like pdf, doc, docx, ppt, pptx, ps or eps) so as not to overlapping with Openness indicator. A strong web presence can only be achieved if everybody in the organization contributes towards its actualization because the top contenders are already able to publish millions of webpages. The weighting is 1/3 corrected to 15%.

#### **Openness**

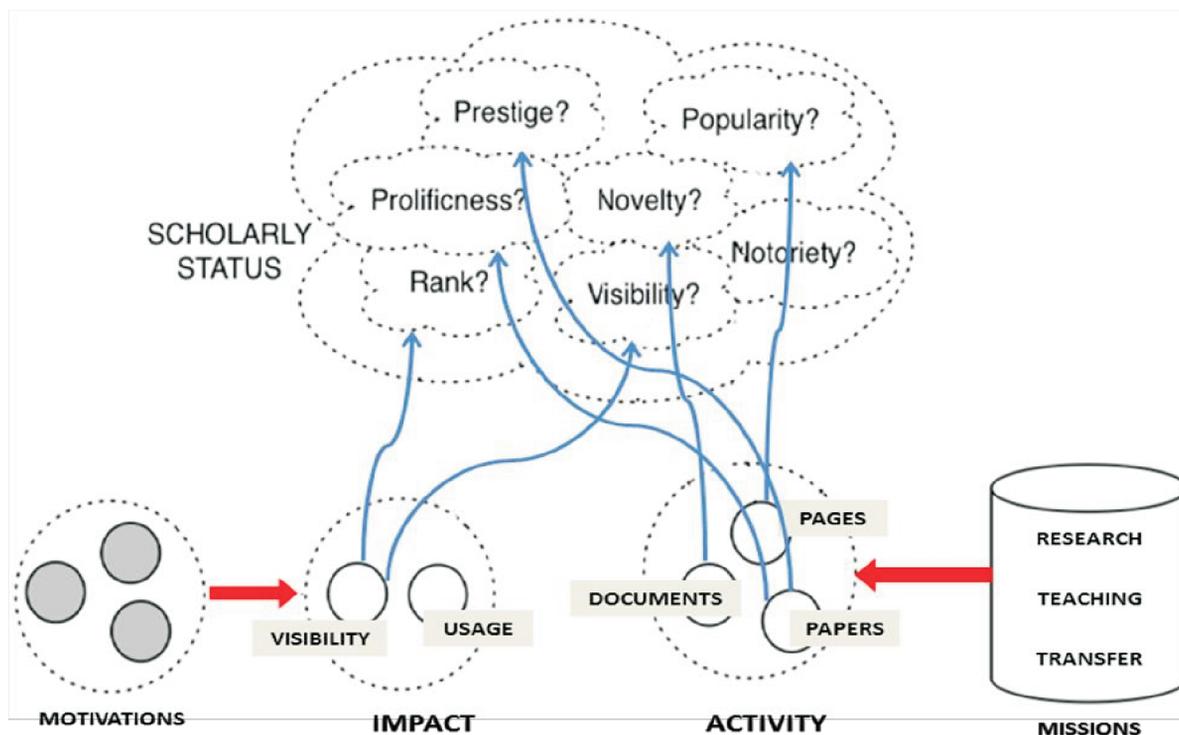
This indicator takes into account the number of files in Google Scholar, the largest academic search engine (over unique 160 million records) thus recognizing the global effort to set up institutional research repositories. The factors considered are the total files records and those files with

correctly formed file name (for example, the Adobe Acrobat files should end with the suffix.pdf). There are two components, the total number and the recent publications, those published between 2009 and 2013 in order to increase the deposit rate. The weighting is 1/3 corrected to 15%.

publications (that is the university's scientific output is taken as part of the 10% most cited papers in the respective scientific fields and not the total number of papers published. The weighting is 1/3 corrected to 20%.

**Excellence**

The hallmark of excellence in ranking of universities are academic papers published in high impact international journals however, the indicator is restricted to only the excellent



**Fig 2. Webometrics ranking model**

**The importance of research in University's webometric ranking**

The importance of research cannot be over-emphasized. The power of research is in its empirical nature; research generates hard data on which policymakers can rely to take informed evidence-based decisions. Furthermore, good research produces results that are innovative and that can be applied to real-world situations to solve society's problems. This is the main impact of research on society, affecting the lives of the common man and giving solutions, innovations and engendering evidence based policy decisions. It is a fact that many indicators serve the purpose of ranking universities, but most observers know that research matters more than anything else in defining the best institutions (15). Literature also confirms that overall globally, university rankings reflect university research performance far more accurately than teaching (16). An examination of the criteria used in the THE ranking of the top 100 institutions in a comprehensive survey of BRICS and Emerging Economies countries conducted by the highly-regarded Times Higher Education (THE) (Thompson-Reuters) in 2014 showed that research played a dominant role (about 60%) in the ranking process as shown by the contents of the metrics which were a set of 13 performance indicators grouped into five areas follows; Teaching: the learning environment, Research: volume, income and reputation, Citations: research influence, Industry income: innovation, International outlook: staff, students and research (17). Furthermore, in its analysis of the performance of Nigerian universities on the Top world universities ranking, listed the following factors as being responsible for the poor performance recorded for Nigerian universities; scanty attention paid to presenting findings of research conducted by scholars in Nigerian universities in a web-searchable form which manifests in the form of publishing in low impact local journals

without Internet links, lack of publication in electronic journals, absence of Nigerian universities on the Internet in a form that can be picked by the radar of Cybermetric Research Group, and lack of up-to-datedness and scanty content of the websites of Nigerian universities (2). A large web presence can be achieved only with the effort of a large group of authors, therefore encouraging and empowering a large proportion of staff, researchers or graduate students to be potential authors is vital.

**CONCLUSION**

Many indicators serve the purpose of ranking, but most observers know that research matters more than anything else in defining the best institutions. A large web presence is made possible only with the effort of a large group of authors. All academic staff should be involved in quality research activities. Availability of infrastructure, latest ICT, scientific collaborations at local, national and international levels, presence of all academic staff members on sites like Research gate and Google Scholar Citation are most important for increasing the capacity of scientific productivity and visibility which are the major components in ranking.

**Recommendations**

All academic staff should be encouraged to imbibe a vibrant research culture and publish the results of such in reputable visible high impact outlets. Mentorship in this regard of the junior cadre should be seen as a responsibility of every senior member of the academic staff. The ICT department of the university should conduct and publish researches evaluating UNIOSUN's website in regards to its visibility, presence, openness and excellence and personal websites of academic staff members, the comprehensiveness of the websites, schedule of up-dating, and the integration of their domain names. An

improvement in the visible research output of the university can be enhanced considerably by improvement in the provision of teaching and research facilities. Subscription to sites such as Researchgate, LinkedIn and Google Scholar Citation by all academic staff will also ensure more visibility.

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