Qualitative and Quantitative Methods in Libraries (QQML) Special Issue
Bibliometrics and Scientometrics: 161- 169, 2015

New questions arise: are bibliometric indicators adequate for evaluating the scientific production of the Social Sciences and Humanities?

Maria João Pinto and Sofia Fernandes

Library and Information Management – Porto | Catholic University of Portugal

Abstract: This study aims to examine the criteria and bibliometric indicators in the evaluation of scientific production and determine the appropriateness of these within the Social Sciences and Humanities.
In an international context, higher education institutions, research centers and groups and funding agencies plan to evaluate qualitatively and quantitatively the scientific production from all areas based on the same indicators.
In fact, scientific areas differ from their nature, publication types to the geographical area in publishing, among other factors. Furthermore, standardization of criteria and indicators for general unique and all scientific truth may not reflect the results of research and publication of each area.
This article collects and analyzes the criteria and indicators for evaluating qualitative and quantitative effects. On the other hand, it makes a collection of information published on the application of this model to evaluate the areas of Social Sciences and Humanities.
We sought to information published by information professionals dedicated to the evaluation of scientific literature and also reports and pronouncements of research centers and higher education institutions. Based on a survey of published information in this area, we tried to identify possible shortcomings of this evaluation model, these areas specifically.
Only with an understanding of research and publication in its field, it may be possible to refute the assessment model in place and also consider the possibility and feasibility of presenting a proper assessment model. This is a necessity in the Humanities and Social Sciences that is demonstrated in the literature.

Keywords: Bibliometric Indicators, Scientific Evaluation, Social Sciences, Humanities, Quality, Productivity, Impact.

Received: 11.4.2013 Accepted: 3.1.2014 ISSN 2241-1925

1. Introduction

Currently, bibliometric indicators and science evaluation issues are in the spotlight by the need to quantify the results of research activities and monitor the progress of science.

An international context, funding agencies, higher education institutions, research centers and groups intend to evaluate qualitatively and quantitatively the scientific production from all areas based on the same indicators. However, the areas of Sciences (Natural and Exact) have not objected to the evaluation model but the social sciences, arts and humanities have been expressing that's a model not appropriate or possible to be applied to the scientific production in this field .

Furthermore, standardization of criteria and indicators for general unique and all scientific may not reflect the true results of research and publication of each area.

The indicators used are, mainly, the citations and the Impact Factor of Web of Knowledge – Thomson Reuters.

2. Science Evaluation

The idea of evaluating the science dates back to the seventeenth century in which it appears citation analysis (Okubo, 1997). In 1926, Lotka's Law is formulated with the intention of studying the productivity of scientists. Ten years after, Otlet creates Bibliometrics, popularized only in 1969 with Pritchard (Araújo, 2006; Okubo, 1997). However, the first citation index is created by Eugene Garfield, founder of the Institute for Scientific Information (ISI), in 1963 (Gevenois & Durieux, 2010): Science Citation Index (Chapula-Macias, 1998). The concepts of Scientometrics and Infometrics appear in literature in 1977 and 1979 by Nacke and Braun, respectively (Araújo, 2006). Since then, countries around the world gradually felt the need to analyze their science, technology and economic as regards the production of Science (Bana e Costa & Oliveira, 2012; Chapula-Macias, 1998).

In the current and global context, due to economic influences and competitive development, the importance of transparency and accountability in measuring, presenting the results and the quality of scientific activities has become essential for support of scientific production (Bana e Costa & Oliveira, 2012). And this need to monitor the quality and impact of science manifested itself in a larger effort within the quantitative studies on science (Beard, 2003). The undeniable evolution of the systems and scientific and technological channels reinforced the need to improve data quality and implement indicators to characterize the scientific system with respect to its outputs (Agapito, 2012; Narin & Hamilton, 1996).

The bibliometric studies, considered as the primary tool available to the review

of Science, are used by colleges and institutions of higher education, research centers, institutional government and funding agencies (Bana e Costa & Oliveira, 2012; Goudard & Lubrano, 2010; Chapula-Macias, 1998; Moed, Burger, Frankfort, & Van Raan, 1985; Narin & Hamilton, 1996) to characterize and demonstrate research results, and, also, support decision making. The use of bibliometric studies looks for the career development of researchers by measuring performance and responding to the needs of forecasting and strategic planning guidelines in the investigation. Moreover, its application is intended to support the allocation of human and material resources. However, its main focus is to promote the recognition and scientific merit and to measure the impact of the institution through rankings.

Many research centers are evaluated according to the bibliometric indicators for funding. Evaluation results dictate values financing for research (Engels, Ossenblok, & Spruyt, 2012).

3. Bibliometric Indicators

Bibliometrics is the main tool to measure quantitatively and qualitatively Science and is accepted internationally in reports and studies, in particular usage examples mentioned above (Beard, 2003; Zitt, 2005). The Bibliometrics is composed of a set of mathematical and statistical methods used in formulas and graphs that aim to analyze and measure the quantity and quality of scientific publications (Beard, 2003; Glanzel, 2003).

Bibliometric indicators come in a more meaningful and generally accepted form, the multidisciplinary bibliographic databases Web of Science, the Institute for Scientific Information (ISI) Web of Knowledge (WoK), owned by Thomson Reuters (Evidence, 2007; Glanzel, 2003).

In fact, the indexing articles in this database in particular is, increasingly, the main requirement of funding agencies and centers (Engels, Ossenblok, & Spruyt, 2012).

The bibliometric indicators are increasingly discussed for their exclusive use because of several limitation and exclusion factors of important data in the studies conducted for the assessment of research in all scientific areas. There are primarily three types of bibliometric indicators: quantitative, qualitative and collaboration. This article discusses the main and most used types of indicators.

The bibliometric indicators for quantitative studies seek to demonstrate the productivity of researchers, research centers and institutions. These indicators account for the number of publications for researchers to reflect the products Science (Chapula-Macias, 1998). The accounting of works of researchers is the leading and most widely used bibliometric indicator (Beard, 2003; Narin & Hamilton, 1996). For comparative purposes, in the case of groups and research

centers, should be taken into account the number of researchers and the time period, along with the number of publications.

These publications can be accounted for in accordance with the kind of document: scientific article, review article, books, reports, conference abstracts, etc.. (Glanzel, 2003). Typically the document type is the most recorded of scientific papers (Narin & Hamilton, 1996). This type of indicator can measure all the articles of a researcher, research group or an institution.

The quantitative bibliometric indicators can be more specific and refer to the number of articles published in national and international journals, in journals with peer review, or even in journals indexed in WoK with attribution of Impact Factor. These more specific quantitative methods, related to the characteristics of the journals in which articles are published, are a form of bring some qualitative value and meaning to this quantitative indicator (Gevenois & Durieux, 2010, Evidence, 2007).

The qualitative indicators intend to reveal the qualitative performance of research results and thus the impact of science produced (Araújo, 2006; Gevenois & Durieux, 2010; A. Nederhof, Van Leeuwen, & Tijssen, 2004). These indicators count the number of citations of the publication: the number of times which others have looked for a particular work and used in the production of other: the impact. The author of the cited work gets recognition in the scientific and demonstrates its performance (Gevenois & Durieux, 2010). This is one of the most widely recognized and used in research (Glanzel, 2003).

From the citations of papers, the journals indexed in WoK acquire a certain Impact Factor (IF), available for the same query in the Journal Citation Reports (JCR). The JCR is a tool provided by ISI that presents bibliometric information about journals through citations of articles also indexed in WoK. The accepted journals are presented as "top journals" (Garfield, 2003; Testa, 2006). The bibliometric indicators related to collaboration are used to enable the recording of co-authorships and analysis of collaborative networks, nationally and internationally. You can also obtain data and knowledge of collaborations between countries, institutions and between research groups.

4. Analysis on the Application of Bibliometric Indicators in the Social Sciences and Humanities

According to the bibliography, there is already awareness of the implementation of this model in scientific assessment of the social sciences and humanities and its implications. In fact, several authors and organizations have already expressed that the application of these bibliometric indicators not only meets the needs of the evaluation of scientific production (Engels, Ossenblok, & Spruyt, 2012; Evidence, 2007; A. Nederhof, Zwaan, De Bruin, & Dekker, 1989). In fact, there are studies that present alternative proposals (Linmans, 2010), and others that describe the need and creation of an appropriate information system

to aggregate the scientific production of these areas so that you can extract data (Engels, Ossenblok, & Spruyt, 2012).

In fact, in 1980, Garfield warned that the Social Sciences and Humanities differ in several aspects of Sciences (Umut, Sahiner, & Dazed, 2006). In fact, Garfield created the system to the Science Citation Index in 1979 led to the Sciences (Nederhof A. Van Leeuwen, & Tijssen, 2004). The ISI provides currently the Social Science Citation Index and Arts & Humanities Citation Index but despite the effort involved to cover these areas, the scope is very limited given the diversity of these publications (Evidence, 2007; Katz, 1999).

In fact, the coverage of journals, particularly European ones, is very limited (AJ Nederhof, 2006) In this sense, it is not adequate to only use the number of papers indexed in ISI to weave any type of evaluation. The Social Sciences and Humanities have a specific behavior in publishing facing Sciences (Umut, Sahiner, & Dazed, 2006).

One of the biggest differences lies in respect of Sciences publication type. In this area, the great results of investigation are scientific articles, while in the Social Sciences and Humanities are books (authored chapter, editing, and organization) and other more traditional publishing (Evidence, 2007; Katz, 1999; Umut, Sahiner, & Dazed, 2006).

Nevertheless, the effort by the ISI has been recently shown by also responding to this need by providing the Book Citation Index Social Sciences & Humanities, this coverage is still very limited. These areas also have articles published but, in some areas of these disciplines, the publication focuses mostly on national magazines, not covered by the ISI. Other disciplines have articles published in magazines or unscientific means more informal because, unlike Sciences researchers they seek to disseminate knowledge to the general public and not to a specialized community (Research Information Network, 2009).

Some disciplines study the same subjects locally (by country) without worrying in disclosing the results internationally, as the case law or political science, for example (Research Information Network, 2009). Due to the use of an evaluation model based on generalized bibliometric indicators of ISI, in recent years there has been a considerable increase in publications in journals, mostly indexed in ISI and FI (Archambault & Gagné, 2004; Engels, Ossenblok, & Spruyt, 2012).

The language issue is discussed in all studies as a major disadvantage to the Sciences. The ISI provides publications mostly in English, at least the bibliographic information (Gantman, 2012; González-Alcaide, Valderrama-Zurián, & Aleixandre-Benavent, 2012).

The fact that the Social Sciences and Humanities publish in national magazines and in their own language are consistent with the objective of these, from the

standpoint of reach to the target audience and the orientation of their research (AJ Nederhof, 2006). However, it becomes almost a hindrance to the indexing of these publications in ISI publications comprising preferably in English language and framework / international interest.

Besides the reasons mentioned above and that apply equally on the language issue, there is the fact that some disciplines study and publish on the language itself, in the case of Languages and Literature (Research Information Network, 2009).

Another relevant difference in behavior in relation to these areas Sciences resides in quotes (Moed, Burger, Frankfort, & Van Raan, 1985). On the one hand, researchers Sciences and Humanities have different habits quote: quote less. Moreover, mentioning materials such as books and other publication (similar to that publish). So cite less and receive fewer citations (Engels, Ossenblok, & Spruyt, 2012). And the citations are not counted as out of the usual pattern of citations in journals, an indicator widely used in bibliometrics.

With respect to books, although it should be noted that the time that a book needs to get quotes is far superior to periodicals. Still regarding citations, another specific feature of these authors is the average age of the references of its publications (AJ Nederhof, 2006). In fact, the use of references old "reference works" is much more frequent than in the Sciences, which explains somehow the pace and frequency of citations in these areas (Umut, Sahiner, Dazed & 2006).

One of the features that sometimes identify scientific areas of Arts, Humanities and Social Sciences is the fact that they have fewer publications. This is one of the aspects relevant to this analysis because this distinction in the face of science is not very significant, but it exists. Moreover, if we analyze again the type of publication of these areas, we realize that often the time of preparation of a monograph is superior compared to articles (Nederhof A. Van Leeuwen, & Tijssen, 2004). Yet, as already stated, the time it takes a book to be edited and published is much higher than if the articles.

However, information from studies that analyzed the total of its publications in these areas holistically, these researchers concluded that not necessarily publish less than researchers Sciences (Katz, 1999; A. Nederhof, Van Leeuwen, & Tijssen, 2004).

However, the smaller number of publications is consistent with that of research groups are often smaller, with less elements. When comparing research groups, the number of posts should be calculated taking into account the number of each group of investigators (Nederhof A., Van Leeuwen, & Tijssen, 2004). One of the more specific features of the authors of the social sciences and

humanities is that publishing with single authorship, without recourse, for the most part, to the participation of co-authors (AJ Nederhof, 2006; Umut, Sahiner, Dazed & 2006).

5. Conclusions

The review of Science, with regard to productivity and efficiency / utility early on it was understood as necessary. The creation and development of bibliometric indicators, along with the ability to create technological tools that could register the scientific, made this credible and tangible goal. The scientific assessment model is based on force, in most cases, the bibliometric indicators provided by bibliographic databases of ISI and JCR. This model is being implemented in all areas of science, despite being widely discussed by the limitations of bibliographic databases and the reliability of its indicators.

The main bibliometric indicators are distinguished into three categories according to their use and purpose: quantitative, qualitative and collaboration. The application of these indicators in assessing the areas of Social Sciences and Humanities is raising, particularly several issues, especially in the context of their particular research and publish in the form of the face of Sciences. In fact, in science there are some grounds for discrediting address this model due to the limitation of bibliographic databases and by questioning the reliability of the indicators. Already in the Social Sciences and Humanities, these indicators show up really misfits in applying criteria molded habits and publish profiles of Sciences.

In fact, these areas differ greatly Sciences in particular with regard to the types of documents published, type of publication (monographs / journals), target audience and goals, privileged language of publication (nationality), habits and behavior of citations, number of annual publications, number of researchers per group and type of authorship (individual / collective). These factors mainly questioning the importance given to accounting articles published as a leading indicator and the importance given to the indicator quote. According to the analysis of the application of these indicators in the Social Sciences and Humanities, we can infer that these differ Sciences with respect to all major criteria and bibliometric indicators.

The main conclusion that can be inferred from these analyzes and the bibliography is that these bibliometric indicators were developed according to the research and publication practiced in the Sciences. This disparity seriously questions the almost exclusive use of these indicators in evaluating these areas. However, due to the implementation of this model, these areas felt the need to change their way of publishing to meet the objectives proposed by the bibliometric indicators. However, this is not a change imposed natural progression or flow of research, which can adulterate the nature and character identity of these areas.

This work demonstrates the weakness and inadequacy of the application of these indicators in these areas and can be a starting point for further development in order to create an appropriate model and answer the evaluation questions. In fact, it is necessary to deepen the knowledge of research and publication in the Social Sciences and Humanities to see if more indicators are needed to supplement the bibliometric indicators presented or the creation of new, specifically for these areas. In fact, as many studies suggest, may be necessary to create not only a model of a technological system as appropriate. New questions are being raised in this context. In these areas there is a need, yet underexplored, analyze and reflect on the evaluation of scientific production.

References

Agapito, C. (2012). Characterization of the scientific production of portuguese universities, researchers and scientific areas. Paper presented at the *Paper Presented at: 3rd International Workshop Sharing the Best Practices in R&D and Education Statistics,* Lisboa. 1-12. Retrieved from http://www.gpeari.mctes.pt/Media/Default/WorkshopMaio2012/ScientificProduction_CristianaAgapito.pdf

Araújo, C. A. (2006). Bibliometria: Evolução histórica e questões atuais. *Em Questão, 12*(1), 11-32. Retrieved from http://periodicos.ufpb.br/ojs/index.php/pbcib/article/view/8023

Archambault, E., & Gagné, É V. (2004). *The use of bibliometrics in the social sciences and humanities.* (Prepared for the Social Sciences and Humanities Research Council of Canada (SSHRCC)). Quebec: Science-Metrix. Retrieved from http://www.science-metrix.com/pdf/SM_2004_008_SSHRC_Bibliometrics_Social_Science.pdf

Bana e Costa, C. A., & Oliveira, M. D. (2012). A multicriteria decision analysis model for faculty evaluation. *Omega, 40*(4), 424-436. doi: 10.1016/j.omega.2011.08.006

Engels, T. C. E., Ossenblok, T. L. B., & Spruyt, E. H. J. (2012). Changing publication patterns in the social sciences and humanities, 2000-2009. *Scientometrics, 93*(2), 373-390. doi: 10.1007/s11192-012-0680-2

Evidence. (2007). *The use of bibliometrics to measure research quality in UK higher education institutions.* (Research). London: Universities UK.

Gantman, E. R. (2012). Economic, linguistic, and political factors in the scientific productivity of countries. *Scientometrics, 93*(3), 967-985. doi: 10.1007/s11192-012-0736-3

Garfield, E. (2003). The meaning of the impact factor. *International Journal of Clinical and Health Psychology, 3*(2), 363-369. Retrieved from http://www.aepc.es/ijchp/articulos_pdf/ijchp-77.pdf

Glanzel, W. (2003). *Bibliometrics as a research field: A course on theory and application of bibliometric indicators* Retrieved from http://yunus.hacettepe.edu.tr/~tonta/courses/spring2011/bby704/Bib_Module_KUL.pdf

González-Alcaide, G., Valderrama-Zurián, J. C., & Aleixandre-Benavent, R. (2012). The impact factor in non-english-speaking countries. *Scientometrics, 92*(2), 297-311. doi: 10.1007/s11192-012-0692-y

Goudard, M., & Lubrano, M. (2010). Human capital, social capital and scientific production. Paper presented at the Braga, Portugal. 1-23. Retrieved from http://www3.eeg.uminho.pt/economia/nipe/workshopresearch/index_ficheiros/Page502.htm

Katz, J. S. (1999). *Bibliometric indicators and the social sciences*. (prepared for ESRC). Sussex: Universty of Sussex. Retrieved from http://www.sussex.ac.uk/Users/sylvank/pubs/ESRC.pdf

Macias-Chapula, C. A. (1998). O papel da informetria e da cienciometria e sua perspectiva nacional e internacional. *Ciência Da Informação, 27*(2), 134-140.

Moed, H. F., Burger, W. J. M., Frankfort, J. G., & Van Raan, A. F. J. (1985). The use of bibliometric data for the measurement of university research performance. *Research Policy, 14*(3), 131-149. doi: 10.1016/0048-7333(85)90012-5

Narin, F., & Hamilton, K. (1996). Bibliometric performance measures. *Scientometrics, 36*(3), 293-310. doi: 10.1007/BF02129596

Nederhof, A., Zwaan, R., De Bruin, R., & Dekker, P. (1989). Assessing the usefulness of bibliometric indicators for the humanities and the social and beha vioural sciences: A comparative study. *Scientometrics, 15*(5), 423-435. doi: 10.1007/BF02017063

Nederhof, A., Van Leeuwen, T., & Tijssen, R. (2004). *International benchmarking and bibliometric monitoring of UK research performance in the social sciences*. Great Britain: CWTS - Centre for Science and Technology Studies, University of Leiden.

Nederhof, A. J. (2006). Bibliometric monitoring of research performance in the social sciences and the humanities: A review. *Scientometrics, 66*(1), 81-100. doi: 10.1007/s11192-006-0007-2

Research Information Network. (2009). *Communicating knowledge: How and why UK researchers publish and disseminate their findings*. (Research Information Network report No. September). United Kingdom: Research Information Network; Joint Information Systems Committee. Retrieved from Loughborough's Institutional Repository. Retrieved from https://dspace.lboro.ac.uk/

Testa, J. (2006). The Thomson scientific journal selection process. *International Microbiology, 9*(2), 135-138. Retrieved from http://revistes.iec.cat/index.php/IM/article/viewFile/4c457c8c230e1.002/9558

Umut, A. I., Sahiner, M., & Tonta, Y. (2006). Arts and humanities literature: Bibliometric characteristics of contributions by turkish authors. *Journal of the American Society for Information Science and Technology, 57*(8), 1011-1022. doi: 10.1002/asi.20366

Zitt, M. (2005). Facing diversity of science: A challenge for bibliometric indicators. *Measurement: Interdisciplinary Research and Perspectives, 3*(1), 38-49. doi: 10.1207/s15366359mea0301_6