

The Problem of Bibliometry Reflections on its Use for Evaluating Research in the South

by

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KEYWORDS. — Bibliometry; Science Citation Index; Research evaluation.

SUMMARY. — Evaluation of researchers, institutes or projects is commonly based on a bibliometric analysis, especially using the Science Citation Index. The use of this methodology is strongly criticised in literature. For evaluation of research in the South, the disadvantages get an extra dimension. There is not only a risk for underestimation of the quality of researchers and institutes, especially compared to the North, but in addition local development is hindered by the fact that researchers are practically obliged to focus on topics less relevant for development, and stakeholders and decision makers have no access to the necessary information. Moreover, a degradation of the local publishing potential is most probable.

1. Introduction

In order to guarantee quality of research and the best use of budgets, decision makers need tools to evaluate research, scientists and scientific institutions in an objective way. To compare research in an institutional, national or international context, a quantification of quality and efficiency is needed, hence simple numbers are required. The most common method consists of measuring the research output, rather than the research as such, and the most popular way to do that is by considering the number and quality of publications realised by a person or institute. In this way, however, only part of the output is considered. Moreover, the social impact is not taken into consideration.

To allow comparing on an international level, criteria for bibliometric research have to be uniform. In most cases use is made of the existing Science Citation Index (SCI) or of the Social Sciences Index (SSI). These are instruments created in 1960 by the Institute for Scientific Information (ISI) to evaluate and compare the impact of, mostly commercial, journals. Its use to evaluate research is therefore not in agreement with its original aim and is restricted to natural and applied sciences, and medicine. Using SCI to evaluate a researcher could be compared with evaluating a composer without ever listening to his music.

This contribution is not a research paper based on an exhaustive literature review, but rather a series of thoughts based on personal reflections, discussions with members of the RAOS, and on a small survey and discussions with colleagues and trainees of developing countries (mainly geologists and soil scientists). The questionnaire related to that survey can be consulted on <http://www.plr.ugent.be/questionnaires.html>. About 30 scientists of different developing countries took part.

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2. The Science Citation Index (SCI)

The SCI (and also the SSI) gives information on the quality of journals (impact factor, half-life time of citations) and the number of citations per paper. Since several years it can be consulted on-line. Its concept is however subject to critics, regularly discussed in scientific journals. Some of the most important critics are summarised below, but for more details the reader is referred to the extensive bibliography on this subject.

The selection of journals analysed in the SCI is biased by the fact that criteria for inclusion are not purely scientific, but also administrative, linguistic (almost only Anglo-Saxon), commercial and even political. In this way years of important research in China, Russia and South America for instance are completely neglected. Other important scientific publications, such as books, proceedings and maps are not taken into account. Moreover the selection procedure is not at all transparent.

It is in this context an instructive exercise to compare numbers of citations found for an author in the SCI with for instance those appearing on the Google Scholar website or Elsevier's Scopus. It clearly appears that some papers, even not mentioned in the SCI survey, get an important number of citations in the other system, showing the risk of underestimating research capacity by using only the SCI, and the imperfectness of the latter for this aim.

A result of the uncontrolled use of the SCI for evaluating research is a visible change in publishing policy. Researchers are forced to adapt their research to publication possibilities, rather than to the needs in the scientific and industrial world.

Different research fields give often very different response to the SCI parameters. For instance the highest impact for some fields (*e.g.* geology, plant taxonomy) will reach with difficulty the lowest one in other fields (*e.g.* biochemistry). Whereas for disciplines such as biochemistry, microbiology or polyester chemistry the half-life time is short, this is not the case for life sciences or civil engineering, where half-life can be several years, and citations still happen commonly after tens of years. A similar trend is observed for the number of citations: few for instance in earth sciences and civil engineering, many in biochemistry and some fields of medicine.

3. Using SCI to evaluate Research in the South

Problems in using SCI to evaluate research or researchers get an extra dimension when dealing with the South. For researchers in the South access to publish in SCI covered journals is mostly more difficult than for those in the North. Referees of international journals often require extra data (not necessarily of primary importance) that only can be obtained using sophisticated techniques, not currently available in the South. This problem is mentioned in practically all replies on the questionnaire. In some research fields journals (even digital journals) ask high page fees, difficult or impossible to be covered by the laboratory budgets. In addition to this, cultural differences may make publishing in international journals difficult. Most researchers in the South, but for instance also in China and Russia, have not been trained in the Anglo-Saxon reporting style requested by almost all international journals. This is considered practically by all non-native speaking respondents as the most important barrier. It is not only a problem of correct language (although that might be already insuperable in some cases), but also even more of style and approach. The requested compacted style is often contradictory with the own cultural tradition (which is already partially the case for instance for French, Italian or Spanish speaking scientists). One should also not forget that many of the researchers from the South originally come from a culture with oral tradition, where other

rules prevail. Imposing the Anglo-Saxon style as the only valuable for all journals, testifies of little respect for the local identity.

In their comments many questioned scientists of the South express their feeling that exotic author's names and/or their affiliation to an institution in the South have already a negative influence on the chance of a paper to be accepted by an international journal.

Even when scientists from the South succeed to get papers published in SCI covered journals, it is not obvious for them to gather a same number of citations as their American or European colleagues, who the last decades got a strong tradition in networking (*e.g.* European sponsored projects such as COST-actions, ERASMUS-projects) where personal contacts result in a spontaneous higher mutual citation. Some networks even intentionally bias the system by encouraging artificial mutual citations.

It is also a fact that research, useful for development, and therefore supported by national and international sponsoring, mostly deals with local, more practical problems not yielding the type of data needed for publication in international journals. Nevertheless, the SCI is sometimes applied for their evaluation. Several scientists complain to be sandwiched between two duties: the government requiring and funding research on local problems, and the university authorities expecting international publications. An Indian professor states "This has created a paradox, while the local funding agencies would like more research on local issues, scientists tend to take up the topics suitable for international science"

4. Consequences of the Application of the SCI to Evaluate Research in the South

From the discussion above, one can deduce that the use of the SCI to evaluate scientists or institutions in the South can have a negative influence on our opinion on research in these countries. Compared to research in the North, that in the South risks to be underestimated, because fewer papers are accepted in international journals, and papers generate less citations, for reasons not directly related to quality of scientific content.

There is in addition an indirect negative influence on research as such in the South. Information, important for development, remains unpublished when not suitable for international journals, because researchers are obliged to give priority to spend their energy and time to publish in SCI-covered journals. For the same reason, local journals risk degrading by lack of good papers and interest. This can be compared with the situation in Europe where a lot of local scientific journals (mainly published by learned societies) disappeared the last decades, leaving often a vacancy. In Anglo-Saxon countries, especially in the US, this is less the case as their journals are more easily considered as "international", because of the language, compared for instance to France, Germany or Russia.

Up to now the above-mentioned problem is still limited by the fact that in many developing countries the total number of papers is considered more important than their ranking. Nevertheless, this changes gradually with a higher degree of development (*e.g.* China, India). In most of these countries a minimum of two international (not necessary SCI mentioned) publications is required for entering the staff of a university.

If research on local problems of the South gets published in SCI covered journals, it often risks not reaching the target audience of local stakeholders. Researchers in the South often have difficulties to get access to international journals, and this is still much more the case for decision makers and extension workers who have to use or to transmit scientific results. As such, part of the local research is lost for development. Several Chinese researchers pointed out that only studies published in their native language have local impact.

As books are not covered by the SCI, teaching staff is less motivated to prepare good local manuals, especially important for locally bound sciences, such as agriculture, botany,

geology, medicine and veterinary sciences. Primary maps (*e.g.* botanical, geological, pedological) are not only important for scientists and teachers, but especially for decision makers. The heavy efforts, both physically and intellectually, to prepare them, are not rewarded when SCI is used for evaluation.

Also for research in the North on the South evaluation by SCI criteria is contra productive for two major reasons: (*i*) research on many themes important for development is not stimulated, but rather hindered, because not suitable for publication in international journals, and (*ii*) research results important for development remain unpublished for the same reason.

5. Discussion

A main problem the way bibliometry is used by most decision makers to evaluate individual researchers, research teams or institutions, is the fact that all journals not covered by SCI are considered as second hand, or worse, as rubbish or not existing. This is far away from the real situation. Many local journals, for instance in China, Russia, Latin America (*e.g.* Argentina, Brazil, Mexico), India and several European countries have a high scientific quality, at least comparable to that of several SCI-covered journals, but are not included because of linguistic, administrative, or commercial reasons. Many of these journals have an international composed Editorial Board and referee system. Nevertheless, publications in these journals are rejected in bibliometric evaluations based on SCI.

A manner of solving the above-mentioned problems is to come to an internationally accepted rating of scientific journals, using scientific criteria, independent of language and administrative status. Such a rating would stimulate researchers to publish in local journals of high quality, respecting their cultural values, and accessible to local stakeholders, and it would also stimulate local journals to increase their quality in order to get a better rating.

6. Conclusions

Decision makers should be aware that bibliometry measures only one aspect of research, namely part of the purely scientific output, and can be biased by several local conditions. They should also be aware of the discrepancy existing at present, whereby the natural sciences, medicine, and applied sciences are subject to severe bibliometric evaluations, whereas human sciences seem to escape this exercise.

Evaluation of researchers or institutions in the South in an international context using only SCI (or SSI) will in most cases underestimate their quality and capacity. The additional use of other systems may give a correction. The existing international systems moreover comprise a cultural discrimination of many researchers in the South.

Even for the evaluation within a national context the use of SCI is not without risk, and has important side effects: subjects important for development risk to be neglected, data important for development remain unpublished and local scientific journals degrade. It is obvious that the use of SCI by donor agents to evaluate institutions, and especially projects, is a dangerous process. Moreover, from the point of view of development, research has no absolute value, but also cultural dimensions should be taken into account.

A possible solution would be the creation of a rating system for scientific journals by an independent, internationally recognised authority, such as the Belgian Royal Academy for Overseas Sciences, in cooperation with other institutions, taking into account on the first place the real scientific quality of the papers. It is hereby important that all international languages of the South (especially French, Portuguese and Spanish) are treated on a same level as

English. A distinction between technical and scientific publications is necessary without putting one on a higher level than the other.

As a first step a survey covering different fields of science (including medicine and applied sciences) and countries with different degrees of development needs to be organised and critically analysed in order to get a realistic overview of the problems.