GENERAL CONTRIBUTIONS

How to overcome some of the challenges that African scholars are facing in conducting informetrics research[1]

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This article provides evidence to show that the contributions of African researchers to the informetrics literature are minimal. The three main challenges identified as limiting the contributions of African scholars to the informetrics literature are lack of appropriate skills, inadequate data collection sources, and unaffordable analytical tools. To overcome these challenges, it is suggested that regular pre-conference workshops on informetrics should be organized, an African Citation Index should be developed, and the use of free analytical tools should be encouraged.

1 Introduction

In a pilot study to compare the annual contributions of six continents (namely, Europe, North America, Asia, Oceania, South America, and Africa) to the informetrics literature base, Wolfram (2008) noted that not only did Africa almost consistently ranked last in terms of absolute annual contributions from 1987 to 2007 but its relative contributions had declined. These results were later corroborated in the expanded study by Lu and Wolfram (2010). The two studies made use of Thomson Reuters Web of Science as their data source. The results from the two studies prompted the focus of this address. Specifically, we would like to: (i) seek further evidence of the low contributions of African researchers to the informetrics literature; (ii) discuss the challenges preventing African researchers from contributing more; and (iii) make suggestions on how to overcome some of these challenges.

2 Further evidence

In the two studies above that compared the contributions by six continents to the informetrics literature, the authors used Web of Science database but the period of coverage was limited to the electronic database availability to the authors; in each case, the starting year was 1987. So, the first thing we did was to use Web of Science database again to analyze the contributions of researchers in Africa to the informetrics literature but with a wider coverage; the time frame used was 1960 to September 2010 (i.e. the time that the data was collected). Also, instead of looking at the contributions by year, we examined the contributions by each of the countries in Africa. To collect data from Web of Science for each country, we searched for (bibliomet* or informet* or scientomet* or cybermet* or webomet*) in the topic field and country name in the authors' address field. Given that Elsevier's Scopus is a competing database to Web of Science, we repeated our searches in Scopus, and the number of informetrics articles by each country from the two databases can be found in Table 1 below. From the table, only 12 out of the 54 countries in Africa have contributed informetrics articles in journals indexed by either Web of Science or Scopus but only South Africa and Nigeria seemed to have made significant contributions.

We could have repeated our searches in other databases or database hosts, such as EBSCOhost, ProQuest, or Scholars Portal Search but they do not have the author's address field for us to use in limiting contributions to African countries. Given that Scopus and Web of Science do not include articles from many African journals with the African Journal of Library, Archives & Information Science being the only library and information science journal indexed in the Web of Science and its inclusion started in 2007, we decided to also look at the publication of informetrics articles in two of the topmost library and information science journals in Africa. In a citation analysis of Sub-Saharan African library and information science journals, Onyancha (2009) found that the *African Journal of Library, Archives and Information Science*

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(AJLAIS) was the most highly cited journal while the *South African Journal of Libraries and Information Science* (SAJLIS) was the most influential journal in terms of impact factor. Abstracts of articles published by AJLAIS are available online at African Journals Online website from 2000 while SAJLIS has its own website and the abstracts are available as from 2002. It should be noted that the first volume of SAJLIS with the new name was published in 2002 as it was previously published as *South African Journal of Library and Information Science* until 2001. We read the abstract of each of the articles in the two journals to determine whether it could be classified as an informetrics article. The numbers of informetrics articles found in AJLAIS are listed in Table 2 while those found in SAJLIS are listed in Table 3. Even though the overall percentages of informetrics articles published in the two journals are high (9.64% in AJLAIS and 11.76% in SAJLIS), the absolute numbers are meager, just an average of about 2 articles per year for each journal.

Table 1 Informetrics publication contributions by African countries in the Web of Science and Scopus, 1960-2010

Country	Number of informetrics articles in web of science	Number of informetrics articles in scopus
Algeria	0	0
Angola	0	0
Benin	0	0
Botswana	2	3
Burkina Faso	0	0
Burundi	0	0
Cameroon	0	0
Cape Verde	0	0
Central African Republic	0	0
Chad	0	0
Comoros	0	0
Congo, Democratic Republic of	0	0
Congo, Republic of	0	0
Côte d'Ivoire	0	0
Djibouti	0	0
Egypt	2	2
Equatorial Guinea	0	0
Eritrea	0	0
Ethiopia	2	0
Gabon	0	0
Gambia	0	0
Ghana	1	1
Guinea	0	0
Guinea-Bissau	0	0
Kenya	2	1
Lesotho	0	0
Liberia	0	0
Libya	0	0
Madagascar	0	0
Malawi	0	0
Mali	0	0
Mauritania	0	0

Mauritius	0	0
Morocco	6	4
Mozambique	0	0
Namibia	0	0
Niger	0	0
Nigeria	19	17
Rwanda	0	0
Sao Tome and Principe	0	0
Senegal	0	0
Seychelles	0	0
Sierra Leone	0	0
Somalia	0	0
South Africa	57	47
Sudan	0	0
Swaziland	0	0
Tanzania	1	2
Togo	0	0
Tunisia	3	5
Western Sahara	0	0
Uganda	1	1
Zambia	1	1
Zimbabwe	0	0

Table 2 Publication of informetrics articles in the African Journal of Library, Archives and Information Science (AJLAIS), 2000-2010

Year	Total Number of Articles in AJLAIS	Number of Informetrics Articles in AJLAIS	% of AJLAIS articles on Informetrics
2000	17	0	0
2001	14	3	21.42
2002	20	1	5
2003	15	2	13.33
2004	16	1	6.25
2005	10	0	0
2006	14	2	14.29
2007	15	3	20
2008	16	2	12.5
2009	15	2	13.33
2010	14	0	0
Total	**166**	**16**	**9.64**

Table 3 Publication of informetrics articles in the South African Journal of Libraries and Information Science (SAJLIS), 2002-2009

Year	Total Number of Articles in SAJLIS	Number of Informetrics Articles in SAJLIS	% of SAJLIS articles on Informetrics
2002	15	0	0
2003	10	0	0
2004	12	1	8.33
2005	25	1	4
2006	22	4	18.18
2007	17	4	23.53
2008	16	4	25
2009	19	2	10.53
Total	136	16	11.76

The additional data analyzed and presented above seem to have corroborated the findings of Wolfram (2008) and Lu and Wolfram (2010) that the contributions of African researchers to the informetrics literature are very low. Why is this so? We shall examine the challenges facing African researchers in the next section.

3 What are the challenges?

The challenges facing African researchers in conducting informetrics research can be categorized into three, namely lack of appropriate informetrics skills, inaccessible data collection sources, and unaffordable analytical tools.

Informetrics has been defined as the study of the quantitative aspects of information in any form with its scope including: statistical aspects of language; characteristics of authors; characteristics of publication sources; citation and co-citation analysis; scientific productivity indicators; information growth and obsolescence; and document/information resource usage (Tague-Sutcliffe 1992). However, since the rise in popularity of the Internet, researchers have extended the applications of informetrics methods to the World Wide Web. Such applications have often been referred to as webometrics (Bjorneborn & Ingwersen 2001). So, there is a body of knowledge to be learnt about informetrics and it was surprising to read that, in sub-Saharan Africa, only the Africa Regional Centre for Information Science, University of Ibadan, Nigeria has a formal course on informetrics (Onyancha 2009). To compound the problem, many faculty members in library and information science schools worldwide, not just in Africa, are not well versed in quantitative methods (Ajiferuke 2002). However, this problem of lack of informetrics/quantitative knowledge by library and information science researchers in Africa could be addressed by organizers of library and information science conferences (such as Progress in Library and Information Science in South Africa Conference) in Africa occasionally including a pre-conference workshop on informetrics in their programmes, and professional publications in Africa (e.g. *African Journal of Library, Archives and Information Science, South African Journal of Libraries and Information Science,* etc.) introducing a teacher's corner that would regularly discuss some of the techniques in a simple manner.

Most webometrics studies make use of either Google or Yahoo (especially Yahoo! Site Explorer) as their source of data. These two sources are readily available to African researchers. However, for most other informetrics studies, Web of Science and Scopus are the sources of data. Their annual subscription charges, either in US dollars or Euros, are so high that, when converted to local currencies, most African universities cannot afford subscribing to them. Google Scholar has been suggested as a free alternative to Web of Science and Scopus (Noruzi 2005) but some studies have shown that results obtained using Google Scholar often differ greatly from those using fee-based databases (Bar-Ilan 2008; Bornmann *et al.*, 2009), and that Google Scholar might be better suited to obtaining citations from books, theses, websites, and open-access journals (Kulkami *et al.*, 2009; Kousha and Thelwall, 2008). In addition, Google Scholar has been criticized for being somewhat unreliable (Mingers and Lipitakis 2010), less often updated (Mayr and Walter 2007; Falagas *et al.*, 2008), often producing invalid number of citations (Jacs 2008), and not very user-friendly (Bar-Ilan 2010).

In any case, even if the African researchers have access to the two fee-based citation databases, the coverage of journals from Africa is negligible (Onyancha 2008). It might be better to actually develop an African Citation Index, which would be a more useful tool that African informetrics researchers can use in evaluating and measuring the impact, quality and quantity of African literature. Such an index would be similar to already developed national citation databases, such as

Chinese Science Citation Index (CSCD), China Scientific and Technical Papers and Citations Database (CSTPC), Chinese Social Sciences Citation Index (CSSCI), Korean Medical Citation Index (KoMCI), Citation Database for Japanese Papers (CJP), and Indian Citation Index (ICI). The African Citation Index could be based on the exiting database of the African Journals Online (*http://www.ajol.info/*). African Journals Online (AJOL), a non-profit organization based in South Africa, provides free hosting to about 400 peer-reviewed journals from about 30 African countries. As has been demonstrated by Mallig (2010), AJOL could easily modify its database structure and add a few functions to its system for it to perform the additional role of a citation index.

After collecting data for informetrics study, analysis is made easier if one has an appropriate analytical tool. The appropriate tool might be a spreadsheet, a statistical software, or a specially designed software. A spreadsheet is readily available to most African researchers but a statistical software such as SPSS might be too expensive while designing a special software might be both expensive and time consuming. An easy way out is to use an open source statistical software sure as R or make use of free specially designed software. Such software include LotkaProj for model fitting, SocSciBot for link analysis, Combine.exe for mapping heterogeneous network analysis, and Harzing's Publish and Perish for analyzing academic citations. Some other analytical tools are listed on the website of Cybermetrics, the International Journal of Scientometrics, Informetrics, and Bibliometrics (see *http://www.cindoc.csic.es/cybermetrics/links18.html*).

4 Conclusions

There is ample evidence to show that very few informetric research studies, as illustrated by the number of publications, are taking place in Africa. The three key challenges identified as contributing to the limited activities include lack of appropriate skills by researchers, inadequate data collection sources, and unaffordable analytical tools. To overcome these challenges, it has been suggested that pre-conference workshops on informetrics should be organized regularly, an African Citation Index should be developed, and that African informetrics researchers should take advantage of freely available analytical tools.

References:

Ajiferuke, I. 2002. Use of statistics in library and information science research In: Aina, L.O. (ed). *Research in Information Sciences: an African perspective*. Ibadan: Stirling-Horden Publishers (Nig.) Ltd, 145-157.

Bar-Ilan, J. 2008. Which h-index?- a comparison of WOS, Scopus and Google Scholar. *Scientometrics*, 74(2): 257-271.

Bar-Ilan, J. 2010. Citations to the 'Introduction to informetrics" indexed by WOS, Scopus and Google Scholar. *Scientometrics*, 82(3): 495-506.

Bornmann, L., Marx, W., Schier, H., Rahm, E., Thor, A. & Daniel, H.D. 2009. Convergent validity of bibliometric Google Scholar data in the field of chemistry – citation counts for papers that were accepted by *Angewandte Chemie International Edition* or rejected but published elsewhere, using Google Scholar, Science Citation Index, Scopus, and Chemical Abstracts. *Journal of Informetrics*, 3(1): 27-35.

Falagas, M.E., Pitsouni, E.I., Malietzis, G.A. & Pappas, G. 2008. *FASEB Journal*, 22(2): 338-342.

Jacs, P. 2008. The pros and cons of computing the h-index using Google Scholar. *Online Information Review*, 32(3): 437-452.

Kousha, K. & Thelwall, M. 2008. Sources of Google Scholar citations outside the Science Citation Index: a comparison between four science disciplines. *Scientometrics*, 74(2): 273-294.

Kulkami, A.V., Aziz, B., Shama, I. & Busse, J.W. 2009. Comparisons of citations in Web of Science, Scopus, and Google Scholar for articles published in general medical journals. *Journal of the American Medical Association*, 302(10): 1092-1096.

Lu, K. and Wolfram, D. 2010. Geographical characteristics of the growth of informetrics literature 1987-2008. *Journal of Informetrics*, 4(4): 591-601.

Mallig, N. 2010. A relational database for bibliometric analysis. *Journal of Informetrics*, 4(4): 564-580.

Mayr, P. & Walter, A.K. 2007. An exploratory study of Google Scholar. *Online Information Review*, 31(6): 814-830.

Mingers, J. & Lipitakis, E. 2010. Counting the citations: a comparison of Web of Science and Google Scholar in the field of business and management. *Scientometrics*, 85(2): 613-625.

Noruzi, A. 2005. Google Scholar: the new generation of citation indexes. *Libri*, 55(4): 170-180.

Onyancha, OB. 2008. Growth, productivity, and scientific impact of sources of HIV/AIDS research in Eastern and Southern Africa, 1980-2005. *African Journal of AIDS Research*, 7(1): 55-70.

Onyancha, OB. 2009. A citation analysis of Sub-Saharan African library and information science journals using Google Scholar. *African Journal of Library, Archives and Information Science*, 19(2): 101-116.

Tague-Sutcliffe, J. 1992. An introduction to informetrics. *Information Processing and Management*, 28(1): 1-3.

Wolfram, D. 2008. Is informetrics research on the decline in North America? *ISSI Newsletter*, 4(2): 21-23.