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Publication productivity and scholarly impact of academic librarians in Tanzania: A scientometric analysis

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A scientometric analysis

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Abstract

Purpose – The purpose of this scientometric study was to conduct an analysis of the research productivity and scholarly impact of academic librarians in Tanzania for a period of 30 years from 1984 to 2013.

Design/methodology/approach – Data were obtained using the Publish or Perish software which uses Google Scholar to retrieve scholars' publications, citations and related metrics. For each librarian, the retrieved metrics were the number of papers, papers per author, citation counts, average citations per paper, average papers per author, average citations per year, average citations per author and four indices, namely, the h-index, g-index, Hc-index and the HI-norm.

Findings – The study findings indicate that 434 publications were recorded for all librarians, giving an average of 14.5 publications per year. The year 2008 had the most (9.9 per cent) publications followed by 2010 (7.8 per cent), while the years 1985 and 1987 had the lowest (0.2 per cent) number of publications. About 43 per cent of the publications were single-authored and the degree of collaboration was 0.57. The top-ten ranked librarians contributed more than half (53.2 per cent) of all publications, although they showed considerable variation among different metrics. Only three journal articles had 25 or more citations.

Originality/value – Previous studies on the topic are scarce, and, therefore, this paper provides useful recommendations to library and information science (LIS) schools, libraries and universities to improve research productivity of their academic librarians in Tanzania and other countries with a similar setting.

Keywords Citation analysis, Academic librarians, Tanzania, Publication patterns, Research productivity, Scientometric analysis

Paper type Research paper

Introduction

Research in library and information science (LIS) contributes to problem-solving and decision-making in libraries and information centers; enhances management and provision of information services; and creates new knowledge for the continued development of LIS as a profession. Academic librarians also conduct research to meet promotion and tenure demands of their institutions. In addition, Montanelli and

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Stenstrom (1986) noted that librarians who conduct research are likely to be more receptive to changes and have a more effective relationship with users. In other words, LIS research adds the value to librarianship by improving the management and provision of information services, contributing to the body of scholarship and professional knowledge, and uplifting the academic status of librarians. Research and publishing complement each other because it is necessary to publish outcomes of research for others to gain access.

Evaluation of scholars' research productivity can be conducted for various reasons. In universities and research institutions, research productivity is an important criterion for recruitment, promotion, rewards, professional recognition, workload decisions, for allocation of resources and for ranking universities and research institutes. Evaluation of research productivity can reveal contributions of individual scholars to the advancement of the whole field (Lin, 2006). Mapping the performance of researchers can help identify research-oriented individuals and institutions and chart trends in the field. Research productivity comprises the number of publications by an individual, group, institution or country in a particular period. The impact of those publications is often measured by how many times they are cited by other researchers.

Scientometric techniques are significant tools for evaluating research productivity of individuals, groups, institutions and countries (Lwoga and Sife, 2013). Scientometric refers to the "quantitative methods which are used in the analysis of science" (Nalimov and Mulchenko, 1969). Scientometrics analyze the research productivity and citation impact of researchers over a period by quantifying the "utility of literature on a given subject (bibliometrics); patterns of authorship (co-citation analysis); and the impact of reading on groups and societies (social epistemology)" (Kumar *et al.*, 2009). The most commonly used sources of scientometric data are the science citation index (SCI) and the arts and humanities citation index (A&HCI). Nevertheless, recent advances in information and communication technologies (ICTs) have enabled innovative creation of large databases that incorporate publication and citation data from which, among others, a variety of metrics are derived. New data sources including the Web of Science, Scopus, Scholarometer and Publish or Perish (PoP) have emerged in recent years. The PoP software, which was released in 2006, uses Google Scholar to obtain the number of publications and sources which cite them (Harzing, 2008). Comparative studies indicate that the PoP software retrieves more publications and citations through Google Scholar compared to others such as Web of Science and Scopus (Saad, 2006; Meho and Yang, 2007; Bar-Ilan, 2008). Another study of ten purposefully selected LIS researchers in South Africa showed that Google scholar has a wider coverage of publications and citations (Ocholla and Onyancha, 2009).

PoP produces a number of descriptive statistics for individual authors including the total number of publications, total number of citations, years since first publication, average number of citations per year, total citations per paper, total citations per author and total papers per author. It also calculates several indices including the h-index, g-index, Hc-index and HI-norm index (Harzing, 2008). According to (Hirsch, 2005), a scientist has index h, if h of his/her papers have at least h citations each, and the other papers have fewer than h citations each. Panaretos and Malesios (2009) define h-index as a set of highly cited papers of a scientist and the number of citations that one has received in his publications. In 2006, Egghe (2006) introduced g-index to improve the h-index. This refers to the largest rank such that the first g papers have, together, at least

2g citations (Egghe, 2006). Other metrics were also introduced to improve h-index, which include Hc-index and the HI-norm. Hc-index accords more weight to recent articles (Sidiropoulos *et al.*, 2007) and HI-norm-index is "the citation totals for multiple authorship" (Khey *et al.*, 2007).

In Africa, there are few studies on research productivity and citation impact of academic librarians (Onyancha, 2007). The available studies are for the West Africa region (Aina and Mabawonku, 1997; Aina and Mooko, 1999; Aina, 1998; Alemna and Badu, 1994; Alemna, 1996, 2001; Kadiri, 2001; Mabawonku, 2001) and the Southern Africa region (Boon and van Zyl, 1990; Ocholla and Ocholla, 2007; Ocholla, 2000; Ocholla *et al.*, 2013; Onyancha, 2007; Sitienei and Ocholla, 2010). There has not been any scientometric study focusing on research output of academic librarians in Tanzania, apart from two recent studies (Ocholla *et al.*, 2012; Sitienei and Ocholla, 2010) that covered the East African region. Thus, not much is currently known about research productivity and the scholarly impact of academic librarians in Tanzania. The present study sought to establish the research productivity and scholarly impact of academic librarians in Tanzania for 30 years from 1984 to 2013. Specifically, the study was set out to analyze the growth of LIS scholarly literature in Tanzania; determine the collaboration patterns among academic librarians; determine the research productivity and scholarly impact of individual authors; identify citations trends of individual publications; and assess the journal preference of authors.

Literature review

Research productivity studies in LIS have addressed issues related to the number of publications and their growth over time and ranking by countries, institutions, schools, authors and journals. At the global level, Davarpanah and Aslekia (2008) analyzed 56 LIS journals in social science citation index (SSCI) from 2000 to 2004 and found that most journal articles were published from the USA (58 per cent), followed by the UK (10 per cent), Canada (4 per cent) and Australia (3 per cent). Similar studies such as a study of 61 LIS journals from Web of Science (Erfanmanesh *et al.*, 2010), and a study of the Chinese Librarianship journal (Hussain and Fatima, 2010) revealed that US LIS professionals contributed more articles than any other countries. A study of *Library and Philosophy Journal* during 2004-2009 showed that the contributions to this journal are still limited within 15 countries with the highest number of contributors belonging to Nigeria (140 contributors), followed by the USA (128 contributors), India (77 contributions) and Iran (23 contributions) (Swain, 2011). Generally, studies show that there are distinct variations regarding the rate of LIS research publications across countries.

Several scientometrics studies show that there is an increase in research productivity of LIS profession over time. A study of Australian LIS educators revealed that there were 2,235 unique journal articles authored or co-authored by at least one Australian LIS academic during the period from 1967 to 2008. Few publications by Australian LIS academics were retrieved, prior to 1980 (Wilson and Boell, 2012). Similar incremental trends in the number of publications among librarians were revealed by studies that analyzed 159 Korean LIS professors (Yang and Lee, 2012), Malaysians librarians' publications produced between 1965 and 2005 (Yazit and Zainab, 2007), and a study of the *Annals of Library and Information Studies* from 2002 to 2011 (Rahul, 2011). According to Adkins and Budd (2006), such trend shows that LIS profession is maturing as a field of study and developing a larger body of research.

Scientometrics studies show that LIS publications tend to receive few citations. Davarpanah and Aslekia (2008) found that most papers received few citations, with each article receiving an average 1.6 citations. Another study of 99,789 documents published in 61 LIS journals revealed that the number of citations received by each publication was low, being 0.27 on average (Erfanmanesh *et al.*, 2010). Nonetheless, scientometric studies of single journals indicate increase on the number of publications and citations counts. A scientometric study of the *Journal of Documentation* during 2007-2011 showed that the mean of relative growth for the first five years was 0.278 and the average rate of citation per article was 10.37 (Suradkar and Khaparde, 2012). Other scientometric studies of single journals also revealed similar results of a steady increase in number of publications, such as the citation analysis of *Library Philosophy and Practice Journals* during 2004-2009 (Swain, 2011) and *Annals of Library and Information Studies* from 2007 to 2012 (Velmurugan, 2013).

With regard to the publication patterns of librarians, Wilson and Boell (2012) found that one-third of longer-serving Australian LIS academics published no journal articles, while a small number authored or co-authored over one-fourth of all the journal articles. Similarly, a Malaysian study reported that most authors were one time contributors of LIS publications, and a few highly productive authors contributed to most of the publications (Yazit and Zainab, 2007). The findings from these studies are similar to what Lotka's (1926) law of scientific productivity stipulated that only a small number of authors were highly productive in most research disciplines.

There is also an increasing trend in collaborative research and publication among academic librarians across the world. A study of Australian LIS educators showed that about three-quarters (72 per cent) of all journal articles were single-authored; however, multiple authorship increased over time (Wilson and Boell, 2012). Velmurugan (2013) found that most of the publications in ALIS were double-authored (43.35 per cent), with the degree of collaboration as high as 0.64. Another study of Spanish LIS professionals also indicated a significant increase in co-authorship (Ardanuy, 2011). However, other studies have indicated that there is still low level of co-authorship in LIS research. For instance, a study of Indian LIS literature showed that most of the papers (60 per cent) were published by a single author (Singh, 2009). Similarly, studies on the *Chinese Librarianship Journal* (Hussain and Fatima, 2010), the *Library Philosophy and Practice Journal* (Swain, 2011) and a study of Malaysian LIS authors (Yazit and Zainab, 2007) have revealed that single-authorship still dominates LIS research. Generally, the prevalence of single-authorship indicates low level of collaboration and team research.

Studies also show that the internationalization of LIS articles is not equally distributed across the world. On one hand, most LIS articles are published in local journals rather than international journals. Wilson and Boell (2012) found that Australian LIS academics published in nearly one-half of all journals only once, and over one-quarter of their journal articles were published in only five national journals. Another study of 3,396 Indian LIS publications retrieved from Library and Information Science Abstracts (LISA) database during 1967-2004 revealed that Indian authors' contribution in international journals was very low (Patraa and Chandb, 2006). Similar findings were revealed by a Malaysian study that most LIS authors published in local journals (78.6 per cent), followed by journals published in the UK (14.0 per cent), the USA (2.4 per cent) and the rest in journals published in diverse number of countries. On the other hand, studies show an increasing number of international publications among

librarians. For instance, a study of 159 Korean LIS professors showed a steady growth of LIS literature in international journals between 2001 and 2010.

Scientometric research of academic librarians in Africa is generally low. The few available studies have mainly focused on the West Africa (Aina and Mabawonku, 1997; Aina and Mooko, 1999; Aina, 1998; Alemna and Badu, 1994; Alemna, 1996, 2001; Kadiri, 2001; Mabawonku, 2001) and Southern Africa regions (Boon and van Zyl, 1990; Ocholla and Ocholla, 2007; Ocholla, 2000; Ocholla *et al.*, 2013; Sitienei and Ocholla, 2010). In Tanzania, the only two studies are those conducted recently covering Eastern Africa (Ocholla *et al.*, 2012) and Eastern and Southern Africa (Sitienei and Ocholla, 2010). Ocholla *et al.* (2012) examined the research productivity of academic librarians in Eastern Africa from 2000 to 2009 by using LISA database. This study found that the research visibility of academic librarians was insignificant; most librarians preferred publishing individually; and the most prolific authors were from Tanzania. Sitienei and Ocholla's (2010) study assessed the research productivity of 866 academic librarians in Eastern and Southern Africa from 1990 to 2006 by using the Library, Information Science and Technology Abstracts (LISTA) and WORLDCAT databases. This study found that South Africa was the most prolific country in both regions, while Tanzania was the most productive country in the Eastern Africa region. However, these two studies have not yielded sufficient evidence to comprehensively understand the publishing trends and scholarly impact of Tanzanian academic librarians.

Methods

This scientometric analysis was conducted for five days from January 13 to 17, 2014. This short period was important because online publications and citation counts keep on accumulating rapidly. At first, names of academic librarians were obtained from their institution Web sites and verified through phone calls to the respective institutions. Efforts were also made to obtain the names of academic librarians who worked with those institutions for different periods between 1984 and 2013, but had left for various reasons. In total, 82 academic librarians were identified for this study. Using the PoP software, author impact analyses of all 82 librarians were conducted for the 30-year period from 1984 to 2013.

A search strategy was developed including all authors' names and their possible variants and each individual scholar was entered into PoP to determine their statistics. Search results were carefully refined to ensure that only works of intended persons were captured and duplicates were removed and publications from homonym authors were identified and removed. If questions arose on the validity of particular publications, these were re-searched via Google Scholar to determine whether they were actually written by those particular authors. To obtain the year-wise distribution of publications, the results were sorted according to years. They were also sorted according to citation counts to obtain the most-cited publications. In the context of this study, the types of publications considered were journal articles, books, book chapters, conference papers and book reviews. For each scholar, the retrieved metrics included the total number of authors for each publication, total publications, total citation counts, average citations per paper, average papers per author, average citations per year, h-index, g-index, Hc-index and the HI-norm. Generally, the present study utilized data that were available on the Web, meaning that any publications and citations that were not available on the web could not be retrieved.

Results and discussion

Growth of LIS scholarly literature in Tanzania

Based on the "all counting method", whereby each author receives a full count for joint publications, 434 publications were recorded for all academic librarians in Tanzania during the period between 1984 and 2013, giving an average of 14.5 publications per year. Of the 82 academic librarians that were included in the study, 67 per cent ($n = 62$) had at least one publication, whereas the rest (33 per cent, $n = 27$) had either not produced any research publications or their publications were not visible online. The year-wise distribution of publications shows that the year 2008 had the highest number (9.9 per cent, $n = 43$) of publications followed by the year 2010 (7.8 per cent, $n = 34$). The years 1985 and 1987 had single publications each (Table I). Generally, the growth of LIS literature in Tanzania has been very low during the 30 years between 1984 and 2013. Similar studies conducted recently on other fields in the country have shown relatively better trends. For instance, a scientometric analysis of only 12 traditional medicine scholars at Muhimbili University of Health and Allied Sciences (MUHAS) for the period

Table I.
Year-wise distribution of publications

Year	No. of publications	(%)
1984	5	1.2
1985	1	0.2
1986	2	0.5
1987	1	0.2
1988	7	1.6
1989	5	1.2
1990	10	2.3
1991	4	0.9
1992	6	1.4
1993	3	0.7
1994	4	0.9
1995	5	1.2
1996	4	0.9
1997	8	1.8
1998	5	1.2
1999	11	2.5
2000	24	5.5
2001	18	4.1
2002	21	4.8
2003	14	3.2
2004	33	7.6
2005	20	4.6
2006	20	4.6
2007	24	5.5
2008	43	9.9
2009	22	5.1
2010	34	7.8
2011	24	5.5
2012	26	6.0
2013	30	6.9
Total	434	100.0

between 1980 and 2013 recorded 381 publications with an average of 11.2 publications per year (Lwoga and Sife, 2013). Similarly, a study of 72 forestry researchers at Sokoine University of Agriculture (SUA) for the period 1998-2013 recorded 1,031 publications with an average of 64.4 publications per year (Sife *et al.*, 2013).

Despite the fact that research and publishing is an important role of academic librarians, these findings reveal that they do not conduct enough research and, thus, published less. Previously, Msuya and Muneja (2011) and Sendikakawa (2005) reported that the state of LIS research and publishing in East African is very low with only a few renowned professionals publishing a lot, whereas many others publish very little. This is contrary to what has been reported from other African countries such as Nigeria. Raptis (1992) reported that LIS professionals in Nigeria ranked among the 10 leading producers of LIS research in the world. Similarly, Uzun (2002) placed Nigerian LIS professionals in first among the 76 countries.

Collaboration patterns among academic librarians

The study findings indicate that more than half (57.1 per cent) of the publications were multiple-authored with nearly one-third (31.1 per cent) of the publications being contributed by three joint authors (Table II). This shows that ratio of team work to that of sole work was 1.3:1, indicating a very low level of collaboration in LIS research. The degree of collaboration among academic librarians was computed as the ratio of the total number of collaborative publications to the total number of publications (Subramanyam, 1983). The computed degree of collaboration among Tanzanian academic librarians was 0.57, which again points toward a low level of teamwork. This is consistent with what Onyancha (2007) and Ocholla *et al.* (2012) reported as a weak collaboration in LIS research in Africa. Collaboration in research is often recommended, as it enables researchers to share skills and techniques; enhances transferring of knowledge (especially tacit knowledge); brings about cross-fertilization of ideas; provides intellectual companionship; plugs the researcher into a wider scientific network; and enhances the visibility of research works (Katz and Martin, 1997).

Productivity and scholarly impact of individual authors

The study findings in Table III indicate various productivity and impact measures of the top-ten ranked academic librarians in Tanzania. The mean scores for various metrics for these top-ten ranked academic librarians were 22 publications, 13.85 papers/author, 88 citations, 3.99 cites/paper, 5.76 cites/year, h-index of 5, g-index of 8, Hc-index of 3 and HI-index of 4. The top-ten ranked academic librarians together contributed more than half (59.4 per cent, $n = 258$) of all publications with an average of 25.8

Table II. Authorship pattern of publications

No. of Authors	No. of publications	(%)
Single authors	186	42.9
Two authors	135	31.1
Three authors	58	13.4
Four authors	44	10.1
Five authors	7	1.6
Six or more authors	4	0.9
Total	434	100.0

Table III.
Rank-list of most productive authors

Author name	No. of publications	Papers/author	Citations	Cites/paper	Cites/year	H-index	G-index	HC-index	HI-norm	Overall rank
E.T. Lwoga	41 (1)	22.33 (2)	202 (1)	4.93 (3)	18.36 (1)	7 (1)	13 (1)	6 (1)	5 (1)	1
A.S. Sife	21 (5)	11.17 (7)	144 (2)	6.86 (1)	14.40 (2)	3 (5)	12 (2)	4 (2)	3 (3)	2
J. Nawe	36 (2)	30.08 (1)	128 (3)	3.56 (9)	4.27 (6)	5 (3)	9 (3)	3 (3)	5 (1)	3
E. Kiondo	22 (4)	14.54 (4)	98 (5)	4.55 (4)	4.08 (7)	6 (2)	8 (4)	3 (3)	5 (1)	4
F.W. Dulle	23 (3)	12.83 (7)	99 (4)	3.96 (6)	6.19 (3)	7 (1)	9 (3)	3 (3)	4 (2)	4
M.J.F. Lwehabura	15 (10)	8.92 (8)	96 (6)	6.40 (2)	5.65 (4)	6 (2)	9 (3)	3 (3)	5 (1)	5
D.S. Matovelo	17 (8)	7.25 (13)	77 (7)	4.53 (5)	5.13 (5)	4 (4)	8 (5)	3 (3)	3 (3)	6
P. A. Manda	19 (6)	16.50 (3)	70 (8)	3.68 (8)	2.33 (14)	4 (4)	7 (6)	3 (3)	3 (3)	7
F. Mukangara	13 (11)	7.50 (11)	49 (9)	3.77 (7)	2.04 (16)	3 (5)	6 (7)	2 (4)	3 (3)	8
A.A.S. Mcharazo	18 (7)	13.32 (6)	36 (11)	2.12 (10)	1.80 (18)	5 (3)	5 (8)	1 (5)	4 (2)	8
W.L. Chilimo	16 (9)	7.92 (11)	29 (15)	1.81 (11)	2.90 (12)	3 (5)	4 (9)	3 (3)	2 (4)	9
J. Msuya	17 (8)	13.83 (5)	30 (14)	1.76 (12)	1.25 (20)	3 (5)	4 (9)	2 (4)	2 (4)	10
Means	22	13.85	88	3.99	5.76	5	8	3	4	

Note: Number in parentheses is the scholars rank on that measure

publications per author. These findings corroborate Lotka's 1(926) law of scientific productivity which postulates that large proportions of authors tend to produce relatively few article equivalents, with the bulk of production being made by a small number of individuals. In this case, E.T. Lwoga was the most prolific author (41 publications) followed by J. Nawe (36 publications) and F.W. Dulle (23 publications). The top three authors with the most papers per single author were Nawe (30.08 papers per author), Lwoga (22.33 papers per author) and P.A. Manda (16.50 papers per author). The number of papers per author is obtained by dividing each publication unit by the number of authors of that publication and summing the results over all publications.

When the authors were re-ranked based on citation counts, which indicates the usefulness of the publications, E.T. Lwoga maintained the first position (202 citations) followed by A.S. Sife (144 citations) and Nawe moved to the third position (128 citations), whereas Dulle moved to the fourth place (99 citations). This confirms the fact that one's citation counts depend on one's number of publications plus other factors such as the visibility of journals where one publishes, quality of publications, author's integration into scientific networks, age of publications, the size of the scientific community (Creamer, 1998; Zuckerman, 1991) and the topic or issues which one's publishes. When considering the number of cites given to each individual publication, Sife ranked the first followed by M.J.F. Lwehabura and Lwoga with 6.86, 6.40 and 4.93 cites per paper, respectively. The average number of citations per paper indicates the relative extent to which certain publications generate interest in the scientific community. With respect to the researchers' yearly impact, Lwoga ranked number one with 18.36 cites per year, followed by Sife (14.40 cites per year) and Dulle (6.19 cites per year).

The performance of academic librarians in Tanzania was also measured on the basis of the h-index, which is regarded as the most robust and accurate measure of productivity and impact (Harzing, 2008). Lwoga and Dulle had the h-indices of 7, meaning that seven of their publications had been cited seven or more times each, and the rest of the publications had fewer than seven citations. E. Kiondo and Lwehabura ranked the second (h-indices of 6), followed by Nawe and A.A.S. Mcharazo (h-index 5). Once more weight was given to the authors' highly cited publications (g-index), Lwoga had a g-index of 13 followed Sife (g-index of 12), and three librarians (Nawe, Dulle and Lwehabura) ranked the third with g-index of 9 each. When more weight was given to the newly published works (Hc-index), Lwoga had Hc-index of 6 followed by Sife (Hc-index 4) and six librarians (Nawe, Kiondo, Dulle, Lwehabura, D.S. Matovelo and Manda) had Hc-index of 3.

For junior scholars, the Hc-index is generally close to their regular h-index as most of their publications would be recent, whereas, for seniors, there can be substantial differences between the two indices as most papers included in their h-index are relatively old (Harzing, 2008). With regard to the HI-norm-index which evaluates the effects of co-authorship and estimates the per-author impact, Lwoga, Nawe, Kiondo and Lwehabura occupied the first position with HI-norm index of 5 each followed by Dulle and Mcharazo with indices of 4 each.

Overall, Lwoga ranked the first followed by Sife and Nawe. Whereas Lwoga maintained from first to third positions in various metrics, Sife fluctuated between the first and seventh position and Nawe was placed between the first and the ninth place. The top-ten ranked academic librarians showed variation among productivity and impact measures since no single scholar maintained the same rank in all nine metrics. Hence, these findings support the argument that multiple measures should be employed

when assessing scholars' performance. This means that there are no all-purpose indicators for measuring ones research performance. Almost all top-ten ranked scholars were from the University of Dar es Salaam and SUA with exception of Lwoga who is currently based at MUHAS (Lwoga also worked for SUA until 2010) and Mcharazo who is the current Director of the Tanzania Library Services (TLS) (Mcharazo also worked for MUHAS until 2008). It is also interesting to note that in addition to being such prolific researchers, many of the top-ten academic librarians listed held or they are still holding administrative positions too. For instance, Nawe, Kiondo, Dulle, Mcharazo and Msuya were the Library Directors for different periods.

It is worth noting that topping the list of researchers should not be considered that these scholars are always more prolific, neither should it create any sense of superiority for these individuals. Instead, scholars should simply use this as a means to show how they fare among others in the discipline in a particular period of time. It is also emphasized that ranking of academic librarians was based on publications and citations that were available online covering the period between 1984 and 2013. This means that some senior researchers could rank differently if their productivity and impacts were measured based on their career life and if offline publications and citations were retrieved.

Citations trends of individual publications

The study findings indicate that only three journal articles had received 25 or more citations. An article jointly produced by Sife *et al.* – *New technologies for teaching and learning: Challenges for higher learning institutions in developing countries* – published in the *International Journal of Education and Development using ICT* had received 100 citations. Another jointly produced article (I. Luambano and Nawe) – *Internet Use by Students of the University of Dar es Salaam* - published in the *Library Hi Tech News* had received 39 citations. Manda's article - *Electronic Resource Usage in Academic and Research Institutions in Tanzania* – published in the *Information Development* had been cited 25 times (Table IV).

Journal preference for publication

The analysis of distribution of articles in journals revealed that during the period under study, only 17 journals had published three or more articles. In total, 174 journal articles which is equivalent to 40 per cent of all publications were published in these 17 journals (Table V). The *University of Dar es Salaam Library Journal* (with 75 articles) was the only Tanzanian journal that published three or more articles. Most academic librarians published

Author(s)	Article title	Journal title	No. of citations
Sife *et al.* (2007)	New technologies for teaching and learning: Challenges for higher learning institutions in developing countries	*International Journal of Education and Development using ICT 3 (2)*	100
Luambano and Nawe (2004)	Internet Use by Students of the University of Dar es Salaam	*Library Hi Tech News*	39
Manda (2005)	Electronic Resource Usage in Academic and Research Institutions in Tanzania	*Information Development*	25

Table IV.
Highly cited articles

their research results in foreign journals and the *Library Review* tops the list of foreign journals followed by the *Information Development* and the A*frican Journal of Library, Archives and Information Science*. According to Lancaster (1982), many scientists in developing countries prefer to publish in foreign journals rather than in their native journals for the sake of prestige and recognition. On the other hand, it can be said that there is a scarcity of relevant journals in the country for publishing LIS research.

Conclusion

This study has provided insights of the research productivity and scholarly impact of Tanzanian academic librarians for a period of 30 years from 1984 to 2013. The findings indicate that academic librarians produced an average of 14.5 publications per year during the period under study. One-third (33 per cent) of academic librarians had either not produced any research publications or their publications were not visible online. The study findings also indicated a low level of teamwork among LIS scholars in Tanzania. The top-ten ranked LIS researchers showed considerable variation in various metrics, as no single scholar maintained the same rank in all nine metrics. This finding supports the argument that multiple measures should be used when evaluating productivity and impact of scholars. Overall, Lwoga was the top ranking scholar followed by Sife and Nawe. The findings indicate further that only three journal articles had received 25 or more citations. Most academic librarians published their research results in foreign journals and the *University of Dar es Salaam Library Journal* was the only Tanzanian journal that published three or more articles. This study used the PoP software which uses Google Scholar to retrieve scholars' publications, citations and related metrics. This method can be used to assess research productivity of not only Tanzanian LIS scholars but also other scientists in various fields, institutions and countries with similar setting.

Based on the study findings, a number of recommendations can be made. First, several indicators should be considered in combination when evaluating research performance of individual scholars. Second, researchers should publish substantial

No.	Journal	No. of articles
1	*University of Dar es Salaam Library Journal*	75
2	*Library Review*	18
3	*Information Development*	14
4	*African Journal of Library, Archives and Information Science*	13
5	*International Journal of Education and Development Using ICT*	10
6	*Electronic Journal of Information Systems in Developing Countries*	6
7	*International Journal of Computing Research*	6
8	*Journal of Information Science*	4
9	*Tanzania Journal of Forest and Nature Conservation*	4
10	*Campus-Wide Information Systems*	3
11	*INDILINGA: African Journal of Indigenous Knowledge System*	3
12	*Library Management*	3
13	*Information Technology Development*	3
14	*New review of information and library research*	3
15	*Journal of Librarianship and Information Science*	3
16	*Libri*	3
17	*Mousaion*	3

Table V.
Journal preference of researchers

number in highly cited journals to improve their productivity and impact. This calls for scholars to publish their research papers in journals that are widely visible such as e-journals and, particularly, open-access journals. Third, as scientific research is collaborative in nature, team work in research and publication should be encouraged among librarians within and outside the country. This collaboration should also be encouraged within and outside the LIS profession for the maturity of the discipline in the country. For instance, senior librarians should be encouraged to collaborate in research with junior staff and students. Fourth, there is a need to establish LIS online journals in Tanzania to encourage librarians to publish their findings. One option could be to establish a journal under the Consortium of University and Research Libraries in Tanzania or Tanzania Library Association. Finally, LIS schools in the country should put emphasis on teaching bibliometrics/scientometrics in their courses because few studies have been conducted in Tanzania on the given subject. Future bibliometric research in the country could investigate factors that determine the research performance of individual academic librarians. The limitation of this study is that it only focused on publications that were retrieved by PoP through Google Scholar.

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