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A bibliometric analysis of the Tanzania Journal of Agricultural Science (1998-2017)

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Introduction

The term bibliometrics was first coined by Pritchard in 1969. From there on different people defined and interpreted bibliometrics in various ways. For instance, British Standards Institution, (1976) define bibliometrics as the use of mathematical and statistical methods to study documents and patterns of publication. One year later Hawkins (1977) interpreted bibliometrics to mean the “quantitative analysis of the bibliographic features of a body of literature”.

Historically, the term “librametry” was firstly used as coined by S.R. Ranganathan to refer quantitative study of librarianship. Bibliometrics is analogous to Ranganathan’s librametrics and the Russian concept scientometrics (Thanuskodi, 2010).

Tanzania Journal of Agricultural Science (TAJAS) is a peer reviewed scientific journal that publishes original and scholarly research articles dealing with fundamental and applied aspects of agriculture, food, aquaculture and agricultural mechanization. It is published jointly by College of Agriculture, Sokoine University of Agriculture and Tanzania Ministry of Agriculture, Livestock and Fisheries (<https://www.ajol.info/index.php/tjags>).

Significance of the study

Bibliometric study of periodicals is very important because it equip librarians with basic knowledge on journal trends and characteristics which is necessary for librarians in making

proper decisions in collection development. It further help researchers to make informed decision regarding a place to publish their research outputs.

General objective

To establish publication characteristics and development of the Tanzania Journal of Agricultural Science for 20 years.

Specific objectives

1. To identify the number of articles published in 1998-2017
2. To determine the year wise distribution of articles
3. To establish the degree of collaboration by studying authorship pattern
4. To establish most prolific countries contributed to TAJAS

Reviewed Literature

Bibliometric studies have been widely used to examine the publication characteristics and development of journals (Zeleznik, Vosner and Kokol, 2017) to establish collaboration pattern, research productivity (Haddow, Xia and Willson, 2017; Thavamani, 2015; Strydom and Els, 2016; Rajgoli and Laxminarsaiah, 2015; Navaneethakrishnan, 2014; Khaparde and Pawar, 2013) and to rank research departments and institutions (Ellegaard and Wallin, 2015). Bibliometric methods are suitable for the determination of the quantity and focus of research output by a particular organization (Ziegler 2009).

One of the parameters which can be measured by bibliometrics methods is the extent of collaboration in authorship. The extent of collaboration in authorship have been reported widely. For instance, the studies by (Swan, 2014; Kasa, Ibrahim and Momoh, 2014) revealed that multi authored papers were dominating the journals under the studies. Several reasons have been attributed to multi authorship these include authors' field of specialization, individual attitude, psychological

and organisational factor. For example, previous studies by (Real, 2012; Khaparde and Pawar, 2013) revealed that the extent of collaboration differs from fields to fields; sciences researchers collaborate more than humanists. Other studies have revealed that authors from science fields collaborate at higher rates than social sciences and humanities (Abramo et al., 2014; Bordons and Gomez, 2000). However, Brocato (2001) pointed that the extent of collaboration may be attributable to individual characteristics, psychological factors, environment and organizational factors. Yet, Edge et al. (2012) attributed researcher behavior and attitude towards each other as the major factor driving academics to work with others, interact, motivate and also to support each other, and making research output freely and openly available. Other parameters which have successful measured by bibliometrics include year's distribution of journal articles (Oluwakemi and Paul, 2012; Swain, 2013; Ellegaard and Wallin, 2015; Strydom and Els, 2016; Ani and Okwueze, 2017).

Although there are more than one Journals hosted by SUA, the researchers decided to study only single journal study. This is due to the fact that studying a single journal helps to characterise the journal thus giving more insights about the quality, maturity and productivity of the journal (Zainab, Anyi and Anuar, 2009).

In their study about the *Journal of Documentation* Nebelong-Bonnevie and Faber Frandsen (2006) indicated that single journal studies provided a comprehensive multi-faceted image of the features of a particular journal in study. Therefore, selected bibliometric measures such as number of articles published for the period of 20 years, authorship collaboration and geographical distribution of the authors were used to study the Tanzania Journal of Agricultural Sciences.

Methodology

The data was collected from the website African Journal Online (AJOL) in order to establish publication characteristics and development of the Tanzania Journal of Agricultural Science for 20 years. Based on the objectives of this study, the bibliometric method was used to examine the articles published in the TAJAS from 1998-2017. Bibliometric is a quantitative study of the published or bibliographic units. Bibliometric studies have been used widely to provide useful indicators in research development such as research productivity, collaboration and trends. (Jacobs, 2001; Crawley-Low, 2006; Hussain, Fatima, and Kumar, 2010; Thanuskodi, 2010; Nongrang and Laloo, 2016).

All articles available from (Volume 1-15) were retrieved and data were extracted based on the set parameters with the exception of articles from 2004,2008,2009,2011, 2012 and 2017 which were missing during data collection. Then Microsoft Excel was used to organise the data year wise, country wise, institution, authorship and number of articles. The results were then presented in Tables and Graphs.

Data analysis and discussion

Number of articles and authorship patterns (1998-2017)

The number of articles and authorship patterns per period of time is presented in Table 1. The results show that for the period of twenty years TAJAS produced 197 articles with various authorship patterns. The production of research output has not been stable since the establishment of the TAJAS in 1998. The results revealed that for period of 1998-2002 95 (48%), 2003-2007 50 (25%) and 2013-2017 45 (23%) articles were produced with the remarkable decrease in 2008-2012 where only 7 (4%) articles were published in the five years. The data further revealed that the publication frequency of TAJAS is not defined, though it was stated that the journal produces two volumes per year, which is contrary to the data collected in Figure 1 which shows that six years were missing (2004,2008,2009,2011 and 2012) and 2017 was available with no volumes. Publication frequency has implication in authors choice of the journal. Some authors have tight timeframes for publication due to various reasons such as tenure or promotion cases (Knight and Steinbach, 2008) and nature of the research topic where by topical area need to be published on time before the findings become obsolete (Lang, 2003).

To determine extent of collaboration the Subramanyam (1983) formula which is expressed mathematically as; $C = N_m / (N_m + N_s)$ was used. In which C is the degree of collaboration in a discipline. N_m is the number of multi-authored research papers in the discipline published during a year. N_s is the number of single authored research papers in the discipline published during a year.

The calculations show that the overall degree of collaboration in the articles published in the Tanzania Journal of Agricultural Sciences was 0.91 which means that multi authored articles

(179 articles out of 197) have dominated this journal. These results agree with other researches that, although there are variations in the extent of collaboration in various fields, sciences researchers agree the critical role of collaboration in scientific research than humanists. (Real, 2012; Khaparde and Pawar, 2013). The studies conducted by (Abramo et al., 2014; Bordons and Gomez, 2000) revealed that authors from science fields collaborate at higher rates than social sciences and humanities fields authors. Although authorship pattern is not the perfect measure of the extent of collaboration in research or rather in authorship, the general assumption is that multiple-authorship is evidence of an increase in collaboration. In addition, implying co-authorship with collaboration is, invariant, verifiable and relatively inexpensive and practical method for quantifying collaboration (Katz and Martin, 1997).

Table 1 Number of articles and authorship patterns (1998-2017)

Authorship/Years	1998-2002	2003-2007	2008-2012	2013-2017	Total-author wise
Single authored papers	12	5	0	1	18
Two authored papers	18	14	2	7	41
Three or more authors	65	31	5	37	138
Total-year wise	95 (48%)	50 (25%)	7 (4%)	45 (23%)	197
Degree of collaboration (C=Nm/Nm+Ns)	0.87 (83/95)	0.9 (45/50)	1 (7/7)	0.98 (44/45)	0.91 (179/197)

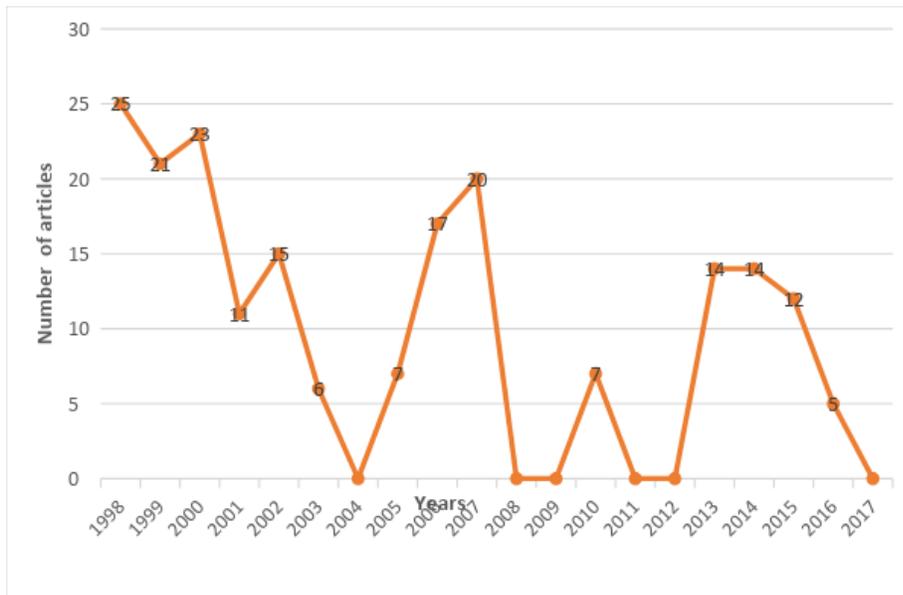


Figure 1 Year wise distribution of articles (1998-2017)

Contribution of authors country wise (1998-2017)

The bibliometric analysis for the period of 20 years from 1998 to 2017 revealed that 197 articles were published in the Tanzania Journal of Agricultural Sciences. Moreover, the journal reached a very wide audience of authors located in 22 countries. However, the top five countries with highest authorship contribution are Tanzania, UK, Norway, USA and Denmark.

Table 2 Contribution of authors country wise (1998-2017)

	Countries	Contributions	Percentage (%)
1	Tanzania	209	65.9
2	United Kingdom (UK)	32	10.1
3	Norway	15	4.7

4	United State of America (USA)	11	3.5
5	Denmark	10	3.2
6	Nigeria	8	2.5
7	Kenya	8	2.5
8	Uganda	3	0.9
9	Canada	3	0.9
10	Ghana	3	0.9
11	Belgium	2	0.6
12	Zimbabwe	2	0.6
13	Japan	2	0.6
14	Austria	1	0.3
15	Turkey	1	0.3
16	Philippines	1	0.3
17	Israel	1	0.3
18	German	1	0.3
19	Ethiopia	1	0.3
20	Colombia	1	0.3
21	France	1	0.3
22	South Africa	1	0.3
	Total Contributions	317	

Conclusion and recommendation

The bibliometric analysis for the period of 20 years from 1998 to 2017 revealed that a total of 197 articles were published in the Tanzania Journal of Agricultural Sciences from all years with the exceptions of six years; 2004,2008,2009,2011, 2012 and 2017 which were missing articles. This is contrary to the TAJAS policy which requires the journal to publish two volume per year. This is very serious matter because inconsistency in the frequency of publication has the implication to the journal reliability and thus authors' choice.

Moreover, it was revealed that TAJAS reached a very wide audience of authors located in 22 countries globally with majority of the research articles written by two or more authors from one or more countries. However, the top five countries with highest authorship contribution are Tanzania, UK, Norway, USA and Denmark. This study recommends that the multi authorship should be maintained and encouraged because collaboration is one of the important elements in career and research development. The researchers recommend further research to find out the extent of contribution of each participating institution from the top five countries. Further research should be conducted to establish the reasons inconsistency in frequency of publication of TAJAS.

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