Citation Analysis on the Articles Published in Bayero Journal of Pure and Applied Sciences (BAJOPAS), from 2008-2020. An International Journal in Bayero University, Kano, Nigeria

By

G. A. Babalola, (PhD)
Department of Library and Information Science,
Federal University of Technology, Minna, Niger state, Nigeria
E-mails: gbabalola@futminn.edu.ng

Muhammad Yusuf, MLS (CLN)
University Library,
Bayero University, Kano
E-mail: ymuhammad.lib@buk.edu.ng

Yahuza Aliyu, (CLN)
University Library,
Bayero University, Kano

Abstract

An analysis was carried out on 19,759 citations appended to the References Section of 881 research articles published in Bayero Journal of Pure and Applied Sciences. It was found that journals publications were the most cited source of information among pure and applied sciences scientists with 12,090 (61.2%). The study also revealed that researchers in the field of pure and applied sciences used very current and up to date information sources in writing theirs articles with 10,091 (51.1%) citations and an average mean 11.1 per article in the journal.

Keywords: Citation Analysis, BAJOPAS, Journal Article, Bayero University Kano, Nigeria,

Introduction

Citation analysis literally was derived from the combination of two words "citation" which means 'reference' and "analysis" refers to 'study'. This connote as the study of reference. In view of this, A reference is the acknowledgment that one document *gives* to another; a citation is the acknowledgment that one document *receives* from another. In general, a citation implies a relationship between a part or the whole of the cited document and a part or the whole of the citing document (Smith, 1981). Citation analysis as a concept was defined vigorously by different scholars for instance: Gupta and Rattan (2013) defined Citation analysis as a "bibliometric technique of counting citations".

It also, refers to mathematical analysis of references or citations appended at the end of each scientific communication as an essential part of it. Analysis of cited papers is used as a measure of impact of individual articles, periodicals, authors, etc. and has become an accepted practice in almost all scientific communications and a well-established part of information research. Citation analysis is a tool to identify the core references in a subject by counting the citations appended at the end of each scientific article. It is basically a technique, which involves the process of collection, counting, analysis and interpretation of citations given in research writing and thereby helping in identification of significant sources of information (Simisaye & Osinaike 2010)

However, citation analysis is about much more than producing shock statistics. Along with peer review, it has over the past three decades been increasingly used to judge and quantify the importance of scientists and scientific research. Citation analysis is also the machinery behind journal "impact factors" – figures of merit that researchers take note of when deciding which journal to submit their work to so that it is read as widely as possible. Indeed, the output from citation studies is often the only way that non-specialists in governments and funding bodies – or even those in different scientific disciplines – can judge the importance of a piece of scientific research.(Meho, 2007). The significance of citation analysis are enormous, Gooden (2001) indicated that citation analysis has been used for the following: journal subscription, cancellation, weeding, relegation to remote storage and filling-in-gap decisions; budgeting; a checklist for collection evaluation; defining the core; collection development planning concerning the age, language or formats collected; and comparing scholarly communication patterns among different disciplines.

Bayero Journal of Pure and Applied Sciences (BAJOPAS) is an international journal that publishes original research and critical reviews in broad areas of Agricultural Sciences, Biological Sciences, Biochemistry, Chemistry, Computer Science, Engineering, Environmental Sciences, Geography, Laboratory Science and Technology, Mathematical Sciences, Microbiology, Physics and Medical Sciences. BAJOPAS is an online (hard copy available also) biannual publication (June & December) with intent to publish more frequently in the future depending on availability of accepted manuscripts. The journal started publication in Dec. 2008.The journal has been gaining patronage and ground as reputable journal in pure and applied sciences in the country. The journal is currently published by the Deanery of the College of Natural and Pharmaceutical Sciences of Bayero University, Kano, (BAJOPAS, 2017).

Bayero University, Kano is a federal university situated in Kano. Kano is a state in the North-west Geo-political zone of Nigeria. The university was established as a university college in 1960 and was made full pledge university in 1975. Nigeria is a federal republic in West Africa, bordering three French speaking countries of Niger, Chad, Cameroon and the Atlantic Ocean. The federation comprises of thirty six (36) states and Federal Capital Territory (FCT) Abuja. This study intends to carry out citation analysis of BAJOPAS with the view to finding out characteristics and patterns of citations used by authors of articles in the journal .The study becomes imperative as literature survey revealed that no study of this nature has been conducted on the journal. This, therefore, poses a problem that makes the study worthwhile of investigation. Thus, this study attempts to investigate the types, frequency and currency of the information sources cited in Bayero Journal of Pure and Applied Sciences.

Aim and Objectives of the study

The main aim of this study is to apply citation analysis as a branch of bibliometrics in examining the frequency of sources cited by authors of articles in Bayero Journal of Pure and Applied Sciences. Therefore, the specific objectives are designed to:
I.   find out the types of sources cited by authors of articles in Bayero Journal of Pure and Applied Sciences;
II.   examine the frequency of sources cited by authors of articles in Bayero Journal of Pure and Applied Sciences;
III. ascertain the currency of the information sources cited

Review of Literature

Literature review is of enormous importance in the conduct of any study and one of the most important steps in the research process. It is an account of what is already known about a specific phenomenon. A review of literature reveals that a lot of studies have been carried out in the field of Bibliometrics, Scientometrics, and Citation Analysis and these studies elaborate a complete scenario of concerning topic very well; therefore, every research publication keep its existence marvelously. Some related literature has been taken into account for conducting this study. The review of literature for this study was carried out under the following sub-headings:

Types and frequency of information sources cited in articles published in journals

In a study conducted by Anaehobi and Ofoedu (2021) on a citation analysis using indicators such as types of cited sources, most cited journals, most cited books, age of cited journal and books and availability of cited journals and books in the university library. A total of four thousand, seven hundred and thirty (4,730) citations were obtained from the 85 theses. The findings of the study revealed that journal was the most cited source with 2,001 (42.30%) citations. Book is the next most cited source with 1,365 (28.86%) citations.

Kodandarama and Chandrashekara (2020) conducted a citation analysis of chemistry publications by faculty members and research scholars at University of Mysore and Karnatak University. The findings among others revealed the use of various information sources in research publications. Source wise distribution of citations shows the highest journal literature use in the study which accounts for 89.98% of overall citations. Results indicate that literature.

Anunobi, *et al.* (2012) in their study titled Citation analysis of Postgraduate Students as a Measure of their Resource Preference found that out of 2,350 citations generated, journal articles were cited most with 34.12 % citations, of 2,350 citations generated, journal articles were cited most with 34.12 % citations, generated 29.91 %. The most cited journal was Nigerian Journal of Animal Production with 54 (6.73%) citations.

Haque (2012) has analyzed a citation pattern in The Journal of Poultry Science (JPS). The study's main goals from 2001 to 2010 were to determine the authorship and citation patterns of articles published in the JPS. During that time, a total of 425 articles were published. There have been a total of 13012 citations with 425 contributors. Journal articles accounted for 84 per cent of the citations, followed by books at 8%.

Zhang (2013) compared uses of research materials in chemistry versus chemical engineering dissertations completed at Mississippi State University, 2002–2011. Unsurprisingly, journal articles and books were the dominant format of cited sources, and conference proceedings and web resources accounted for much of the remainder. In addition,

Currency of information sources cited in articles published in journals

Currency is the state of being recent, up to date, current, keeping up with times as in information and extending to the present time including to the latest information. According to Muokebe (2012) current information resources are information that are used or accepted by people at present time. On the currency of information resources a citation analysis of Makama (2015) found that undergraduate students used resources that were very current side by side those that were very fairly current. Citation analysis conducted by Fasae (2012) found out that out of 4227 citations, 475 (11.24%) were below the period of 5 years and classified as very current,

while the highest 1902 (45%) citations fell between 16 years and above are classified as not current.

In addition, Kocher and Kelly (2017) conducted a citation analysis on four journals covering the topic of food systems. The analyses revealed that the most-cited types of works was Journal Article (56%) followed by Book or Book Chapter (19%) and Government Publication (6%), the most commonly-cited journals was agronomy journal with 250 citations (4%) of the total journal citations in this discipline, age of materials cited, geographic location of authors shows that the majority (46%) of authors are based in the United States, the average number of references cited per article was 46.

Salisu and Gama (2017) examined the currency of information sources cited in masters' degree dissertations. The findings reveals that masters' degree students used non-current information sources in writing their dissertations because law is conservative in nature and legal profession is strict about tradition, it follows the precedents always. In their studies on Citation Analysis of Journal of Natural Rubber Research, Tiew and Kaur (2000) revealed that, 4181 citations affixed to the References of 250 research articles and 8 short communications in Journal of Natural Rubber Research. It was found that Rubber scientists are also quite up-to-date in their search for knowledge, as references cited were fairly recent with 55.97%.

However, going by the review, there is no literature on currency of information sources cited in Bayero Journal of Pure and Applied Sciences. Equally, the citation studies reviewed so far focused on different areas of study and branches of knowledge, without involvement of adequate citations in the area of pure and applied sciences in Nigeria. This study, therefore, set to bridge the identified gap.

METHODOLOGY

The study used documentary research methodology and the *ex-facto research design* because it best suits the research topic as the citations and references of each article was analyzed. The population of the study is 881 articles published in Bayero Journal of Pure and Applied Sciences, from 2008-2020. A checklist was designed for data collection. The data collected was analyzed using descriptive statistics.

Data Presentation, Analysis and Discussions of Findings

This segment present the analysis of the data collected using data collection checklist. It also involves discussion of findings from the data, which strive to substantiate the findings of the present study with previous studies to reveal their relevance or otherwise.

Types and frequency of information sources cited in the articles published in the journal

This gives the frequency of the types of information sources cited in the articles. Below is the analysis of the data.

Table 1: Types and frequency of information sources cited

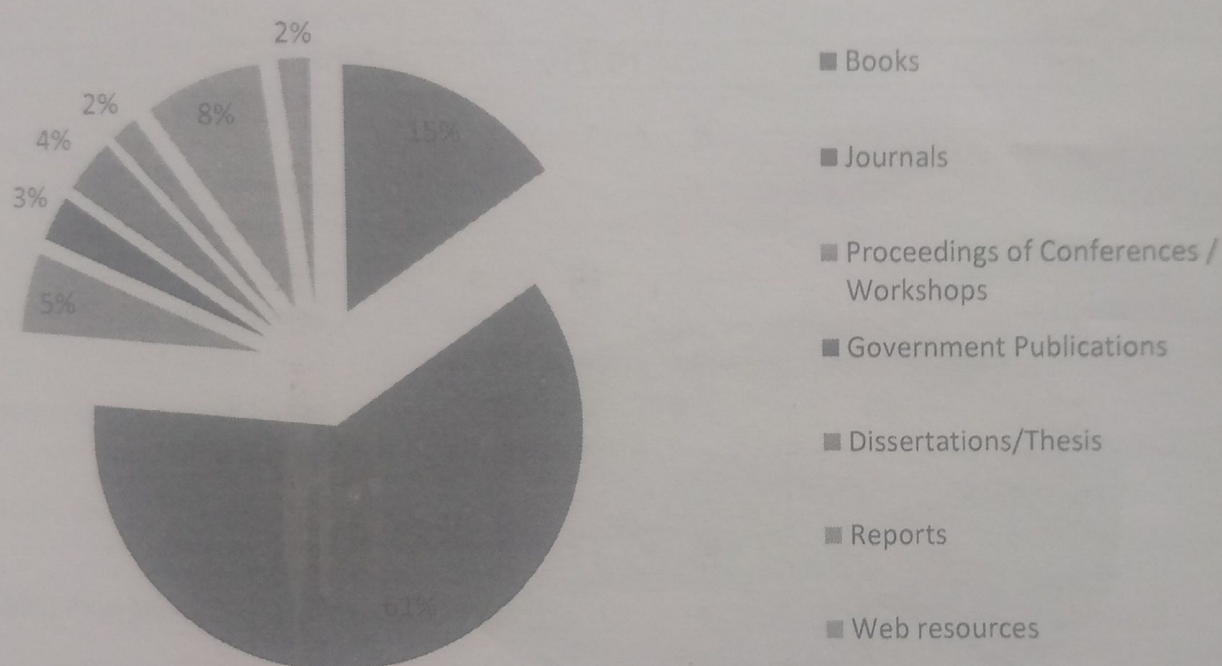|	Types of Sources	Frequency	Percentage	Mean Number of Sources Cited
1	Books	2,991	15.1	3.4
2	Journals	12, 090	61.2	13.7
3	Proceedings of Conferences / Workshops	1,037	5.3	1.2
4	Government Publications	597	3.0	0.7
5	Dissertations/Thesis	714	3.6	0.8
6	Reports	361	1.8	0.4
7	Web Resources	1,556	7.9	1.8
8	Others	413	2.1	0.5
	Total	19,759	100	22.5

Figure 1: Types and Frequency of information sources cited

Table 1: indicate the types and frequency of information sources cited in Bayero Journal of Pure and Applied Sciences studied. A total of 881 articles in twelve volumes (2008-2020) of the journals were studied and 19,759 citations were recorded. The findings of the study reveal that Journals 12,090 (61.2%) were the most cited sources of information by the researchers in the journal because they are the main primary sources of latest information in the field of pure and applied sciences, followed by Books 2,991 (15.1%) which shows that traditional secondary of information sources were also vital information resources cited. This finding corroborate with the findings of Anaehobi and Ofoedu (2021), Kodandarama and Chandrashekara (2020), Kocher and Kelly (2017) and Zhang (2013) who found journals to be the most cited information sources and followed by books in their studies. The results further reveals that Proceedings of Conferences / Workshops were cited with 1,037(5.3%), Web Resources were cited with 1,556 (3.7%), Dissertations and Theses were cited with 714 (3.6%), Government publications were cited with 97 (3.0%), Reports were cited with 361(2.4%), and lastly others were the least cited with 413(2.8%) only.

Currency of information sources cited

This section analyses the currency of information sources cited in term of year of publication of each sources cited in the articles published in the journal. The result of the analysis is as follows:

Table 2: Currency of information sources

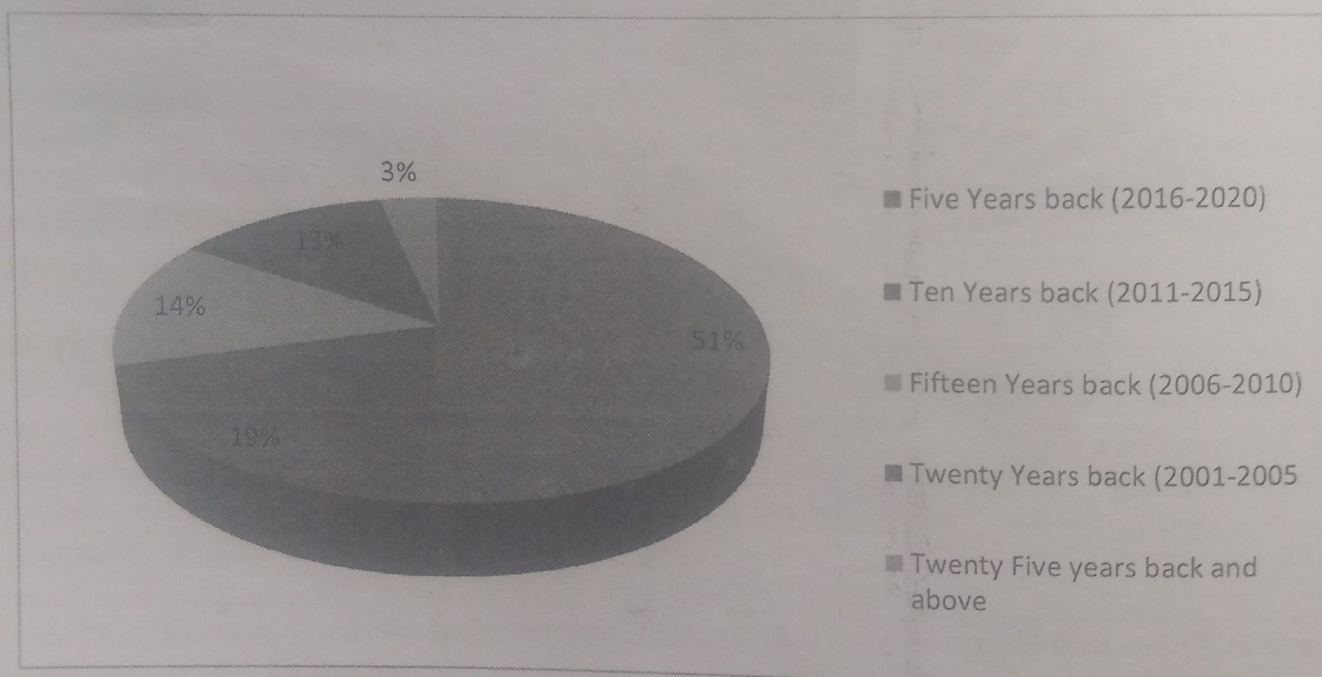|	Publication Range	Frequency	Percentage	Mean Number of Sources Cited
1	Five Years back (2016-2020)	10,091	51.1	11.5
2	Ten Years back (2011-2015)	3,838	19.4	4.4
3	Fifteen Years back (2006-2010)	2,687	13.6	3.1
4	Twenty Years back (2001-2005)	2,490	12.6	2.8
5	Twenty Five years back and above	653	3.3	0.7
	Total	19,759	100	22.5

Figure 2: Currency of information sources

Table 2 indicates the currency of information sources cited in Bayero Journal of Pure and Applied Sciences studied. A total of 19,759 citations were recorded from 881 articles in twelve volumes (2008-2020) of the journal studied. Five years back had the highest of number of currency level of citations with a total of 10,091 (51.1%) citations and an average mean 11.1 per article in the journal, next was ten years back followed with 3,838 (19.4%) citations and an average mean of 4.4 per article in the journal, next was fifteen years back having a total of 2,687 (13.6) citations and an average mean of 3.1 per article. Twenty years back with 2,490 (12.6) citations and an average mean of 2.8 per article in the journal. Twenty five years and above had the least with 653 (3.3) citations and an average mean of 0.7 per article in the journal. The findings to this study reveals that researchers in the field of pure and applied sciences used very current and up to date information sources in writing theirs articles, because scientist are non-conservative but progressive in nature, pure and applied sciences profession is dynamics as a result of new and latest discoveries. The result showcased that new discoveries are very germane in the field of pure and applied sciences. This finding is unlike the findings of Salisu

and Gama (2017) and Fasae (2012) who found in their studies the high use of non-current information sources among different researchers.

Conclusion and recommendations

It is concluded that researchers in the field of pure and applied sciences frequently use journals and books as information sources in their research than any other type of information sources. It is also observed that latest and up to date information is very crucial to the scientists because of the dynamic nature of their profession.

It is therefore recommended that there should be more subscription to many new reputable journals of both local and international. There should be purchase of many new books in the library as researchers from the field of pure and applied sciences are more interested in using journals and books in their researches.

References

Anunobi, C. V., Okoye, I. & Chima, N. J. (2012) Citation Analysis of Postgraduate Students as a Measure of Their Preferences. *International Journal of Social Science and Education 2(4), 646-656.*

Fasae, J. K. (2012) Citation Analysis of Dissertations and Theses Submitted to the Department of Agricultural Economics and Extension, Federal University of Technology Akure, Nigeria. Library philosophy and practice (e-journal).

Gooden, A. M. (2001). Citation Analysis of Chemistry Doctoral Dissertations: An Ohio State University Case Study. Retrieved from http://www.istl.org./1-fall/referred.html

Gupta, K. & Rattan, G. K. (2013). Citation Analysis of Information Research: An International Electronic Journal. *Library Philosophy and Practice (e-journal).* 1034. Retrieved from http://digitalcommons.unl.edu/libphilprac/1034

Hussain, A. & Swain, D. K. (2011) A Citation Analysis of Top Research Papers of Computer Science. *International Research: Journal of Library and Information Science, 1(2).*

Kocher, M. & Kelly, J. (2015) Food Systems Citation Analysis: Trends in an Emerging Interdisciplinary Field. *Agricultural Information Worldwide, 7 (2), 212-220.*

Makama, A. M. (2015). Citation Analysis of Undergraduate Projects in Abubakar Tafawa Balewa University, Bauchi (2010-2012). Unpublished Thesis.

Meho, L. I. (2007). The Rise and Rise of Citation Analysis. *Physics World,* 20 (1), 32-36.

Muokebe, B.O. (2012). Citation Analysis of Masters' Theses by Postgraduate Students at Nnamdi Azikiwe University, Awka. Retrieved from www.naudigitallibrary.wordpress. Com.

Salisu, Z. I. & Gama, U. G. (2017) Citation Analysis of Information Sources Used in Masters' Degree Dissertations in the Faculty of Law, Bayero University, Kano, Nigeria. *Ebonyi Journal of Library and Information Science, 4(2), 314-22.*

Simisaye, A.O. & Osinaike A. B. (2010) Citation Analysis of Journal of Library and Information Science (2004-2009) 4(1), 35-60 retrieved from http://www2.marilia.unesp.br/revistas/index.php/bjis/index

Smith, L. (1981). Citation Analysis, *Library Trends, 30, 83-106.*

Tiew, W.S. & K. Kaur (2000) Citation Analysis of *Journal of Natural Rubber Research,* 1988-1997 *Malaysian Journal of Library & Information Science, Vol. 5, no.2, December 2000: 45-56*