



## CITATION ANALYSIS OF LIS PUBLICATION OUTPUTS IN THE WEB OF SCIENCE IN NIGERIA

**Innocent Iwezor Ordu Ph.D**

Department of Library and Information Science  
Rivers State University Nkpolu-Oroworukwo, Port Harcourt  
Email: [innocent.ordu@ust.edu.ng](mailto:innocent.ordu@ust.edu.ng), [innocent.iwezor@gmail.com](mailto:innocent.iwezor@gmail.com)  
**08065054441**

&

**Boma Torukwein David-West PhD**

Department of Library and Information Science  
University of Port Harcourt  
[boma.davidwest@uniport.edu.ng](mailto:boma.davidwest@uniport.edu.ng)

### **Abstract**

*This study examined citation analysis of LIS publication outputs in Nigeria from 2000-2016 in the Web of Science (WOS) database. To accomplish the research purpose, three research questions were formulated to guide the study. A descriptive research survey design was adopted while 270 articles formed the population of the study and also used as the sample size, mean while a purposive sampling technique was used with a checklist as instrument for data collection. The study was limited to the use of Social Science Citation Index (SSCI) and Arts and Humanities Citation Index (AHCI) all in WOS to analyze the citation of publication outputs in LIS for Nigeria while publication counts and analysis were used to analyze data based on the research questions. The results of the study indicated that, the highest citation index was 78 citations while the lowest was 1 citation. Meanwhile funding of LIS research was relatively poor in Nigeria while the TETFUND was adjudged to be the major funding agency of LIS research in Nigeria. It was recommended that, increased funding of LIS research could improve research productivity; also, alternative sources of funding should be encouraged to enhance the efficiency of research among scholars.*

**Keyword:** citation Analysis, Publication, Library, Web, Science

### **Introduction**

Research is one of the core activities of universities, just as it is the case with similar institutions of higher learning across the world. Despite the responsibilities of teaching and learning, academic staff also engages in community services. Among these activities, research is a critical indicator used in performance evaluation of academic staff in Nigeria. Research inventions, innovations, and ideas are the driving force of modern society, they are undertakings which are supposed to be funded by government and the private sector, although the level of research

funding in Nigeria is relatively low when compared to other developed countries. However, measuring and studying research activities in any country through bibliometrics methods is vital; especially, to justify the scarce allocation of funds; itemize an appropriate national research policy according to the available resources and to obtain information about the current state of research growth in particular areas and direct researchers to new line of research. The purpose of any research is to bring novelty in the field towards national development. Thus, publications are always expected to be of high quality in order to produce knowledge that is applicable outside the research environment.

Citation analysis is the study of the impact and assumed quality of an article, an author, or an institution based on the number of times works and/or authors have been cited by others. It also explains a way of measuring the relative importance or impact of an author; an article or a publication by counting the number of times that author, article, or publication has been cited by other works. The essence of citation analysis is to find out how much impact a particular article has had by showing which author(s) based some work upon it or cited it as an example within their own papers.

Also, to find out more about a field or topic and to determine how much impact a particular author has had by looking at the number of times his/her work has been cited by others. Meho (2007) has observed that citation analysis is actually a branch of information science in which researchers studied the way articles in a scholarly field are accessed and referenced by others. It has been used for the purpose of scholarly analysis and evaluation in several fields of human endeavor.

The importance of research is immeasurable because it is vital in all fields of knowledge because it in taking essential decisions making and brings about consistency in works. Research helps to develop new understandings that are relative to learning and teaching. Research in the area of Library and Information Science (LIS) provide solution related to the discipline and it helps in moving the profession forward as new findings are unfolded. Based on this, there is need to ascertain the level of growth and impact made so far in LIS discipline through bibliometric studies and analysis. This study is carried out to ascertain the citation analysis of LIS publication

outputs in the Web of Science in Nigeria from 2000 to 2016 using the Web of Science Database as source platform.

### **Aim/Objective of the Study**

The main aim of this study is to examine the citation analysis of LIS publication outputs in the Web of Science in Nigeria. More specifically to:

1. Find out the Citation analysis of LIS publication outputs in Nigeria in the WOS.
2. Identify fields/areas of research where LIS publications were published.
3. Identify funding agencies of LIS research in Nigeria.

### **Research Questions**

The following research questions were formulated to guide the study as thus:

1. What is the level of citation analyses of LIS publication outputs in Nigeria in the WOS?
2. Which fields/research areas were LIS publications published?
3. Which agencies funded LIS research in Nigeria in the WOS?

### **Scope of the Study**

This study focused on the citation analysis, research areas and funding agencies of LIS publication outputs in Web of Science database in Nigeria from 2000 to 2016. The WOS is one of the common database source platforms for bibliometric studies. This study is limited to the use of Social Science Citation Index (SSCI) and Arts and Humanities Citation Index (A & HCI), which covers all articles published for LIS in Nigeria from 2000 – 2016 with regards to the variables of the study.

### **Literature Review**

Citation analysis is the study of the impact and assumed quality of an article, an author, or an institution based on the number of times works or authors have been cited by others. It also explains a way of measuring the relative importance or impact of an author; an article or a

publication by counting the number of times that author, article, or publication has been cited by other works. The essence of citation analysis is to find out more about a field or topic and to determine how much impact a particular author has had by looking at the number of times his/her work has been cited by others. Most bibliometric studies provide a citation analysis of the research field, usually in the form of top – N lists of the most cited studies, authors or journals in the study area. Citations are used as a measure of influence. If an article is heavily cited, it is considered important. This proposition is based on the assumption that authors cite documents they consider relevant to their work.

A study examined elements of the history of research publications on accounting's past through an analysis of citations appearing in 546 articles published from 1996 to 2008 in the three specialized, English language, accounting history journals. The purpose was to enlighten the understandings of the literature, particularly through the exploration of the significance, interrelationships and comparative dimensions of this journal network and its scholarly community. There was an observable isolation in citation patterns within the specialist journals, and yet a degree of heterogeneity across these journals. The findings suggested that while accounting history, as a discipline, can foster excellence in research, there is considerable scope for addressing identified deficiencies in the literature and for expanding the research community to revive the discipline. <sup>2</sup>Similarly a study evaluated the pattern of publications of Internet Research (IR) from 2008 to 2012 and to reveal the research influence of this journal from the citing and cited references of the papers through appropriate bibliometric measures. The study examined five volumes of Internet Research from the year 2008 to 2012. Citations to each of the published articles were explored using Google Scholar for assessing average impact of individual paper. Citation record for measurement of impact factor and immediacy index was extracted from *Scopus*. It is found that the average length of articles published in IR is 19.83 ranging from year wise average of 18.63 to 21.96 pages. The numbers of references used by the authors were high with majority of them citing 41 to 50 references and on an average, Internet Research authors were noted to have cited over 53 references per article. It was found that more than two third of citations reflected in Internet Research which emanated from journals followed by books. <sup>3</sup>a study examined citation analysis tools as workflow support for lawyer. The number of integrated services or tools designed to characterize value and enhance the output of legal practitioners' workflow is growing, not least because information service providers need to

differentiate between themselves and their nearest competitors. The study examined some of the major citation tools available, and focused on one in particular, Lexis Check as an example of a tool that brings together most of the desired functionality of a true citation checker. <sup>4</sup>Two authors explored the use of citation analysis methods to assess the influence of program evaluations conducted within the area of science, technology, engineering, and mathematics (STEM) education. This study examined the levels, content, and networks of citations arising from products produced by four large-scale, multi-site STEM evaluations. It further explored the usefulness of citation data in understanding the impact of evaluations and findings revealed that citation analysis methods provide information to help understand, to a limited extent, the influence of large-scale, multi-site program evaluations on the fields of STEM education and evaluation. <sup>5</sup>Examined the patterns of publications in the Journal of Educational Media and Library Science (JoEMLS) from 2008 to 2012 and observed that, in the citations of all the published articles of JoEMLS, among the 99 published papers, only 17 have received their relative impact as they have been more or less cited in other different published sources. Okafor (2011) in a study of comparative analysis of research output of Federal Universities in Southern Nigeria noted that, research output is the mean by which academics contribute their knowledge to the existing body of knowledge. Research is not an end in itself but a means to an end. <sup>7</sup>Citation analysis can provide information about relative influence of the publications, but lacks the ability to identify networks of interconnection among scholars. <sup>8</sup>Observed that citation analysis is actually a branch of information science in which researchers studied the way articles in a scholarly field are accessed and referenced by others. It has been used for the purpose of scholarly analysis and evaluation in several fields of human endeavour. <sup>9</sup>In a study that covered 457 citations appended to 26 research articles published in the quarterly Indian Journal of Physiology and Allied Sciences. Of the citations, 76.81% relate to journal articles, 18.59% to monographs, and the rest to conference papers, theses, etc. <sup>10</sup>Studied a total of 4,012 citations in 70 postgraduate dissertations in education. Most students in education used more textbooks (60.3%), than other forms of library materials. <sup>11</sup>Studied the citations of dissertations of library and information science undergraduate students and found that the number of citations to Internet resources was very low.

Meanwhile, the funding of higher education in Nigeria is crucial and timely to meet the research needs and obligation of institutions. Research grants and sponsorships need to be improved upon.

This is because there is an increasing need and demand for specialized services in different sectors within the academic institutions. There is also an increasing growth in student's enrolment and the available resources in the higher institutions are not sufficient to meet up with the funding requirements. Research and innovations in our higher education have become very fundamental that individual and institutional advancements are linked to it and no institution can exist without research and innovations. <sup>12</sup>Fadokun (2015) reported that 80% of research activities in Nigeria were funded by researchers themselves and parents of postgraduate students, leaving only about 20% for governmental organizations and foreign donors. A study reported that Nigeria was ranked eighth amongst the 10 largest countries in the world on expenditure on research and development as percentage of GDP 2005 - 2014. While United States spent 2.81%, Nigeria only spent 0.22% of its GDP 2005 - 2014. <sup>12</sup>Identified one of the major problems militating against scientific research in general and educational research in particular, as the complete absence of a clear-cut philosophy of national development, a philosophy which should spell out the direction in which Nigeria wants to channel its development efforts, a philosophy that should not change no matter how frequently political power changes hands. With the frequent changes of political power in Nigeria and the attendant instability, inconsistency and incoherence in governmental policies and programmes, the practitioner in the education industry, including the researcher, is left confused. In addition to the lamentations of some researchers as stated above, the complete lack of infrastructural support for research in research institutions, especially in the areas of regular supply of electricity and adequate bandwidth for Internet access exacerbates the state of research in Nigeria<sup>13</sup>. It is important to state that all is not gloomy in Nigeria, although the Tertiary Education Trust Fund (TETFUND) has become a major player in the promotion of research in Nigeria. The Tertiary Education Trust Fund (TETFUND) originally known as Education Trust Fund (ETF) in 1993 was established in 2011, as an intervention agency that supports public tertiary education. The main source of income available to the Fund is the 2.0% education tax paid from the assessable profit of companies registered in Nigeria. Over the years the TETFUND has provided funding for research in Nigerian tertiary institutions and has been involved in assisting professional associations to improve their scholarly journals<sup>13</sup>. <sup>14</sup>Argued that the picture portrayed on research funding in LIS is not as bleak as sometimes painted, as researches in LIS are often supported with funding from JISC, Research councils and

EU, but often times they are ICT dominated and that getting funding for practitioner based or practitioner-led researches are difficult.

## **Methodology**

This study adopted a descriptive survey design and the population for the study comprised all 270 research articles in Library and Information Science in Nigeria from 2000 to 2016 that are indexed in the WOS database. Purposive sampling technique was adopted to select all the articles in the field of LIS published in the WOS database for the study. Thus 270 articles indexed in the WOS Database were obtained as records for LIS in Nigeria for the period under study.

The Web of Science Core Citation Index published by Thomson Reuters was used as instrument for data collection and it comprises the following five databases in the Web of Science Core Citation Index: ‘Science Citation Index’, ‘Social Science Citation Index’, ‘Arts and Humanities Citation Index’, ‘Conference Proceeding Citation Index and Book Citation Index’. Two of these citation databases: SSCI and AHCI were selected and used for the study. The search was conducted in October 2017 using advanced search tool to determine publication outputs in Nigeria (CU=Nigeria) with “articles” as document types. The choice of journal articles as document types was informed by the fact that journal article is the primary and common medium of dissemination of knowledge by scholars/researchers. The search was conducted from 2000-2016 as the “Timespan”; while “all languages” was selected as the language of publication. After the main search by country (CU=Nigeria), the result of the search was “refined” and “analyzed” by “Information Science and Library Science” (library and information science, LIS) selected from Web of Science Categories. Data obtained were analyzed by country (Nigeria to be specific) while publication counts and analysis were adopted and applied to determine the productivity of the citation analysis. Funding agencies were analysed using the parameters outlined in the search engine based on the variables of the study. Only authors indexed in the WOS database were analysed. Simple percentage was used to analyze data.

## **Results and Discussion of Findings**

Citation analysis depicts the process whereby the impact or quality of an article is measured through counting of the number of times other authors mentioned or cited it in their work. It also

involves counting the number of times an article is cited by other works to measure the significance of a publication or author.

The result of the study shows that WOS indexes over 10, 000 journals in the arts, humanities, sciences and social sciences. The data was subjected to proper examination of citations received as recorded in the WOS. Table 1 depicts the distribution of papers by citations as contained in the record. It is observed that for this study, 270 articles were indexed in the WOS for LIS research in Nigeria. Citation analysis of 270 published papers indicated that, these papers received a total estimate of 888 citations in the entire Publication outputs, 3.29 as average citation per article and 52.24 as average citation per year; while the result for h-index indicated 13.

In this study, the number of articles does not predict an increase in the total citation. For instance, Nwagwu, W. E. had 22 articles with 78 total citations, while Baro, E. E. had 8 articles with 37 total citations. Similarly, Popoola, S. O. had 7 articles with 13 total citation and Tella, A. with 7 articles and 30 total citations. Also, Ani, O. E. had 4 articles with 39 total citations and Ehikhamenor, F. A. had 4 articles with 42 total citations. Yet, Nwagwu, W. E. with 22 articles and 78 total citations has the highest h-index of 6, followed by Baro, F. E. with 8 articles and 37 total citations, and 4 h-index value and Ani, O. E. with 4 articles and 39 total citations has 4 h-index value which earned them the highest impactful articles and authors of LIS research for Nigeria in the Web of Science over the period of study.

Table 2 shows research areas where publication outputs of articles in library science or those related to library and information science are published. It provides records or publication counts of LIS in Nigeria in the WOS. The record showed that, Information Science and Library Science had 270 publications which is 100% estimate and the highest in the list, followed by Computer Science with 34 publications in it showing 12.6%, Business Economics 5 (1.95%), Social Science 3(1.1%) among others. These research areas show relationship in areas of research publications.

Table 3 explains the agencies that are responsible or that encourage research activities in LIS field especially in Nigeria. Funding is a crucial aspect of research because it can encourage and also discourage meaningful research activities. Analysis of results indicated that there top 10



agencies that fund LIS research in Nigeria. Although the record count indicates 1 for each agency (0.372%), this explains the fact that there is no significant difference among the ten funding agencies that fund research in Nigeria. This implies that, there is not enough funding of LIS research in Nigeria and most research activities recorded in this study are funded by individuals. It is imperative that, for there to be a meaningful research outputs in LIS research, funding agencies and institutions must step-up their games as to encourage growth in the field.

**TABLE 1:** Showing citation analysis of library and information science publications in WOS in Nigeria.

S/N	Authors	Total articles	Total citation	Average citation		H-Index
				per article	Average citation per year	
1.	NWAGWU, W. E.	20	78	3.90	7.80	6
2.	BARO, E. E.	8	37	4.63	4.11	4
3.	POPOOLA, S. O.	7	13	1.86	1.18	3
4.	TELLA, A.	7	30	4.29	3.33	3
5.	ASOGWA, B. E.	6	27	4.50	5.40	3
6.	ODUWOLE, A. A.	6	20	3.33	1.18	3
7.	TIAMIYU, M. A.	6	9	1.50	0.56	2
8.	ADOMI, E. E.	5	27	5.40	1.93	2
9.	EZEMA, I. J.	5	18	3.60	1.00	3
10.	OLATOKUN, W. M.	5	24	4.80	2.67	3
11.	ANI, O. E.	4	39	9.75	2.79	4
12.	OKAFOR, V. N.	4	9	2.25	1.50	2
13.	EHIKHAMENOR, F. A.	4	42	10.50	2.63	2
14.	OMEKWU, C. D.	4	21	5.25	1.75	2
15.	UGWOKE, B. U.	4	3	0.75	1.00	1
16.	OJOKOH, B. A.	3	3	1.00	0.38	1
17.	OKIY, P. B.	3	19	6.33	1.36	2
18.	OLORUNSOLA, R.	3	5	1.67	0.42	2
19.	OPARA, U. N.	3	13	4.33	1/44	2
20.	OPEKE, R. O.	3	1	0.33	0.25	1
21.	Total	270	888	3.29	52.24	13

**Source: Web of Science (citation records were collated in 2018)**

**TABLE 2:** Indicating fields/areas of research where LIS publications were published in WOS

S/N	RESEARCH AREAS	RECORD COUNT	PERCENTAGE (%)
1	Information Science	270	100.000
2	Computer Science	34	12.593
3	Business Economics	5	1.852
4	Social Sciences other topics	3	1.111
5	Biomedical Social Sciences	2	0.741
6	Communication	2	0.741
7	Arts, Humanities Other Topics	1	0.370
8	Government Law	1	0.370
9	Health Care Sciences Services	1	0.3
10	Medical Informatics	1	0.370
11	Philosophy	1	0.370
12	Telecommunications	1	0.370

**Source: Web of Science (Research Areas records were collated on the 6th January, 2018)**

**TABLE 3:** showing top funding agencies of LIS research in Nigeria

S/N	Funding agencies	Record counts	%
•	Islamic Development Bank Jeddah	1	0.372%
•	Malaysian Ministry of Higher Education under the University of Malaya High Impact Research Grant	1	0.372%
•	Ministry of Science ICT and Future Planning MSIP Korea under the Communication Policy Research Centre (CPRC)	1	0.372%
•	Obafemi Awolowo University, Ile Ife, Nigeria, TETFUND Grant	1	0.372%
•	US Agency for International Development (USAID)	1	0.372%
•	University of Abuja Nigeria	1	0.372%
•	University of Ibadan	1	0.372%
•	University of Malaya	1	0.372%

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• World Health Organization	1	0.372%
• US National Institute of Mental Health of the National Institutes of Health	1	0.372%

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**Source: Web of Science (Funding Agencies record were collated on the 6th January, 2018)**

### **Discussion**

A look at the number of citations received indicated that authors with more publications do not necessarily have more citations. Surprisingly, four of the top ranked authors received less than six citations, the lowest being for R. O. Opeke with one citation for three articles. Meanwhile, looking at the impact level, one could see three authors with the highest impact value – W. E. Nwagwu has 6 h-index value, E. E. Baro with 4 h-index value and O. E. Ani also has 4 h-index value topping the list of most cited authors and articles. The lowest impactful articles were that of B. U. Ugwoke with 1 h-index value, B. A. Ojokoh with 1 h-index value and R. O. Okpeke also with 1 h-index value.

Moreover, the h-index is recognized as a measure of the highest number of articles published (productivity) and how often they are cited (impact). Meanwhile, over the course of 16 years, W. E. Nwagwu was recognized to have received the highest number of citations estimated at (78), while F. A. Ehikahmenor followed with (42) and O. E. Ani (39), respectively. Meanwhile since the number of citations received largely depends on the total number of articles that an author has published, the value of citations per article (CPA) would be more accurate measure of impact. The value of CPA for different authors listed in table 1 shows that, F. A. Ehikahmenor has the highest citations per article (10.50), followed by O. E. Ani with (9.75) and P. B. Okiy with (6.33) citations per article respectively. Among all the authors, R. O. Opeke, B. U. Ugwoke, B. A. Ojokoh, M. A. Tihamiyu, R. Olorunsola and S. O. Popoola had the lowest citations per article (0.33, 0.75, 1.00, 1.50, 1.67 and 1.86) respectively. It is important to note that, scholars from different disciplines have different citation practices; hence the average number of citations received by an article varies from field to field.

As the society keeps developing, there is urgent concern for changes hence the concept of research and innovation. In Nigeria, research still lags behind because much investment has not been put into research as is obtainable in most developed countries of the world who invest heavily on research. Meanwhile ‘there is no evidence of any counterpart body in Nigeria that is

solely devoted to promotion and development of research. Studies have shown that, 80% of research activities in Nigeria are funded by researchers themselves, and parents of postgraduate students, leaving 20% for donor agencies and governmental organizations” (Fadokun, 2015). The Tertiary Education Trust Fund (TETFUND) is a major player in research promotion in Nigeria. The TETFUND formerly known as Education Trust Fund (ETF) in the year 1993 was recently rebranded and established in 2011 as an intervention agency to support tertiary education. Meanwhile, source of income available to the fund is got from the 2% education tax paid from the assessable profit of companies registered in the country. This study further revealed that, the TETFUND has provided relative funding for research in Nigeria tertiary institutions and has involved in assisting professional bodies to step up their scholarly journals and publications in areas of needs. Findings from Web of Science also revealed other funding agencies that provide grants and support research for LIS in Nigeria. Funding remains critical to achieving quality and quantitative publication outputs in LIS research in Nigeria.

### **Findings**

1. Nwagwu, W. E. with 78 citations, Ehikahmenor, F. A. with 42 citations and Ani, O. E. with 39 citations received the highest number of citations.
2. Also, for citation analyses, Nwagwu, W. E. with 6 h-index value, Baro, E. E. with 4 h-index value and Ani, O. E. with 4 h-index value topped the list of most cited authors and articles of LIS research in Nigeria in the WOS for the period of study.
3. Ehikahmenor, F. A. (10.50), Ani, O. E. (7.75) and Okiy, P. B. (6.33) have the highest citations per article.
4. Information Science, Library Science showed 100% of research areas for LIS publications.
5. That TETFUND was one of the major funding agencies of LIS research in Nigeria.
6. Funding of LIS research was relatively poor in Nigeria.
7. The above findings indicated that not much impact has been made with regards to annual publication outputs at the country level, international collaborations among researchers and funding of LIS research in Nigeria.

### **Conclusion**

Citation analysis explain ways of measuring the relative importance or impact of an author; an article or a publication by counting the number of times that author, article, or publication has

been cited by other works. This in essence depicts how much impact a particular article has had by showing which author(s) based their work upon it or cited it as an example within their own papers. Citations are used as a measure of influence, hence considered important. This proposition is based on the assumption that authors cite documents they consider relevant to their work. More so, research requires funding or sponsorship and the number of publication outputs an individual, institution or country parades depends on the amount of encouragement/sponsorship or funding allocated to that given area of study for its research potentials to be harnessed. Therefore, funding is crucial to meaningful publications outputs in LIS research in Nigeria so as to measure scholarly research among community of researchers when rated in the global ranking of universities.

### **Recommendations**

The study therefore recommends that:

1. Scholars should be encouraged to publish in high impact journals for visibility
2. Alternative sources of funding should be encouraged to promote increased research output
3. Research requires funding, hence adequate budgetary provisions for research should be made by funding agencies.

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