

Citation Analysis of Theses in the Departments of Engineering and Technology, Nnamdi Azikiwe University Awka, Nigeria

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Abstract

Purpose: This study examined the citation analysis of thesis in the departments of engineering and Technology, in Nnamdi Azikiwe University Awka, Nigeria and also to know the availability of the resources cited.

Methodology: Document analysis was employed to extract data from all the Masters theses submitted to Festus Aghagbo Nwako Library. A total of 87 documents were studied and 2949 citations were recorded. The analysis and organization of data were done through the use of frequency tables and percentages. Five research questions were posed to guide the study.

Findings: The result indicated that Internet resources had the least citation with (12.14%), books *54.09%). Journals (34.05%). Hence, it has shown that traditional secondary information resources (books) were the main information resources used by the faculty of Engineering & Technology followed by traditional primary information resources (journals) and the least was Internet information resources. Most of the most frequently cited primary information resources were not available in the university library. Most of the information resources heavily cited by researchers were foreign.

Implications: The study implies that Internet sources cited were limited and this shows that many PG students are not familiar with online sources of information and this will also affect their access to global information for their research work. Most of the cited journals were not available in the university library, which means that students went outside to search for the resources which are supposed to be made available in the library.

Value/Originality: The study is educational value rest on the recommendations that the library management should collaborate with the departments in acquisition of the information resources that are relevant to their studies, especially the most cited journals and monographs. Also efforts should be made towards acquiring all the titles that were extensively used by students but were not available in the university library.

Key Words: Citation Analysis, Engineering and Technology, Thesis, Nigeria.

Introduction

Citation analysis is a major area of bibliometric research which uses various methods of citation analysis to establish relationship between authors and their works. It has been used beyond information sciences for scholarly analysis and evaluation. Johnson (2000) points out that citation studies reveal much about scholarly communication and guide collection development in academic libraries. Bibliometrics and scientometrics make extensive use of citations to assess quality and trace patterns of scholarly communication (Borgman, and Funer, 2002; Wouters, 1989). A number of researchers have used citation analysis to look at the subject focus of postgraduate students and determine their journal needs (McCain and

Bobick, 1981; Monah 1996) in Olatokun and Makinde (2009). From the above background, this study does citation analysis of master's theses by postgraduate students of Nnamdi Azikiwe University Awka, (NAU) to trace these patterns of scholarly communication which include determining the number of Internet Information resources, primary and secondary traditional information resources cited in master's theses by the postgraduate students. Also the currency and the availability of the materials cited. Knowledge of postgraduate students, citation characteristics will enable the library identify the information focus of the students in order to determine their information resources need.

Statement of the Problem

In scholarly communication, researchers collaborate and disseminate their findings through publications both in print and electronic. Good quality research findings usually rely on the previous works of earlier researchers. To what extent do the theses submitted by NAU candidates make use of these earlier researches as indicated in their references?

The cost of journal subscription by the libraries has escalated in the past few years due to inflation and price increases by publishers. Budgetary allocation to academic libraries has not matched the increasing cost of books and Journals thereby creating a serious gap between information needs of researchers and what the library provides. Hence does the NAU library provide information materials employed by the postgraduate students in writing their theses?

Emergence of internet in recent years has brought relief to researchers and students as e-books, e-journals and full databases are available to support their research work. These may be available through library or cyber cafe. Do students avail the resources provided in the Internet?

To understand the information needs of the post graduate students demands that the researcher has to undertake a citation analysis of the reference of theses submitted to the three faculties chosen to determine the number of Internet information resources cited, the number of primary traditional information resources cited, number of secondary traditional information resources cited and the currency of the traditional information resources cited. Also the availability of the cited resources in the NAU library was determined.

Purpose of the Study

The broad purpose of the study is to do citation analysis of Masters' theses in the faculties of Engineering and Technology, Biological Sciences and Social Sciences of Nnamdi Azikiwe University, Awka during the period of 2005 - 2010 in order to determine their citation patterns and availability of

these resources cited. Specifically, the study will determine:

1. The number of Internet information resources cited;
1. The number of primary traditional

information resources cited in theses;

- 3 The number of secondary traditional information resources cited;
- 4 The currency of the traditional information resources cited; and
- 5 The availability of the most cited information resources in Professor Festus Aghagbo Nwako Library.

Significance of the Study

This work will benefit the library management, the students and the lecturers. It will help the library managers in managing collection development. It will be useful in stock evaluation as citation analysis is a tool for literature evaluation. It will enable the library to know the researchers needs as it is assumed that the most frequently cited resources of information are the very important resources in any subject field. The library will through the study know the gaps in its collection and make effort to fill the gap.

The students will benefit as the library management knows the gap in their information needs and fills them by providing popular titles not available in the collection. It will alert the students on the importance of making adequate citation to other works employed in their studies. Use of up-to-date resources in researches provide current status of the subject. It will alert the students to always seek for latest information from other researchers.

Finally, it will alert the lecturers on the need to give serious attention to students citations in their theses. This study also will reveal the significance differences in the citation of various resources by the researcher.

Scope of the Study

The study examined citations in references of masters theses submitted in faculty of Engineering and Technology in Nnamdi Azikiwe University, Awka. Masters theses were chosen for this study because all departments have started masters programmes unlike doctoral programmes that is yet to take off in some departments in the faculty chosen. The researcher chose the period between 2005 – 2010 because it was in 2005 that all the departments understudy had Masters theses for the first time. This study is to determine the number of Internet information resources cited, the number of traditional information resources cited, the currency of the materials cited and the

availability of the most cited in formational resources. This is based on the work submitted between 2005 – 2010 of Masters theses and are available in the professor Festus Aghagba Nwakor Library.

Research Questions

The following research questions were posed to guide the study:

- a. What is the number of Internet information resources cited in theses?
- b. What is the number of primary traditional information resources cited in theses?
- c. What is the number of secondary traditional information resources cited in the theses? .
- d. How current are the traditional information resources cited in the theses?
- e. What is the availability of the traditional information resources cited in theses in the professor Festus Aghagbo Nwako Library?

Literature Review

Citation analysis is an unobtrusive research method that identifies core lists of journals and monographs in a subject discipline (Kumppu and Moore, 2008). The usefulness of a discipline is measured by the amount and quality of research completed in the discipline (Onyancha 2007). Lancaster (1991) stated that "research productivity and impact is measured through

an analysis of the 'number of publications produced and the quality of the sources in which the published materials appears". This implies that sources of citation are important in determining the quality of a work.

Although the information needs of university researchers can be ascertained using request from faculty, circulation, journal frequency use and interlibrary loan statistics (Thomas 1993). Sylvia and Leshner (1995) argued that citation analysis is one of the best ways of measuring the need and use of resources in the academic library. Citation analysis describes as the ranking of information resource particularly serials according to the frequency of citation in reference listing (Waugh & Ruppel 2004) was first adopted by Gross & Gross (1927) in determining the value of journals.

Apart from using citation analysis to determine core resources needed for research, it helps authors to identify journals to publish their research and to determine journal impact factor

(Zivney & Reichenstain 1994) as well as determining literature obsolescence (Ucak 2010). Its importance to libraries could not be over emphasized as it also help during journal cancellation and other collection development policy issues (Ucak & Al 2009), Zipp 1996, Ucak, 2010). Literature abound on citation analysis with respect to institution, field and discipline/academic levels.

Anunobi (2002) conducted citation analysis to determine the citation behavior of under graduate and postgraduate students of Federal University of Technology Owerri, Nigeria. The author discovered that doctoral students were more elaborate in their citation showing a spread of 57.83% for journals 21.06% for monographs and 14.29% for conferences/seminar materials with very small percentage of newspaper and thesis cited.

Echezona, Okafor and Ukwoma, (2011), examined the information sources used by doctoral students in library and information science and found that journals (58.8%) were most cited of all the information sources by postgraduate students. Otubelu (2003) discovered that journals (74.2%) are more frequently used than other resources. Tewolde (1992) found that books and chapters in books are heavily cited (41% of the 689 citation). Omekwu and Popoola (1998) found that monographs are cited more than journals. Okiy (2003) discovered that books (60.3%) out of the total citation were heavily cited.

Olatokun (2009) found out that the most cited source was journal accounting for more than half of the total citation to reference sources. Web resources were the lowest. Joseph (2011) found out that journal (72%) were more consulted compared to other sources of information materials.

Despite the unique nature of theses, citation in the field of natural science as well as engineering discipline/academic levels, it is of concern that information resources are provided for a wide range of Engineering and Technology department in Nigerian including Nnamdi Azikiwe University without proper analysis of what and sources of information used by these researchers in the university.

Method

The study employed document analysis to extract data from Masters theses in Engineering and Technology departments submitted to Festus

Aghagbo Nwako Library of the University. A total of 87 Masters theses were studied. Cited resources in each of the documents were collated and grouped according to the types as monographs, journals, reference sources and Internet resources. A database of the reference

was produced and analyzed using frequency counts and percentages. Documents were selected based on the currency and the degree of availability in the library. Those on display feature more in the analysis. Sampling method used was purposive.

Results

Table 1: Citation frequency of Internet information resources in theses of Engineering and Technology, Departments.

Faculty/ Departments	No. of Theses	No. of Citations	No. of Internet Sources Cited	%
Engineering & Technology	6	151	6	3.97
Civil Engineering				
Chemical Engineering	8	389	9	2.31
Electrical Engineering	4	155	15	25.13
Electrical & Computer Engineering	19	955	240	2.79
Industrial & Production Engineering	18	322	9	7.23
Mechanical Engineering	32	977	71	12.14
Total	87	2949	350	12.14

Table 1 shows citation frequencies of Internet Resources in Engineering and Technology departments. Department of Electrical engineering had the highest Internet citation of

25.13%, followed by the Medical Engineering with 12.14%, Chemical Engineering had the least number of 2.31%.

Table 2: Citation frequency of traditional primary resources in theses of Engineering and Technology departments.

Faculty & Department	No. of Theses	No. of Traditional Primary Info. Resources	Journals	Conference proceedings	Technical Report & Standard	Government Document	Theses & Dissertations	Miscellaneous
Engineering & Technology								
Civil Engr.	6	90	60 (62.5%)	10(10.42%)	2(2.08%)	6(6.25%)	5(5.21%)	7(7.29%)
Chemical Engr.	5	160	105(62.13%)	10(5.92%)	30(17.75%)	5(2.96%)	4(2.37%)	6(3.55%)
Electrical Engr.	4	93	61 (65.59%)	11(11.83%)	10(10.75%)	5(5.38%)	4(4.30%)	2(2.15%)
Electrical & Computer Engr.	19	210	168 (80%)	12(5.71%)	12(5.71%)	8(3.81%)	5(2.38%)	5(2.38%)
Industrial & Production Engr	18	141	100(70.92%)	10(7.09%)	15(10.64%)	5(3.51%)	3(2.13%)	8(5.67%)
Mechanical Engr	32	310	250(80.65%)	15(4.84%)	20(6.45%)	5(1.61%)	10(3.21%)	10(3.23%)
Total	87	1004	744(74.01%)	68(6.67%)	89(8.73%)	34(3.34%)	31(3.04%)	38(3.73%)

Table 2 shows citation frequencies of traditional primary information resources Engineering and Technology department. Based on this table, it is observed that journal were the most cited

resources in all the departments with 74.01% followed by Technical reports & standard with 8.73%.

Table 3: Citation frequency of traditional secondary information resources in theses of Engineering and Technology, department.

FACULTY & DEPARTMENTS	No. of Theses	No. of Traditional Secondary Info. Resources	Monographs	Abstracts	Indexes	Encyclo	Dictionaries	Hand book	Guides	Year book	Almanacs
Engineering & Technology											
Civil Engineering	6	177	150(84.75%)	-	-	5(2.82%)	5(2.82%)	6(3.39%)	2(1.13%)	8(3.39%)	1(0.56%)
Chemical Engr.	8	195	160(82.05%)	-	-	2(1.03%)	10(5.13%)	10(5.13%)	3(1.54%)	10(5.13%)	-
Electrical Engr.	4	110	165(59.09%)	-	-	3(2.73%)	10(9.09%)	12(10.91%)	8(7.27%)	10(9.09%)	2(1.82%)
Electronic & Comp Engr.	19	237	171(72.15%)	-	-	5(2.11%)	5(2.11%)	34(14.34%)	10(4.22%)	10(4.22%)	2(12.84%)
Ind. & Prod. Engr.	18	233	158(67.81%)	-	-	5(2.15%)	10(4.29%)	30(12.88%)	16(6.87%)	13(5.58%)	1(0.43%)
Mechanical Engr.	32	643	388(60.34%)	-	-	5(0.78%)	10(1.56%)	150(23.33%)	50(7.78%)	35(5.44%)	5(0.78%)
Total	87	1595	092(68.42%)			25(1.75%)	50(3.13%)	242(15.17%)	89(5.58%)	86(5.39%)	11(0.69%)

Table 3 shows citation frequencies of traditional secondary information resources in Engineering and Technology. Based on this table, Monographs were heavily cited in all the departments with 68.42% followed by hand books with 15.17%.

Table 4: Publication date profile of traditional information resources cited in theses by postgraduate students of Nnamdi Azikiwe University, Awka from 2005-2010.

Faculty & departments	No. Of theses	No. Of Citations	No. Of traditional information resources	Published before 1990	1990-1999	2000-2010
Engineering and Technology						
Civil Engineering	6	151	145	25(17.24%)	50 (34.48%)	70 (47.28%)
Chemical Engineering	8	389	380	80 (21.05%)	135 (35.53%)	165(43.42%)
Electrical Engineering	4	155	140	39(27.86%)	45 (31.03%)	56 (40%)
Electronic & Computer Engineering	19	955	715	106(14.83%)	207 (28.25%)	402 (56.23%)
Industrial & Production Engineering	18	322	313	66(21.09%)	No (35.14%)	137 (43.77%)
Mechanical Engineering	32	977	906	109 (12.03%)	397 (43.82%)	400(44.15%)
Total	87	2949	2599	425(16.35%)	944 (36.32%)	1230 (47.33%)

Table 4 shows profile of the date of publication of traditional information resources in Engineering & Technology departments. Based on the table, Electronic and Computer Engineering had the highest frequency number of current traditional information resources with 56.23% followed by civil engineering with 47.28% while other departments had the least number of current traditional information resources.

Table 5: Availability of 10 top most Ranked book's and Journals cited Engineering & Technology departments.

Departments	10 Top Most Ranked Books	No. Available in the Library	%	10 Top Most Ranked Journals	No. Available in Library	%
Engineering and Technology						
Civil Engineering	10	9	90	10	3	30
Chemical Engr.	10	8	80	10	3	30
Electrical Engr.	10	8	80	10	3	30
Electronic & Computer Engr.	10	10	100	10	3	30
Industrial & Production Engr.	10	9	90	10	-	-
Mechanical Engr.	10	8	80	10	3	30
Total	60	52	86.66	60	15	25

Table 5 shows availability in the library of 10 Top Most Ranked cited books and journals in Engineering Departments. It is observed that 86% of the books cited were available in the library while 25.33% of the journals cited were not available in the library.

Discussion:

Out of 2949 citations in theses submitted in Engineering and Technology, departments, 2005 - 2010 only 380 citations are from the Internet. Based on this data, generally, Internet information resources cited were very low when compared with other information resources. This agrees with Megnigbeto (2007) and Tunon and Bridges (2008) who found that the percentage of online resources was very low in their previous researches done on citation analysis concerning information sources cited by students. A reason one could adduce for this is that the students do not know correct reference or they do not have a enough access to Internet facilities.

Out of the 2949 citations, 1004 citations are from primary traditional information resources. Based on the data collected journals were heavily cited in all departments with 74.01% followed by Technical reports and standard with 8.73%, conference proceedings with 6.67%, miscellaneous with 3.73%, government document with 3.34% and the least are thesis and dissertation. This is in line with Gooden, (2001) King, (2006), Rethlefsen and Wallis (2007), Johnson, (1996) that many studies in citation analysis buttress the finding from this study that journals are the most used materials in any research field judging from the fact that they point to currency of research works. Also this is in line with Sam (2009); Okafor and Ukworna (2007), Gooden (2000) who found that researchers make reference to more journal articles than other information resources in their researches. This can be attributed to the fact that professional journals are major sources on information for academics to carry out meaningful research. This may also be attributed to the fact that journals are cumulative in nature and so contain latest information.

Out of 2949 citations, 1595 citations are from traditional secondary information resources. This is in line with Omekwu and Poopola (1998), Ogunleye (1996) and Nkiko and Adetoro (2008), who found that monographs are cited more than journals in their citations studies

conducted to determine the information resources cited by students. This may be attributed to the fact that masters students at this level are still interested in textbooks thus their research is based on old findings.

The study also revealed that, out of the 2949 citations, only 1320 citations are found to be current materials in all the departments. To determine the currency of the work cited, every source published from 2000 till date is regarded as a current source. Based on the data collected, the percentage of the current traditional information sources was low. Department of Electronic and Computer Engineering had the highest frequency number of current traditional information resources with 56.23% followed by Civil Engineering with 47.28% while other departments had the least number of current traditional information resources. In as much as they have the highest number, the percentage was not encouraging. Since engineering courses deal with practical skill acquisition for life sustenance, efforts should be geared towards provision of current materials for their research. Researchers in these departments need current traditional information resources to their research. In order to do this, emphasis should be laid on the materials needed by researchers. This can easily be determined through citation analysis of researches in order to determine information resources useful to the researchers and efforts made to acquire them.

Finally, findings revealed that the journals heavily cited by the researchers were not available in the university library. The implication is that may be students went elsewhere to get these materials. The findings also revealed that the books heavily cited by the students were available in the university library. The finding also revealed that non-availability of most frequently cited journals in the university library could be attributed to the fact that collection development in the university library depends on demand, that is acquiring the titles demanded by the subject lecturers instead of basing collection development on value that is studying citation patterns of students and supplementing it with in-house use and circulation and interlibrary loan of library resources.

Conclusion:

The use of citation analysis for this study was to provide a better understanding of the information resources used by postgraduate

students. The study revealed that the postgraduate students consulted and used mostly journals in their research works and the most cited journals used are not available in the university library. The study also revealed that internet information resources were poorly cited, which may be due to poor level of information literacy, high cost of journal subscription and inadequate power supply. The study also revealed that most of the information resources cited were published before 2000 and almost all the most cited traditional information resources were published by foreign based publishers. Citation analysis as a tool for collection development aids provision of relevant and current materials in various disciplines in higher institutions of learning and efforts should therefore be geared towards provision of adequate and relevant materials for research. If this is done, it will go a long way making useful resources of information available and also make students to find the library of greater use when they are battling with their works.

Recommendation:

Based on the above findings the following recommendations are made.

- 1) There should be information and communication Technology (ICT) laboratory in all the departments to enable the students and lecturers to have access to online resources.
- 2) Information literacy should be part of the curriculum to encourage use of open access resources that are available.
- 3) The library management should collaborate with the departments in acquisition of the information resources that are relevant to their studies, especially the most cited journals and monographs.
- 4) Efforts should be made towards acquiring all the titles that were extensively used by students but were not available in the university library.

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