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Citation Analysis of Theses and Dissertations in Chemistry Submitted to the LNB Library, Dibrugarh University, 2009-13

Prarthana Borthakur

Library Assistant ,Demow College, Demow

borthakur.prarthana,@gmail.com

ABSTRACT

The Present study is conducted to find out the citation patterns used by students and scholars of Dibrugarh University in their thesis and dissertation. Based on the results of this study, it is hoped that certain conclusions about scholarly communications can be drawn such as form of citation used by scholars, pattern of authorship etc.

. **Methodology**-For the present study 21 thesis and 7 dissertation of chemistry were chosen as a sample from 2009-2013 submitted to the Laxminath Bezbarua Library in which 5145 citations appended. The data was collected from bibliographical entries listed at the end of theses and dissertation and then began the task of identifying individual citation.

Findings-The research revealed that collaborative research is prevailing in the field of chemistry. It is found that journal contributes the highest no. of citation. Books and journals are found to be widely used format compared to web/internet resource and other form of literature.

Originality-The technique of citation analysis is effective and easier among all other techniques of bibliometrics to know the trend of research in a particular field, to know the preferences of scholar for varied information sources. The study will help researchers to carry out research in similar field as well as it will help librarians to plan effective collection development within limited budget constraints**.**

Keywords: Citation Analysis, LNB Library, Dibrugarh University, Department of chemistry, Thesis and Dissertation

1. INTRODUCTION

The basic purpose of a research work is to attain benefit for the specific group of community related with the field of study and for the society as a whole. Research may be applied or fundamental, quantitative or qualitative, whatever be the type of research, its purpose is to discover answers to question through the application of scientific procedures. After going through data collection, analysis and interpretation, ultimately the researcher reaches on a conclusion as solution of the problem. In order to communicate the findings and results obtained out of the research work for others benefit and so that one can carry out the work further, the researcher prepares a research report. This particular research report is referred to as thesis or as dissertation.

While writing a thesis or dissertation, a researcher goes through several documents like books, journals, proceeding, and technical reports etc, related to his field of study. The author thus make mention of all these documents consulted by him as a mark of respect. This is done to pay homage to pioneers and peers for the work on which the author has depended to carry on his research, which is called as bibliographical reference or citation. A citation is a reference to a published or unpublished document. It is nothing but reference made to other documents in an article by an author.

Citation analysis is the examination of pattern, frequency of citations in books and articles. It was citation in scholarly works to establish links to another work or other researchers. The study of the relationship between

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cited and citing document come under the purview of citation analysis. A cited document is one which is taken as a source of reference by the author in his study and a citing document is the document which makes references of other documents. Citation analysis is thus the analyses of citation to and from documents, that is appended with the research communication it count citation given at the end of each scientific article counting citation is often called citation analysis citation analysis, which involves counting how many times a paper or research is cited, assumes that influential scientists and important work are cited more than others.

1.1 Citation Analysis of Theses and Dissertation:

It seems absurd that in the information age, it could be so difficult to have all the journals in a specific scientific field available. Some of the main reasons are : the great number of scientific journal published, their high subscription costs with increase in the yearly price, and the budgetary restraint of academic libraries . These reasons force the libraries to establish priorities in their collection acquisition and maintenance policy in accordance with the user's need and this can be identified by the analysis of scientific literature usage by researchers, students, and teachers.

Analysis of reference list of theses and dissertations is one effective method of evaluating journal usage by estimating the number of citations contained in them published by researcher. The analysis of PhD theses and dissertation constitutes a good approach for the evaluation of journal usage and other form of literature, which reveals research trend, authorship trend and many other facts. It is the best way of identifying the sources of information looked up by the researchers and therefore justifies the investment devoted to the subscription.

1.2. Department of Chemistry, Dibrugarh University

Dibrugarh University was set up in 1965 with a set of goals and objectives. Among them, the most important one is to provide for instruction and research in the humanities, Science, Education, Medical and other professional subjects. Among various department, Department of chemistry was started in the year 1968. Since inception the department has a very active research group working in multidisciplinary areas of chemical science such as natural product, polymer industry synthetic organic chemistry, non materials , material chemistry, theoretical and computational chemistry .

2. LITERATURE REVIEW

Lahiri (1996) observed that citation analysis is one of the research methods, generally used for user studies. It is a technique to study the information needs of the scholars and the scientists. It is useful in providing a quantitative indication of some characteristics of literature used and at the same time their limitation in accepting the final conclusion is also accepted.

Leydesdorff (1998) viewed that citation analysis is that which reflects on citation practices. It shows the pattern of citation used in different form of literature. The author observes pattern of citation used vary from one discipline to another. Citation analysis itself considers the use of citation in scientific literature as a practice.

Gooden (2001) undertake citation analysis of chemistry at the Ohio state university between 1996-2000. The 30 dissertations studied generated a total of 3,704 citations. The result revealed that articles were cited most frequently, followed by monographs, dissertation, theses and proceedings. A significant form of citation appeared in duplicate form and 16% of the citation were for articles that were submitted in press.

Shafi (2002) studied 100 doctoral dissertation submitted to Kashmir University during 1980-2000 in the field of Natural Science. Around 8,000 citations were derived from these dissertations. It is found out that highest citations are from journal followed by Seminar proceedings. The field of chemistry report very less number of citations.

Kushkowski (2003) reported on a result of a study of over 9,100 citations from 629 masters and doctoral theses written between 1973 and 1992 at a Midwestern Land Grant University. The study suggests that graduate students writing theses favor current research. The study show distinct trend in graduate students' citation pattern.

3. AIMS AND OBJECTIVES

The present study is carried out with certain aims and objectives to be attained these are:

(i) To identify the form of citation consulted by the researchers in chemistry.

(ii) To identify the authorship pattern and degree of collaboration in research in the field of chemistry.

(iii) To identify the average number of citation per theses and dissertation.

(iv) To determine the most frequently cited journal in chemistry.

(v) To prepare a rank list of care journals of chemistry in order of their frequency of citation.

4. METHODOLOGY

At the very beginning of the study, the information on total number of thesis and dissertation submitted during the 5 years period has been taken from the accession register of thesis along with the demographic data about each thesis and dissertation (Department, publication date, topic of study, date of submission) Once date about each thesis and dissertation was recorded the task of identifying and recording information about the individual citation

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began. After this the collected data is classified, and presented in the form of tables. The study presents analysis of several parameters like authorship pattern, form of literature and finally a list of core journal is compiled and prepared on the basis of highly cited articles of the journal in chemistry.

5. LIMITATIONS OF THE STUDY

Similar to other studies, the present study is also not free from limitations.

(i) The Study is confined to thesis and dissertation submitted to the LNB library of Dibrugarh University.

(ii) The study is completely confined to documentary.

(iii) Another major limitation of the study is its time period. It takes into accounts the thesis and dissertation, that are submitted to the library from 2009-2013.

6. SCOPE OF THE STUDY

Primary sources of information like thesis, journals, dissertation etc. have been playing a key role in research and its upliftment in different fields of study. This study reveals the nature of information used by researchers in the field of chemistry and this can enables librarian of University libraries to plan for better information services and better collection development within their limited budget .It will also help researchers in indentifying the primary source of information from which citations have been made and to know which document is related to their field of study.

7. DATA ANALYSIS AND INTERPRETATION

7.1 Year Wise Distribution of Theses and Dissertations:

Table 1: Distribution of theses and dissertation by years

Sl. No.	Year	Number of thesis / dissertation		Percentage (%)	
		Thesis	Dissertation	Thesis	Dissertation
1	2009	5	4	23.80	57.14
2	2010	4	2	19.04	28.58
3	2011	3	1	14.28	14.28
4	2012	6	-	28.57	-
5	2013	3	-	14.28	-
		21	**7**	**100**	**100**

Table 1 shows the year wise distribution of thesis and dissertation submitted by department of chemistry, Dibrugarh University. A maximum number of 28.57% (6) theses were submitted in the year 2012. 23.80% (5) thesis submitted in the year 2009, 19.04% (4) thesis submitted in the year 2010 followed by 14.28% (3) thesis in the year 2011. Similarly highest numbers of 57.14% (4) dissertation were submitted in the year 2009, followed by 28.57 (2) dissertation was submitted in 2010 and 14.28% (01) dissertation submitted in the year 2011. It is observed in the table that the highest number of Ph.D. degrees (06) was awarded in chemistry by Dibrugarh University during the year 2012. Again, highest number of dissertation (04) submitted by the department of chemistry in the year 2009.

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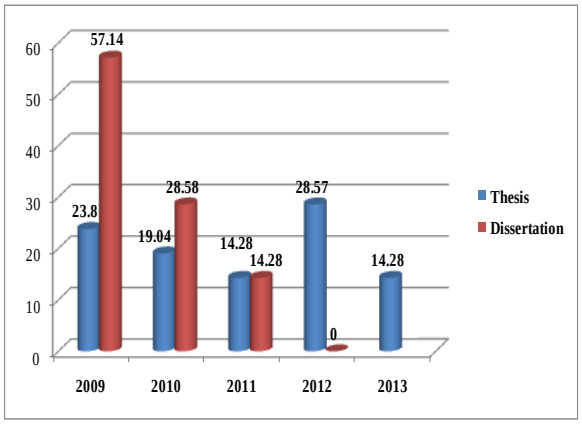

Figure– 1: Year wise distribution of theses and dissertation

7.2. Distribution of Citation per Thesis and Dissertation

Table – 2: Average number of citations per Thesis and Dissertation

Sl. No.	Year	Total no. of thesis and dissertation		Total no. of citation		Average citation	
		Thesis	Dissertation	Thesis	Dissertation	Thesis	Dissertation
1	2009	5	4	1396	263	279.2	65.75
2	2010	4	2	617	127	154.25	63.5
3	2011	3	1	468	63	156	21
4	2012	6	-	1303	-	217.16	-
5	2013	3	-	908	-	302.66	-
		21	7	4692	453	223.6	64.71

Table -2 revealed the data regarding the average number of citation per thesis and dissertation. In case of thesis, the highest number of citation per thesis 302.66 is found in the year 2013 and the lowest average number of citation 154.25 is found in the year 2010. Similarly in case of dissertation, highest number of citation per dissertation is found in the year 2009 i.e., 65.75 and the lowest average number of citation 21 is found in the year 2011. It can be further observed that the highest citation of 1396 is recorded from doctoral thesis while the next which is 1303 citation is also from doctoral thesis. The highest citation count in doctoral work must be due to the fact that their research is highly extensive and broad compared to the master's research that is slightly extensive.

7.3 Authorship pattern of Citation in Chemistry:

Table – 3: Distribution of authorship

Sl. No	Authors	Total no. of citation		Total	Percentage (%)
		Thesis	Dissertation		
1	Single author	96	672	768	14.92
2	Double author	132	1540	1672	32.49
3	Three author	122	681	803	15.60
4	Multiple author paper	150	1752	1902	36.96
	Total	**500**	**4645**	**5145**	**100%**

Table – 3 showing the authorship pattern of citations in doctoral and master's level. It reveal that out of total (5145) citation, 36.96 (1902) are by more than three authors, followed by double authors 32.49% (1672), three authors 15.60% (803) and single author cavers only 14.92% (768). At the master's level as observed from the table out of the total number of authors cited (500), the highest number is multiple author paper (150) followed by double author (132), three author (122) and the least is single author (96). The same situation can be observed at the doctorate level also where multiple author citation accounts for 1752 out of the total (4645) citation followed by double author (1540), three author (681) and single author (672). The table shows that majority of the cited

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documents are by multiple authors papers that means the collaborative research is prevailing in chemistry.

The data presented can be well understand with the help of a diagram shown below –

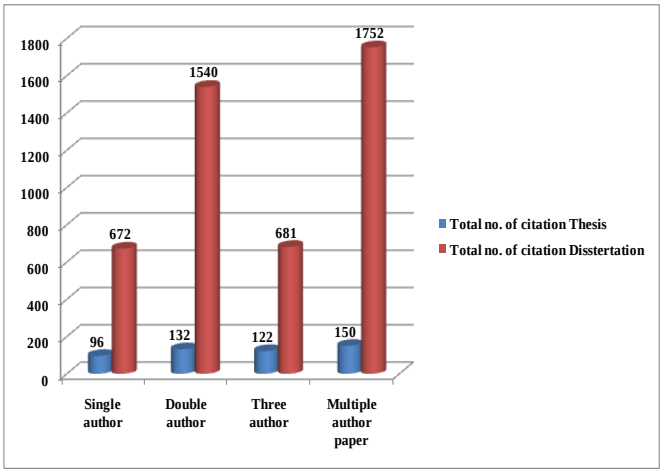

Figure – 2: Authorship pattern of citation in chemistry

7.4. Distribution of Citation According to Type of Materials:

Table – 4: Distribution of Citation according to type of materials

Documents	Source of Material						
	Books	Journal	Patent	Web Resources	Seminar/Conference Proceeding	PhD Thesis	Total
Dissertation	25	414	1	7	2	4	453
Thesis	742	3840	40	27	30	13	4642
Total No. of Citation	767	4254	41	34	32	17	5145
Percentage (%)	14.90	82.68	0.79	0.58	0.69	0.33	100

It is observed from the table that the journal contributes the highest numbers of citation accounting for 82.68% (4254) of the total citation. This revealed that journals are the most preferred sources of information consulted by Master and Doctoral Students. This could be because journal articles contain current issues and qualitative research work. Books were the second most cited sources accounting for 14.90% (767) of the total citation followed by Patent/ Technical Report which is 0.79% (41) , web resources o.66% (34), 0.62% (32) seminar/conference proceeding and finally Ph.D. Thesis 0.33% (17) citation. The study shows that Master and Doctoral students did not take much advantage of numerous online resources available on the web and internet which provide easy access and retrieval of information.

7.5 Rank list of Journals:

Journals are essential for research but their increase demands that librarian study their quality, usefulness and suitability to particular group of users. The ranking list is a practical tool that helps in selecting journals of maximum utility in relation to their coverage of new and important literature in a particular subject area. Ranked list of journals are prepared based on following criteria: (a) Journal use studies (b) Circulation statistics (c) Inter Library loan data (d) Citation Analysis (e) Questionnaire (f) Comparative techniques.

- **Rank list of Journal in Chemistry:**

Table – 5: Rank list of core Journal in Chemistry

Sl. No	Name of the Journal	No. of citation	Percentage	Rank
1	Journal of American Chemical Society	212	4.98	1
2	Tetrahedron Letters	164	3.85	2
3	Chemical Review	160	3.76	3
4	Tetrahedron	132	3.10	4
5	Ethnopharmocal	130	3.05	5
6	Indian Journal of Chemical	122	2.86	6

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	Technology			
7	Nature	115	2.70	7
8	Synlett	115	2.70	7
9	Synthesis	102	2.37	8
10	Greenchemistry	101	2.35	9
11	Fuel	100	2.35	10
12	Journal of organic chemistry	99	2.32	11
13	Organometallics	98	2.30	12
14	Polyhedron	97	2.28	13
15	Catalysis today	97	2.28	13
16	Journal of chemical society chemical communication	96	2.25	14
17	RSC Advances	95	2.23	14
18	Synthetic Communication	95	2.23	14
19	Journal of Material Chemistry	94	2.20	15
20	Inorganic Chemical Act	91	2.13	16
21	Journal of Molecular catalysis & Chemical	90	2.11	17
22	Chemical communication	90	2.11	17
23	Dalton Transaction	88	2.06	18
24	Journal of catalysis	87	2.04	19

Table 5 shows that the journals with their citation are arranged in the order of decreasing number of their rank. The journal with the highest numbers of citation occupies the highest rank and thus found most important journal in the field of chemistry, while the least important titles are placed in the bottom of table 5. Journal of American Chemical Society occupies the first rank as the most preferred journal having been cited for 212 times by the scholars and students of the university.

8. FINDINGS OF THE STUDY

(i) It is observed from the study that on an average 223.6 citations were cited per thesis and 64.71 citations per dissertation by the chemistry research scholars. Further, highest numbers of citation per thesis is 302.66 found in the year 2013 and lowest average number of citation 154.25 is found in the year 2010. In case of dissertation, on an average 6471 citations are cited by the M.Phil degree holders. Highest number of citation is 65.75 found in the year 2009 and the lowest average number of citation 21 is found in the year 2011.

(ii) Findings revealed that out of the total number of 5145 citation 36.96% (1902) are by more than three authors followed by double author 32.49% (1672), three author 15.60% (803) and single author covers (14.92%) (768).

(iii) Authorship pattern of citation shows that most of the citations are contributed by more than three authors that proved the fact that chemical science research is collaborative in all aspects.

(iv) The analysis of citation according to the bibliographic format revealed that the journal contributes the highest number of citation accounting for 82.68% (4254) of the total citation. This revealed that journals are the most preferred sources of information used by the researchers in the field of chemical sciences, which shows not only their relevance in communicating scholarly literature but also dependency of scholars and students on journals primary source of information for their research work. Book are second most cited source of information accounting for 14.90% (767) of the total citation followed by potent/ technical reports which are 0.79% (41), followed by web resources 0.66% (34), seminar/ conference proceedings 0.62% (32) and Ph.D. Thesis 0.33% (17).

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(v) The rank list of journals in the field of chemistry revealed that journal citation cited by researches were scattered among 61 journals. Journal of American chemical society occupies the first rank as the most letters (3.85%) occupies the second rank getting 164 citation, followed by chemical review (3.76%) with 160 citation and Tetrahedron (3.10%) with 132 citation.

9. RECOMMENDATION AND CONCLUSION

Based on the present study and its findings, following recommendation can be made:

(i) The research methodology as a course which is compulsory for post graduate students should be strengthen to include formal training in literature searching and teaching of research skills needed by master's and doctorate students.

(ii) Necessary researchable materials and facilities such as internet facility, different databases containing recent and full information an a particular discipline (as chemistry in the present study) and web resources should be made available and easily accessible in the departments and libraries to support needs of the research students.

(iii) The web has brought many changes and challenges to the field of citation analysis. Researchers and administrators who want to evaluate research impact and quality accurately will from now on have to use not only multiple sources such as Web of Science and Scopus, but also different method (e.g. Citation Counts and so on).

(iv) Though the cited resources are quite current as revealed from the present study, there is a need to increase awareness on the use of higher quality journals as listed in JCR. There is a need to promote the use of these high impact journals and increase the availability of in demand journals.

(v) No library has unlimited resources allowing it to subscribe to all the journals that their users demand. Therefore, the library must frame an acquisition policy that agrees with the real possibilities and priorities in research areas. For instance, in agreement with the ranking of the journal title core journals must have priority because they are the most cited.

(vi) Lost but not least though citation analysis may be simple to apply but should be used with caution bearing in mind several of its Pitfalls. Thus, it should be carried out in order to supplement and not to replace a system of expert review to determine the actual quality and impact of published research.

The points of recommendations mentioned above may not be the ultimate solution to remove the existing limitations or pitfalls in the use of citation as a tool to evaluate the impact of research on the world at large but to an extent it can help *researchers to use* this technique to attain its main objective i.e. to analyse the present trend of research and can help librarians to frame collection development policy in a better way.

Conclusion: Citation analysis in any research activities has become one of the popular methods to study subject relationship, authorship pattern, impact, publication trends and to identify core journals in a particular subject field or for a particular scientific community. It is an unobtrusive method of gathering data to assist in collection development and in carrying out research.

It is evident from the analysis of citations that Ph.D. research scholars and M.Phil students of the Department of Chemistry, Dibrugarh University consulted enormous literature while preparing their theses and dissertations. This study revealed that journals are the most preferred sources of information used by the researchers in the field of Chemical Science, closely followed by books while resources from the web/ internet is least utilized by scholars and students. It is found that collaborative research is prevailing in the field of chemistry. It can also be observed that highest citation count is in doctoral thesis which must be due to the fact that their research is highly extensive and broad compared to the master's research that is slightly extensive. The first ten journals in the ranking list together accounts for 30% of the total citation. This rank list of journals is very useful in the acquisition of journals in the library and could also help in evaluating the importance of journals. It helps librarians and researchers to select the journals of greater importance in a particular subject area. Since master's and doctorate programmes are research oriented, the study has identified journals worthy of closer examination by librarians for acquisition purposes. Thus this kind of studies will also be helpful to recognize researchers' information needs and requirements and can serve as feedback to the librarians in the selection and acquisition of most useful journals within the budget constraints. Thus this study has revealed that the resources used by the M.Phil and Ph.D. scholars in Chemistry in preparing their dissertation and thesis follow almost the same pattern as of those in other subjects.

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