

CITATION ANALYSIS OF PH.D. THESES AWARDED BY UNIVERSITY OF DELHI DURING 2016 AND 2017 IN THE FIELD OF ZOOLOGY

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ABSTRACT

This study examines the citation pattern of University of Delhi Ph.D. theses in zoology from 2016 to 2017. A total of 10,211 citations were recorded manually from all 57 Ph.D. theses. The study examined the patterns of authorship; the number of citations based on document type; the distribution of citations according to chronology; distribution of citations based on different subfields of zoology; most productive journals in zoology; prolific authors in zoology discipline and the degree of collaboration among the zoologists. The findings reveal that the journal publication citations are maximum accounting for 8816 citations i.e. 86.33%. The share of two-authored citations is highest i.e. 2472 (24.21%). The joint authorship pattern is popular among zoologists. The value of CI is 3.424, DC is 0.875 and the value of CC is 0.601. As a result, the study indicates that in zoology, there is a growing trend toward collaborative research. Kumar, V. is the most cited author in zoology research with 78 (0.022%) citations. The maximum number of citations i.e. 4542 (44.48%) by the zoology researchers are cited from the period 2001 – 2010. It is observed that the biochemistry sub-discipline obtained the highest i.e. 1061(10.39%). It is evident from the study that the Journal of Biological Chemistry published from the United States is the most productive journal, accounting for 224 (2.54%) of the citations. The results of this type of study would be of great value for the librarians and zoologists to carry out research work and the management activities relating to the field.

Keywords: Zoology, Citation analysis, collaborative Index, Degree of Collaboration, Collaboration Coefficient.

1. INTRODUCTION

Citation Analysis is the study of examining the references or the works cited in the publications to reveal the different properties of the documents. Citation analysis helps you to assess the influence of your work by looking at how often it is mentioned by others. Librarians analyze citations in student research papers, theses, and dissertations using the citation analysis approach for the goals of collection evaluation and development. Citation analysis is useful to find subject relationships, authorship patterns, impact, publication trends. Citation analysis allows you to assess and interpret the citations that papers, authors, institutions, and other entities have received.

The current research examines the citation analysis of theses issued by the University of Delhi in the 2016-2017 academic year. Zoology is the branch of biology that studies the structure, physiology, embryology, morphology, evolution, categorization, behavior, and distribution of all living and extinct animals based on certain traits. Zoology is an important field of study that has the potential to have a significant impact on the world around us.

2. LITERATURE REVIEW

In order to carry out the citation analysis for the given topic following literature and articles are reviewed. Tyagi and Kumar (2017) examined the citations in doctoral theses submitted to Chaudhary Charan Singh University's Department of Political Science between 2010 and 2015 and discovered that books were the most cited documents (61.1 percent). Indian literature came in highest with 51.6 percent of citations, followed by 325 (14.8 percent) and 172 (7.8%) citations from the United States and the United Kingdom, respectively. In comparison to sciences and technology, authorship patterns in political science theses suggest less collaborative research and a higher number of single authors. The analysis also indicates that Indian authors (64.8%) are cited more than foreign authors (35.2%). Siddiqui, J. A., & . S. (2016) did a study on citation analysis of PhD.

Theses of sociology from Chaudhary Charan Singh University and analyzed the authorship pattern, the types of literature used by research academics, and the citation distribution across time. It determines which publication has the most citations and compiles a list of sociology's key journals. Gohain and Saikia (2014) did analysis on citations in Tezpur University's Ph.D. theses in chemical sciences. The most frequently cited sources were journals, which accounted for 78.83% of all citations, followed by books, which accounted for 15.57% of all citations. The Journal of the American Chemical Society is the most productive of all having 7.13% citations. The authorship pattern suggests collaborative research, with more than three writers contributing the majority of the citations, followed by two. Singh and Dabas (2013) analysed citations in Ph.D. theses submitted in the sociology field at the University of Delhi from 1995 to 2010 and observed that single-authored theses received the most citations (83.94%), followed by Books (67.23%), and journals (22.20%). India garnered 2536 (45.52 percent) of the citations, with the United States and the United Kingdom coming in second and third, respectively.

3. OBJECTIVES OF RESEARCH

The study's major goal is to examine citation trends in zoological research, particularly Ph.D theses. The objectives are:

1. To investigate the citation distribution by document type.;
2. To analyze how citations are distributed chronologically;
3. To understand the pattern of authorship in referenced references;
4. To figure out how citations are distributed among different subject categories;
5. To compile a ranking list of zoology's core journals.
6. To find zoology's most prolific authors.
7. To ascertain the zoologists' research collaboration.

4. METHODOLOGY

The data for this study was manually gathered from 57 Ph.D. theses submitted to Delhi University's zoology department during 2016 and 2017. The researcher used MS Excel to keep track of all the references included in the thesis. The collected citations were analyzed and categorized into different groups like the various form of documents i.e books, journal articles, conference papers, reports, theses, dissertations, etc. Each citation is tallied and recorded separately. While analyzing every citation, the information collected includes the number of authors, name of the authors, subject subfield, name of the journal, form of the document, country of publication of Journal, etc. A total of 10,211 citations were found in all 57 theses. For data analysis purpose excel is used. To find the prolific authors in zoology the number of citations obtained by each author is taken into account. The number of highly referenced papers was used to determine the most productive journals of zoology.

5. RESULTS AND DISCUSSION

5.1 The Total Number of Theses in Chronological Order

Table 1 depicts the chronological distribution of the total number of theses from 2016 to 2017.

Table 1: Total no. of Theses and Citations in the year 2016-2017

S. No.	Year	Number of Theses	Total Citations	Average number of citations per Theses
1	2016	30	4815	160
2	2017	27	5396	199
Total		57	10211	179

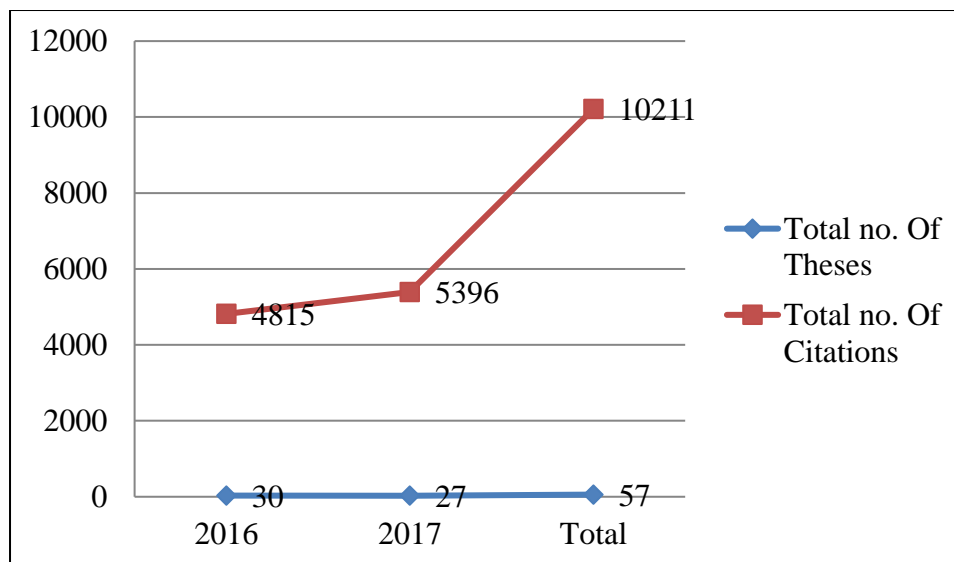


Fig 1. Total No. of Theses and citations in the year 2016-2017

5.2 Distribution of Citations by type of Documents

The largest amount of citations are contributed by journals, as seen in table 2. accounting for 8816 citations i.e. 86.33% followed by Books accounting for 701 citations i.e. 6.86%, and conference proceedings with 355(3.47%) citations. The rest includes other forms of documents. Among other magazines, Bulletins and reports constitute the maximum number of citations than the rest of the documents.

Table 2: Distribution of Citations according to form of document

S. No.	Document Type	Number of Citations (%)
1	Journals	8816 (86.33%)
2	Books	701(6.86%)
3	Conference proceedings	355(3.47%)
4	Magazines	125(1.22%)
5	Bulletins	86(0.84%)
6	Reports	46(0.46%)
7	Theses	30(0.3%)
8	Handbooks	13(0.13%)
9	Manuals	13(0.13%)
10	Websites	7(0.07%)
11	Dissertations	3(0.03%)
12	Encyclopedias	3(0.03%)
13	Atlas	2(0.02%)
14	Monograph	2(0.02%)
15	(Others)	9(0.09%)
Total		10211 (100%)

5.3 Authorship Pattern

To assess the fraction of single and many writers, the authorship pattern was examined. The degree of collaboration and a ranked list of prolific writers are determined in addition to the authorship pattern.

I. Authorship Pattern in Zoology

The major proportion of research output used for citations is generated mostly by two- authored work, followed by five and more. The analysis indicates that the share of two-authored citations is 2472 i.e. (24.21%) which is followed by three-authored citations 1863 i.e. 18.24%. The share of more than five-authored citations is 1673 i.e.(16.38%) & the four-authored citations constitute 15.16% i.e.1548

citations. The five-authored citations are 1386 in number i.e.(13.58%) & single-authored citations ranked last with 1269 citations i.e.12.43% of the total citations.

Table 3.1: Pattern of Authorship in Zoology

S. No.	Number of Authors	Number of Citations	Citations (%)	Rank
1	Single Authors	1269	12.43	6
2	Two Authors	2472	24.21	1
3	Three Authors	1863	18.24	2
4	Four Authors	1548	15.16	4
5	Five Authors	1386	13.58	5
6	More than Five Authors	1673	16.38	3
Total		10211	100	

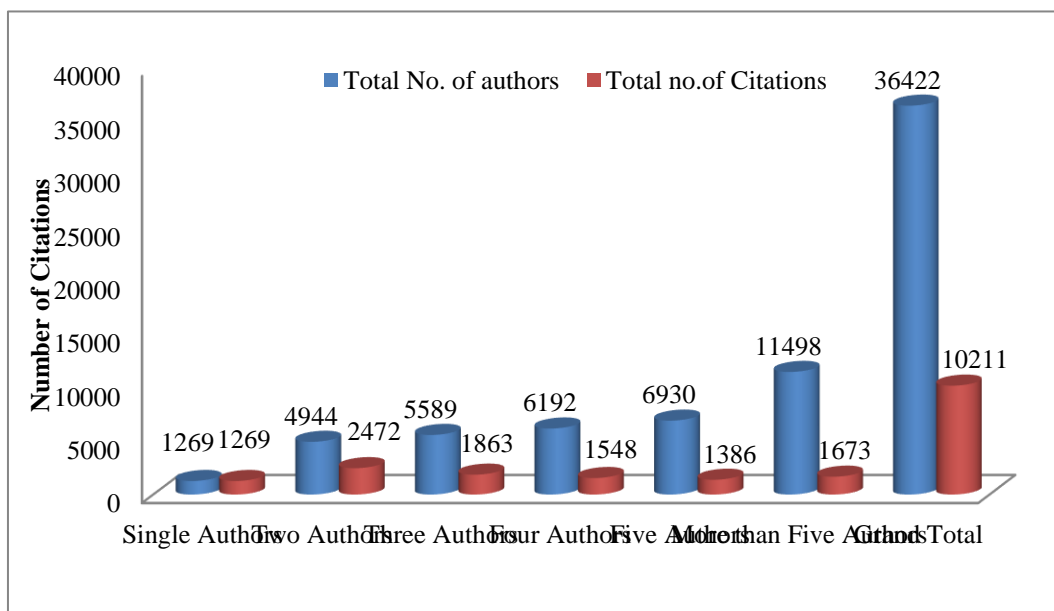


Fig. 2 : Authorship pattern

The practise of collaborating on a paper is becoming increasingly widespread among zoologists. So, it may lead to a conclusion that there is more trend of team research or collaborative research in the field of zoology.

II. Degree of collaborations

The approach for determining the collaboration index was based on Lawani's work and formula, and the value was determined to be 3.424. The degree of collaboration is determined using Subramanyam's formula, which yields a value of 0.875. Ajefruke's formula is used for calculating the value of the collaborative coefficient which is found to be 0.601. This shows that collaborative work is more preferred by zoology researchers; also demonstrate that the fraction of written citations with two or more authors is the highest. Thus, the study concludes that in zoology trend towards collaborative research is more. The below table shows the results of research collaborations in zoology under the study:

Table 3.2: Measures of research collaboration

	Zoology
CI	3.423954559
DC	0.87572226
CC	0.601504913

5.4 Ranked List of Prolific Authors

While determining the prolific authors in zoology the list of first 150 authors has been made by their name. The following table presents the list of 10 prolific authors in zoology:

Table 4: Ranked list of prolific authors in zoology

S.No.	Authors	No.of Citations	Citations %	Cumulative No.	Rank
1	Kumar, V.	78	0.022	78	1
2	White, M.F.	63	0.173	141	2
3	Aggarwal, B.B.	52	0.143	193	3
4	Matzuk, M.M.	39	0.107	232	4
5	Richards, J.S.	33	0.091	265	5
6	Kouzarides, T.	30	0.082	295	6
7	Moudgal, N.R.	30	0.082	325	6
8	Rani, S.	28	0.077	353	7
9	Allis, C.D.	28	0.077	381	7
10	Shimasaki, S.	27	0.074	408	8

It is obvious from the analysis that Kumar,V. is the most cited author in zoology research with 78 (0.022%) citations, followed by White, M.F. with 63 (0.173%) citations, Aggarwal, B.B with 52 citations i.e. (0.143%). Matzuk, M.M holds rank 4 with 39 citations i.e. (0.107%), followed by Richards, J.S. with 33 (0.091%) citations. Kouzarides, T. & Moudgal, N.R. has 30 citations respectively i.e. (0.082%) of the total citations. Rani, S. & Allis, C.D. having 28 citations 0.077% holds the 7th rank. Shimasaki, S. holds rank 8th having 27 citations i.e. (0.074%).

5.5 Citations in Chronological Order

The chronological distribution of citations can be used to estimate the freshness and currentness of the material used in study. The duration of the whole period in the present study is divided into various groups from 1900 to 2017. The period taken is 10 years. Table 5 shows the results of the citations' chronological distribution throughout all theses. It can be observed that the works produced between 2001 and 2010 had the highest amount of citations i.e 44.48 %, followed by the year 1991-2000 with 23.98% citations and 2011- 2017 with 16.88% citations.

Table 5: Citations according to Chronological order

S. No.	Time period	No. of Citations(%)
1	1900 – 1910	1(0.01%)
2	1911 – 1920	5(0.05%)
3	1921 – 1930	16(0.16%)
4	1931 – 1940	24(0.24%)
5	1941 – 1950	15(0.15%)
6	1951 – 1960	53(0.52%)
7	1961 – 1970	151(1.48%)
8	1971 – 1980	439(4.30%)
9	1981 – 1990	792(7.76%)
10	1991 – 2000	2449(23.98%)
11	2001 – 2010	4542 (44.48%)
12	2011 -2017	1724(16.88%)
Grand Total		10211 (100%)

5.6 Citations Based on Subjects

By analysing citations by topic category, the distribution of zoological literature can be seen. This subject distribution is based on the key concepts derived from the titles of the citations which the Ph.D. researchers cite in their theses. Table 6 shows the distribution of citations in zoology subject-wise and the top 20 key concepts or subjects are identified having the maximum number of citations.

Table 6: Citations Based on Key Concepts in Zoology

Key Concept	Number of Citations	Citations (%)
Biochemistry	1061	10.39
Entomology	1047	10.25
Endocrinology	991	9.71
Neurology	772	7.56
Cell biology	706	6.91
Genetics	689	6.75
Reproductive Biology	531	5.20
Immunology	523	5.12
Physiology	416	4.07
Pathology	414	4.05
Microbiology	385	3.77
Molecular biology	318	3.11
Science	305	2.99
Oncology	292	2.86
Aquaculture	218	2.13
Development Biology	214	2.10
Pharmacology	194	1.90
EVS	172	1.68
Medicine	135	1.32
Agriculture	123	1.20
(Others)	705	6.9
Grand Total	10211	100

5.7 Ranked List of Core Journals

Journals are necessary for research, however due to their rising costs, librarians examine their quality, use, and suitability for a certain set of readers. The ranking list is a useful tool for determining which journals are most useful in terms of their coverage of fresh and relevant work in a given topic area. The total citation frequency acquired by each journal was used to create the ranking of the journals. The titles are listed in order of the number of citations they have received. It is given in table 7 with their ranks, country of publication, and percentage of citations of contribution:

Table 7: List of Prolific Journals in Zoology

S. No.	Name of the Journal	No. of Citations	Citations (%)	Country	Rank
1	Journal of Biological Chemistry	224	2.54	United States of America	1
2	Endocrinology	183	2.08	United Kingdom	2
3	Nature	180	2.04	United States of America	3
4	General and Comparative Endocrinology	158	1.79	United States of America	4
5	Cell	141	1.60	United States	5
6	Human Molecular Genetics	140	1.59	United Kingdom	6
7	International Journal of Systematic and Evolutionary Microbiology	96	1.09	United Kingdom	7
8	Journal of Neuroscience	91	1.03	United States of America	8
9	Molecular Endocrinology	83	0.94	United States of America	9
10	Nature Genetics	73	0.83	United Kingdom	10

A total of 8816 journal articles are cited from 2620 journals in the field of zoology by the researchers during the period under study. Table 4.8 depicts the top 10 journals and ranked according to the number of times they are cited by the researchers along with the country of their publications. It is found that the first 10 journals are all published by only three countries i.e. Netherlands, USA and UK.

The Journal of Biological Chemistry from the United States takes the top spot in the list, with 224 (2.54 %) of all journal citations. The Endocrinology secure rank second with 183 (2.08%) citations, followed by science journal Nature having 180 (2.04%) citations, General and Comparative endocrinology with 158 (1.79%) citations, Cell having 141(1.60%) citations, Human molecular genetics having 140 (1.59%) citations, 96 (1.09 percent) of the total citations came from the International Journal of Systematic and Evolutionary Microbiology, 91 (1.03 percent) from the Journal of Neuroscience, and 83 (0.94 percent) from molecular endocrinology. Only journals from the United Kingdom and the United States make the top ten. The first 49 journal citations account for only 28.71 percent of all journal citations. The rest are not listed here and are put in the category of others.

6. FINDINGS AND CONCLUSION

- With 8816 citations i.e (86.33%), journals are the most cited source, out of 10,211 citations in zoology. Books are the second highest cited documents accounting for 701 citations i.e. 6.86% followed by Conference proceeding papers with 355(3.47%) citations and magazines with 125 (1.22%) citations.
- According to the study, the proportion of citations with two authors is the greatest having 2472 citations i.e.(24.21%) which is followed by three- authored citations 1863 i.e.18.24%. The share of more than five-authored citations is 1673 i.e.(16.38%) & the four-authored citations constitute 15.16% i.e.1548 citations. The five–authored citations are 1386 in number i.e. (13.58%) & single authored citations ranked last with 1269 citations i.e. 12.43% of the total citations.
- Collaborative index is 3.424, collaborative degree is 0.875, and collaborative coefficient is 0.601. This demonstrates that zoology researchers favour collaborative work and that the percentage of two authored citations is the greatest.

- d) It is obvious from the study that Kumar, V. is the most cited author in zoology research with 78 (0.022%) citations, followed by White, M.F. with 63 (0.173%) citations, Aggarwal, B.B with 52 citations i.e.(0.143%). Matzuk, M.M holds rank 4 with 39 citations i.e. (0.107%), followed by Richards, J.S. with 33 (0.091%) citations occupying the 5th rank.
- e) The maximum number of citations 4542 (44.48%) by the zoology researchers are cited from the period 2001 – 2010 followed by 2449 i.e. (23.98%) from the period 1991 – 2000.
- f) Biochemistry sub-discipline obtained the last highest i.e.1061(10.39%) citations followed by entomology having 1047(10.25%) citations and endocrinology with 991(9.71%) citations.
- g) Journal of Biological Chemistry published from United States accounts for 224 (2.54%) of the overall journal citations and holds the apex position. The Endocrinology secure rank second with 183 (2.08%) citations, followed by science journal Nature having 180 (2.04%) citations.

This study shows a perceptible upward trend towards collaborative research and decreasing trend towards single authorship. Collaborative research in any field ensures good quality and quantity of research publications in that particular field. This study proves to be of great importance for the zoologists as well as for the libraries in managing the resources and to know the more efficient areas in which work has been already done and the areas that are lagging behind on research perspective.

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