BIBLIOMETRIC STUDY OF PH.D. THESES IN ZOOLOGY OF VIDYASAGAR UNIVERSITY: SPECIAL REFERENCE TO JOURNAL CITATIONS

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ABSTRACT: - *Bibliometrics or the statistical study of bibliographic information is a specialized area in Library and Information Science research. It is an important tools or techniques to study different area both literature cited and literature provided by the researchers. The present study is an attempt to know the citation pattern of journals used by the research scholars of Zoology of Vidyasagar University by using bibliometrics techniques.*

KEY WORDS – ***Bibliometrics Study; Zoology and Citation Analysis***

1. Introduction

'Research Productivity' has been gaining growing importance in last one decade. Faculty members of the universities in India have two functions to perform, teaching and research. Teaching is one of the canonically performed functions. However, research in Universities has gained momentum during the past one and half decade, mainly due to support received through PhD program, in-house projects and extra-mural funding projects form major government scientists agencies. The research output of the university scientists in the form of research papers and theses is being considered as one of the main criteria for assessing the performance of university scientists and faculty.

Doctoral degree acts as an indicator of quality of higher education. A doctoral degree or PhD is the highest academic degree, which is awarded to the students for undertaking original work that advances knowledge and understanding. They demonstrate their expertise in a particular subject or field of investigation. A degree of doctorate is a certificate to the effect that the learner has now achieved a sound academic knowledge that should enable him/her to conduct and present research of a scholarly nature and fulfill the requirements of a teaching faculties at leading institutions.

A PhD degree is the one universally accepted research qualification which facilitates the doctorates to collaborate with their counterparts across the world.

Dissertation or thesis becomes an integral part of the research process act as a vehicle to transmit the results of research. Research and development cannot be envisaged without the communication of results of research. Calvin James Boyer said that, the research process is incomplete if the research results are not used or not made readily accessible to the potentially interested researchers. Each originator wish that the result of the doctoral research as reported in the dissertation or thesis is disseminated to interested audience. In a summary of the McPhie's dissertation, published in Social Education, he concluded by recommending that, each doctoral student should be responsible for publishing at least one good summary article of his thesis in a professional journal that will reach the appropriate group of readers. The dissertation and the publications based on those dissertations serve the purpose of communicating significant research results for the advancement of human race.

India invests a huge amount of fund and time in the creation of doctorates to meet its 'R&D' requirement. Very few studies have been made to compare and evaluate the research output of the universities and R&D organizations of West Bengal. Evaluation of research institutions is very important for their ranking, proper funding, grant releasing etc. In recent past National Assessment and Accreditation Council (NAAC)has started evaluating overall activities of our universities in India.

- **Zoology:**

Zoology, the study of animals, includes both the inquiry into individual animals and their constituent parts, even to the molecular level, the inquiry into animal populations, entire faunas, the relationship of animals to each other, to plants, and to the nonliving environment.

- **Bibliometrics:**

Bibliometrics or the statistical study of bibliographic information is a specialized area in Library and Information Science research. It may be subsumed under a broader field, informetrics, which covers the mathematical theory and modeling of all aspects of information.

The term Bibliometrics has a recent origin. It is analogous to Ranganathan's librametrics, the Russian concept scientometrics, FID's informetrics and also to some well established sub-disciplines like econometrics, psychometrics, sociometrics, biometrics. Here mathematical and statistical formulation have been systematically applied to solve the problems in the fields of library science, scientific knowledge, Information Science, Economics, Psychology, Sociology and Biology.

Allan Pritchard first coined the term 'Bibliometrics` in 1969 in preference to the existing terminology 'statistical billiography', as he felt the latter has some built in ambiguity in it and there is a likelihood to misinterpret it as 'bibliograqphy of statistics'. He defined Bibliometrics as the application of mathematical

methods to books and other media of communications. We may define Bibliometrics more explicitly as follows: **'**Organization, classification and quantitative evaluation of publication patterns of all macro and micro communications along with their authorship by mathematical and statistical calculations.**'**

- **Application of Bibliometrics**

The techniques of bibliometric have extensive applications equally in sociological studies of science, information management, librarianship, history of science including science policy, study of science and also in different branches of social sciences. Some of the areas where bibliometric techniques can be used are:

i. To identify research trends and growth of knowledge;

ii. To estimate comprehensiveness of secondary periodicals;

iii. To identify users of different subjects;

iv. To identify authorship and its trends in documents on various subjects;

v. To measures the usefulness of adhoc and retrospective Selective Dissemination of Information (SDI)services;

vi. To develop experimental mode correlating existing ones

vii. To identify core periodicals in different disciplines;

viii. To formulate an accurate need based acquisition policy within the limited budgetary provision;

ix. To adopt an accurate weeding and stacking policy;

x. To initiate effective multilevel network system;

xi. To study obsolescence and dispersion of scientific literature;

xii. To predict productivity of publishers, individual authors;

xiii. To organizations, country or that of an entire discipline;

xiv. To design automatic language processing, abstracting and auto classification;

xv. To develop norms for standardization.

Bibliometrics is a major sub-discipline of quantitative research. Bibliometric methods are used in studies of properties and behavior of recorded knowledge, analysis of the structures of scientific research and evaluation of research activities. It is relevant for researchers to track the trend in the specific field in their research work. Bibliometric studies should be encouraged to evaluate research performance of any specific field of research in a country.

2. Problems

The problem is the specification of the objective of the investigation and a particular aim to be achieved. There are six universities in West Bengal imparting advanced studies of Zoology at Post Graduate (P.G) and research level. However no specific effort has been made to evaluate the research contribution of these universities on the following aspects:

i) Research output on the specific subject of individual university i.e. how many theses are submitted in different years in the area of Zoology?

ii) Report of the research has neither been published in a professional journal nor easy to access even if published.

iii) Proper steps have not been taken up by the universities or the institutions to know the trend of research on the subject in the region.

iv) Information about research activities found in University Newsletters or some other on-line university databases are also not sufficient due to negligence of the researcher to provide necessary information to the respective authority.

v) What are the different sources of information cited in the theses?

vi) How the citations are being distributed according to the subject, country and language?

vii) What is the trend of authorship pattern of the cited journal article?

viii) Which are the frequently cited journals by the researchers?

ix) What is the commonly cited journal and core journal?

Present exhaustive bibliometric study is an attempt to investigate the prevalent situation of zoological research in Vidyasagar University, West Bengal.

3. Objective of the Study:

Present study is being carried out to identify the research trend as well as to make a bibliometric study on the subject of Zoological Research in Vidyasagar University, West Bengal. However, the objectives of this study are to find out:

1. An exhaustive list of PhD theses on Zoology conducted by the university.
2. Year-wise distribution of research output.
3. Physical description of PhD thesis. Through this study a clear picture will be reflected about the research outputs, researchers and supervisors. This includes :
    - Year-wise submission, number and frequency of words used in title.
    - Distribution of bibliographic pages, chapters used in different thesis
    - Supervising patterns, year-wise distribution of supervisors and their rank
4. Subject-wise distribution of PhD theses.
5. Number of citation appended to the theses.
6. Authorship pattern in the citation.
7. Type and form of literature being used.
8. The language of the journals cited.
9. Distribution of journals by the country of origin.
10. Age distribution of the citations as well as to identify core and allied journals in the disciplines.

4. Methodology:

Present work is based on the study of seventy PhD theses in Zoology accepted by Vidyasagar University from the beginning of its research programme till the end of year 2014, which are available in the Central Library. Following steps are followed as the methodology of the present research work.

1. The literature cited in the Ph.D. thesis of Zoology is the basic source of information to assess the information used by the researchers. Accordingly the references cited in the Ph.D. thesis have been taken as the source data.
2. Individual theses are observed physically and the bibliographic information are collected. Identify various branches of the subject by following appropriate method and find out the specific area on which a research work has been carried out by the researcher to know the subject- wise distribution of the theses.
3. A careful investigation are carried out on the citation appended in a thesis to know the number of citations, authorship pattern of the citations, type and form of literature, language of the journals cited and their country of origin.
4. Age distribution of the citation and half-life of the document on the subject are presented by analyzing the citations.
5. The core journals and allied journals on the subject are identified.
6. Appropriate tables and other figures are prepared to analyze the data to find out necessary results.
7. Trend of research on the subject are find out by preparing subject wise and year wise distribution of the PhD theses.

Thesis-wise various work sheet diagrams have been designed and generated for the purpose of data collection. Initially data have been collected and tabulated in excel sheet with various fields. Consequently the required analysis has been done to identify and satisfy the objectives formulated above.

5. Facts and Findings

After physical observation an attempt is made to recognize the content analysis of the seventy PhD theses in Zoology considering following observations:

Year wise distribution of PhD theses has been shown in the table, where year wise number of PhD theses, percentage of all theses has been presented.

Year	No of Theses submitted	Percentage of Theses
1999	1	1.43
2000	2	2.86
2001	1	1.43
2002	10	14.29
2003	3	4.285
2004	6	8.57

2005	7	10
2006	4	5.71
2007	6	8.57
2008	4	5.71
2009	6	8.57
2010	8	11.43
2011	2	2.86
2012	6	8.57
2013	3	4.285
2014	1	1.43
Total	70	100.00

The highest number of theses i.e. 10 (14.29%) was submitted in the year 2002 and the lowest number of theses are only 1 (1.43%) each for three years i.e. 1999, 2001 and 2014. Average number of theses submission per year is 4.375.

- The highest number of theses i.e. 10 (14.29%) was submitted in the year 2002,
- The highest number of theses i.e. 26 (37.14%) was submitted under the subject Fisheries and next in the subject Ecology, total theses is 21 i.e. (30%).
- The grand average number of citations per dissertation is 257.34 citations.
- Out of 70 Ph.D. theses maximum 42 (60%) theses were supervised by double supervisors. Only 28 (40%) theses were guided by single supervisor.
- From the study it is clear that in Zoology Department of Vidyasagar University only 13 (18.57%) researchers were female. Maximum 57 (81.43%) researchers were male. So that it is clear that higher education is restricted in male member in our society, if all of us get equal opportunity.
- Maximum number of bibliographic page 16-20 has in 14 theses.
- Maximum number of theses i.e. 22 has 7 chapters.

5.1 Citation Analysis of the Doctoral Dissertations

The main objective of this study is to find out the different characteristics of cited documents like journals, journal articles, books, conference papers, conference proceedings, and theses and dissertations only. Bibliographic forms used by the researchers have been shown in Table 2.

Serial No.	Name of the Bibliographic Forms	No. of Citation	% of Citation	No. of cumulative Citation	% of Cum Citation
1	Periodicals	14077	78.14	14077	78.14
2	Books	2350	13.05	16427	91.19
3	Conference Paper	607	3.37	17034	94.56
4	Theses and Dissertations	216	1.20	17250	95.76
5	Reports	189	1.05	17439	96.81
6	Govt Publication	156	0.87	17595	97.67
7	Univ Publication	125	0.69	17720	98.37
8	Web	97	0.54	17817	98.91
9	Course material	36	0.20	17853	99.11
10	Bulletin	35	0.19	17888	99.30
11	Reviews	29	0.16	17917	99.46
12	Occasional Paper	22	0.12	17939	99.58
13	Newsletter	17	0.09	17956	99.68
14	Working Paper	16	0.09	17972	99.77
15	Newspaper	15	0.08	17987	99.85
16	Souveniour	11	0.06	17998	99.91
17	Monograph	8	0.04	18006	99.96
18	Mannual	7	0.04	18013	99.99
19	Leaflet	1	0.01	18014	100.00

Table 2: Bibliographic forms of the citations

Necessary outcomes of the Table are as follows:

- Total number of citations in the theses under study are 18014.
- The highest numbers of citations are recorded in periodicals with 14077 (78.14%) citations. This indicates that the journals are the most preferred source of information used by the researchers in Zoology.
- Books are the second most cited source accounting for 2350 (13.05%) citations.
- Journal article and book citations both constitute 91.19% citations of the total citations.

- Proceedings of conferences/symposia/workshops etc. constitute 607 (3.37%) citations and which is the third most cited source followed by dissertations with 216 (1.20%) citations.
- Use of modern technology i.e. Web resources citations are very low i.e. 97 (0.54%) citations. Present study covered the theses submitted from1999. During that time web resource or electronics resources are not so popular and access was also not so easy.

5.1.1 Year-wise Distribution of Bibliographic Forms

Year-wise distribution of the three main bibliographic form of literature is presented in Table 3 and necessary information obtained from the Table are as follows:

Form	Year of Submission															
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Periodicals	342	141	184	2150	774	1513	1347	566	1530	820	884	1658	250	1078	680	160
Books	36	53	30	369	170	230	129	145	153	110	141	376	45	209	141	13
Conf. Paper	3	13	6	41	18	65	37	56	57	80	44	68	5	77	21	16
Theses	1	2	9	29	11	20	11	5	29	22	10	35	0	23	6	3

Table 3: distribution of bibliographic form of literature

- The highest number of overall periodical citations has been recorded in the year 2002 with 2150 citations and the least number of citations ware 141 in the year 2000.
- The highest number of overall book citations is recorded in the year 2002 with 369 citations and the least being 13 citations in 2014.
- The highest overall conference paper citations were recorded in the year 2008 with 80 citations and the least with 3 citation in1999.
- The uppermost overall citation to theses and dissertation citations was evident in the year 2010 with 35 citations and the least was 0 citations in the year 2011.

5.1.2 Year wise Distribution of Citation

Year- wise distribution of citations has been presented in Table 4 with the following findings:

Serial No.	Year	No. of Dissertation	No. of Citation	Average No. of Citation	% of Citation	No. of cumulative Citation	% of Cum Citation
1	1999	1	390	390.00	2.16	390	2.16
2	2000	2	230	115.00	1.28	620	3.44
3	2001	1	231	231.00	1.28	851	4.72
4	2002	10	2655	265.50	14.74	3506	19.46
5	2003	3	1005	335.00	5.58	4511	25.04
6	2004	6	1871	311.83	10.39	6382	35.43
7	2005	7	1573	224.71	8.73	7955	44.16
8	2006	4	799	199.75	4.44	8754	48.60
9	2007	6	1817	302.83	10.09	10571	58.68
10	2008	4	1159	289.75	6.43	11730	65.12
11	2009	6	1140	190.00	6.33	12870	71.44
12	2010	8	2283	285.38	12.67	15153	84.12
13	2011	2	306	153.00	1.70	15459	85.82
14	2012	6	1466	244.33	8.14	16925	93.95
15	2013	3	876	292.00	4.86	17801	98.82
16	2014	1	213	213.00	1.18	18014	100.00

Table 4: Year- wise distribution of citations

- The maximum number of average citations per dissertation is 390 citations in the year 1999 and the minimum is 115 citations in the year2000.
- The average number of citations per dissertation is calculated to be 257.34 during the period under study.

5.1.3 Distribution of Citations in Dissertations

Table 5 shows the distribution of citations in dissertation.

Serial No.	Number of Citation	No. of Dissertation	% of Dissertation	No. of cumulative Dissertation	% of Cum Dissertation
1	01-50	1	1.43	1	1.43
2	51-100	5	7.14	6	8.57
3	101-150	9	12.86	15	21.43
4	151-200	7	10.00	22	31.43
5	201-250	14	20.00	36	51.43
6	251-300	13	18.57	49	70.00
7	301-350	8	11.43	57	81.43
8	351-400	6	8.57	63	90.00
9	401-450	2	2.86	65	92.86
10	451-500	1	1.43	66	94.29
11	501-550	2	2.86	68	97.14
12	551-600	2	2.86	70	100.00

Table 5: citations in dissertation

It has been found from the Table that-

- The maximum number of references per dissertation is between 201-250 citations in 14 (20%) dissertations, closely followed by 250-299 citations in 13 (18.57%) dissertations and minimum is between1-50 and 451-500 citations in 1 (1.43%) dissertations.

5.1.4 Analysis of the Journal Citations

Journals are the carriers of the latest information and are the most important components of the information resources used by researchers. Most of the research output and original findings or new application of existing knowledge are reported in journals. This study covers the following observations.

5.1.4.1 Distribution of Journal Citations

Information obtained from theses in respect of journal citation in references are as follows:

Serial No.	Number of Journal Citation	No. of Dissertation	% of Dissertation	No. of cumulative Dissertation	% of Cum Dissertation
1	01-20	2	2.86	2	2.86
2	21-40	7	10.00	9	12.86
3	41-60	10	14.29	19	27.14
4	61-80	9	12.86	28	40.00
5	81-100	10	14.29	38	54.29
6	101-120	13	18.57	51	72.86
7	121-140	7	10.00	58	82.86
8	141-160	3	4.29	61	87.14
9	161-180	5	7.14	66	94.29
10	181-200	4	5.71	70	100.00

Table 6: Journal Citations

- The maximum number of journal citations per dissertation is between 101-120 citations in 13 (18.57%) dissertations and the minimum is between 1-20 citations in 2 (2.86%) dissertations.
- The average number of journal citations per doctoral dissertation during 1999- 2014 is calculated as 22.75 citations.

5.1.4.2 Country wise Distribution of Journal Citations

All cited journals are published from different countries. The published countries are tabulated and analyzed in Table 7.

Serial No.	Country of Publication	Rank	No. of Citation	% of Citation	No. of cumulative Citations	% of Cum Citation
1	USA	1	470	29.50	470	29.50
2	UK	2	246	15.44	716	44.95
3	India	3	240	15.07	956	60.01
4	Germany	4	109	6.84	1065	66.85
5	Netherlands	5	99	6.21	1164	73.07
6	Japan	6	51	3.20	1215	76.27
7	Canada	7	40	2.51	1255	78.78
8	France	8	37	2.32	1292	81.10
9	China	9	27	1.69	1319	82.80
10	Poland	9	27	1.69	1346	84.49
11	Brazil	11	19	1.19	1365	85.69
12	Egypt	11	19	1.19	1384	86.88
13	New Zealand	13	18	1.13	1402	88.01
14	South Africa	13	18	1.13	1420	89.14
15	Australia	15	16	1.00	1436	90.14
16	Italy	15	16	1.00	1452	91.15
17	Pakistan	17	11	0.69	1463	91.84
18	Chez Republic	18	8	0.50	1471	92.34
19	Hungary	18	8	0.50	1479	92.84
20	Israel	18	8	0.50	1487	93.35
21	Rest other countries	21	106	6.65	1593	100.00

Table 7: Country wise distribution of journal citations

Findings of country wise distribution of journal citations are given below:

- The most of the journal citations come from USA with 470 (29.5%) citations and followed by UK with 246 (15.44%)citations and India with 240 (15.07%).
- Only top three countries (USA, UK, India) cover 60.01% of cited journals, top 8 countries cover

81.10% of total citations, top 16 countries cover 91.15 percent citations and remaining other countries cover 8.85 percent citations.

5.1.4.3 Language Distribution of Journal Citations

- Out of the total number of Journal cited, almost all of them were English language journals. Specifically 98.79% of cited journals were in English some which have other language editions available. Rest other 1.21% journals were in other languages, predominantly French-0.45%, German-0.29% and Japanese -0.2%.
- Other language journals cited have very low percentage as most of the researchers didn't have understanding in other foreign language except English. Also availability of these Journals in languages other than English is very low.

5.1.4.4 Chronological Distribution of Journal Citations

The foundation year of the cited journals are grouped and tabulated into 13 separate groups as given in Table 8.

Serial No.	Period of Publication	No. of Citation	% of Citation	No. of cumulative Citations	% of Cum Citation
1	Prior to 1900	128	8.14	128	8.14
2	1901-1910	81	5.15	209	13.29
3	1911-1920	70	4.45	279	17.74
4	1921-1930	59	3.75	338	21.49
5	1931-1940	112	7.12	450	28.61
6	1941-1950	81	5.15	531	33.76
7	1951-1960	133	8.46	664	42.21
8	1961-1970	228	14.49	892	56.71
9	1971-1980	241	15.32	1133	72.03
10	1981-1990	181	11.51	1314	83.53
11	1991-2000	119	7.57	1433	91.10
12	2001-2010	106	6.74	1539	97.84
13	2011-till date	34	2.16	1573	100.00

- **.The researchers prefer the most of the journal with 241 (15.32%) citations in the period 1971-1980, followed by 228 (14.49%) citations in the period 1961-1970 and 181 (11.51%)**

citations in the period1981-1990. So, it is clear that, Researchers of Zoology Prefer the journal from 1961-1990, which covers 41.32%

5.1.4.5 Ranking of the Journal Citations

- "Aquaculture" occupies the first rank with 671 (4.77%) citations of the total journal citations and followed by "Hydrobiologia" with 542 (3.85%)citations.
- The Journal Article citations with 14077 citations are scattered in 1593 different Journal citations

5.1.4.6 Frequency wise Analysis of Journal Citations

- The present study reveals that Quarterly (4/year) journals are the most cited journals by the researchers which account for 434 (27.24%) citations and followed by Monthly (12/year) with a share of 302 (18.96%)citations

6. Conclusion

Any research work played an important role for development of that subject. It is very much essential for any researcher to know the doctoral research works carried out in other university departments in our country. Researchers are unable to get any authentic source to know about the research going on. The study shows the present situation of doctoral research in the field of Zoological Science in Vidyasagar University. For further research work it will be helpful to the researcher.

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