BIBLIOMETRIC CITATIONS IN PH.D. THESES IN LIBRARY AND INFORMATION SCIENCE AT BHARATHIDASAN UNIVERSITY, TIRUCHI

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Abstract

The present study analyses the preferences and usage of different types of information resources used by the research scholars to write PhD theses in the discipline of Library and Information Science. The citations examined different type of literatures cited such as journal articles, books, databases, theses and reference sources. The results indicate that researchers have cited nearly 69 % of journals used for their research, the researchers have cited more foreign journals.

Key words: Bibliometric, Citation Studies, Ph.D, Theses, Library and Information Science and Journals.

1. INTRODUCTION

Bibliometrics has become a standard tool of science policy and research management in the last decades. All significant compilations of science indicators heavily rely on publication and citation statistics and other, more sophisticated bibliometric techniques. Today, bibliometrics is one of the rare, truly interdisciplinary research fields to extend to almost all scientific fields. Bibliometric methodology comprises components from Mathematics, Social Sciences, Natural Sciences, Engineering and even Life sciences.

The term 'Bibliometrics' and Scietometrics were almost simultaneously introduced by Pritchard and Nalimov and Mulchenko in 1969. While Pritchard explained the term

'Bibliometrics' as "the application of mathematical and statistical methods to books and other media of communication".

In 1927 Gross and Gross published their citation-based study in order to aid the decision which periodicals should best purchased by small college libraries. In particular, they examined 3633 citations from the 1926 volume of the journals of the American Chemical Society. This study is considered about the first citation analysis, although it is not a citation analysis in the sense of present day bibliometrics.

1.1. Journal citation Measures

Journal citation measures are one of the most widely used bibliometric tools. They are used in information retrieval, scientific information, library science and research evaluation. They are applied at all levels of aggregation. The main source of journal citation measures is the annually appearing Journal citation Report (JCR). The most important measure is the Impact Factor (Garfield, 1979). The impact factor for the journal J in the year n is defined as the ratio

$$IF_n(J) = \frac{c_n}{P_{n-1} + P_{n-2}}$$

Where cn is the number of citations received in the year n by papers published in the journal J in the years n-1 and n-2 and the total number of source items (pn-1+Pn-2) published in the journal J in these two years (n-1 and n-2).

The Immediacy Index is defined analogously to the Impact factor as a journal citation measure of citations received in the publication year, particularly,

$$In(J) = \frac{c_n}{P_n}$$

2. Source Theses for the present study

The source theses of the present study belongs to Bharathidasan University in the department of library and information science   submitted from the year 2008 to2012.The thesis, downloaded from the "Shodhganga" is the name coined to denote digital repository of Indian Electronic Theses and Dissertations set-up by the INFLIBNET Centre. Theses and dissertations are known to be the rich and unique source of information, often the only source of research work that does not find its way into various publication channels. Theses and dissertations remain an un-tapped and under-utilized asset, leading to unnecessary duplication and repetition that, in effect, is the anti-theses of research and wastage of huge resources, both human and financial. Shodhganga" is the name coined to denote digital repository of Indian Electronic Theses and Dissertations set-up by the INFLIBNET Centre.

3 .Objective of the Study

- To identify different type of Bibliographic form used by researchers

- Subject Wise citation of resources
- Language Wise citation of resources
- To identify country wise cited resources
- To authorship wise distribution of Citations
- To identify the average number of authors per citation
- To identify the ranking of journals
- To identify the age of literature
- Productivity of cited journals
- Applicability of Bradford's law of Scattering

4. Methodology

The source of the data for the present study is the four Ph.D. Theses submitted to Bharathidasan University during the year2008-12. In this discipline of library and information science, a total number of 4 theses in 791 citations were found in the four thesis, each thesis was manually examined and citations were extracted from the references and bibliographical sections of the four thesis. The data extracted were analysed using MS-Excel software.

5. Data Analysis:

Table- 5.1
Bibliographic form-wise distribution of citations

S.No	Bibliography form	Number of Citations	Percentage	Cumulative Number	Cumulative Percentage
1	Journals	545	68.90	545	68.9
2	Electronic Resources	103	13.02	648	81.92
3	Conferences	60	7.59	708	89.51
4	Books	44	5.56	752	95.07
5	Bulletins	18	2.28	770	97.35
6	Report	13	1.64	783	98.99
7	Newsletters	2	0.25	785	99.24
8	Current content	2	0.25	787	99.49
9	Thesis	1	0.13	788	99.62
10	Review	1	0.13	789	99.75
11	Patent	1	0.13	790	99.87
12	Lecture notes	1	0.13	791	100.00
	Total	791	100.00	791	100

The table-5.1 shows the different bibliographic form-wise distribution of articles cited by the researchers, 791 citations cited by the researchers in 12 bibliographic forms. Highly cited articles in journals is 68.90%.. Electronic resources, articles cited is 13.02%. Conference Proceedings, Articles cited is 7.59% books cited is 5.56%. Bulletin articles cited is 2.28 % reports cited only is 1. 64 % and other remaining 6 bibliographic forms cited below 1.00%.

Table-5.2

Subject Wise Citation of resources

S.No	Subject	No. of. Citations	Percentage	Cumulative Number	Cumulative Percentage
1	Library Science	736	93.05	736	93.05
2	Computer Science	35	4.42	771	97.47
4	Social Science	3	0.38	774	97.85
5	Atmospheric Science	3	0.38	777	98.23
6	Virtual Environments	2	0.25	779	98.49
7	Physics	2	0.25	781	98.74
8	Mobile Communication	2	0.25	783	98.99
9	Internet Adoption	2	0.25	785	99.24
10	Economics	2	0.25	787	99.50
11	Management Studies	1	0.13	788	99.62
12	Higher Education	1	0.13	789	99.75
13	Environmental Science	1	0.13	790	99.88
14	E-Business	1	0.13	791	100.00

The table 5.2 shows the different type of subjects cited by the researchers in the791 citations highly cited subjects in library and information science is 736 articles 93.05%. The researcher cited not only Library science articles. He is cited Computer science articles is 4.42%, Social Science and Atmospheric Science article is each 0.38%, Virtual Environment, physics, Mobile Communication Internet Adoption and Economics articles are each 0.25% and Management Studies Higher Education, Environmental Science and E-Business each article is 0.13%.

Table- 5.3. Language-wise distribution of articles

S.No.	Language	Number of Citations	Percentage	Cumulative Citations	Cumulative Percentage
1	English	781	98.74	781	98.74
2	Chinese	10	1.26	791	100.00
	Total	791	100.00	791	100.00

The table -5.3 shows language-wise distribution of articles. The researcher cited only two languages highly cited language is in English that is 98.74%. Chinese language articles cited only is 1.26%.

Table-5.4

Country –wise distribution of articles

S.NO.	Country of Origin	Number of Citation	Percentage	Cumulative Number	Cumulative Percentage
1	USA	261	33.00	261	33.00
2	UK	217	27.43	478	60.43
3	India	201	25.41	679	85.84
4	Netherland	66	8.34	745	94.19
5	China	14	1.77	759	95.96
6	Malaya	6	0.76	765	96.72
7	Africa	4	0.51	769	97.22
8	Pakistan	4	0.51	773	97.73
9	Iran	3	0.38	776	98.11
10	Australia	2	0.25	778	98.36
11	Czech Republic	2	0.25	780	98.61
12	Singapore	2	0.25	782	98.87
13	Sri Lanka	2	0.25	784	99.12
14	Taiwan	2	0.25	786	99.37
15	Yugoslavia	2	0.25	788	99.62
16	Brazil	1	0.13	789	99.75
17	Canada	1	0.13	790	99.88
18	Switzerland	1	0.13	791	100.00
	Total	791	100.00	791	100.00

The table-5. 4 shows the country-wise distribution of articles, the researcher cited 16 countries article for his research USA (261) 33 % of articles, UK (217) 27.43% of the articles, India (201) 25.41%, Netherland (66) 8.34% and other remaining 12 countries article cited by the researchers is below 2%.

5.1. Multiple authorship and Collaborative Research

Collaboration among scientists is a common phenomenon in the scientific community, As scientific research has become more complex, the multiple disciplinary approach to various studies became necessary, and this involved collaboration between

scientists from various fields and disciplines. The present section is devoted to the study of authorship patterns, the average number of authors per citation i.e (author/article ratio) and the degree of collaboration in the discipline of Library and Information science as a whole, and its different sub disciplines.

5.1.1. Authorship pattern in Journal Citations:

The distribution of citations to articles in journals in Library and Information science in relation to the number of authors is presented in the table 5.5. Papers with multiple authors (2-6 authors) are the highest in number, comprising 55.23 percent of the total citations. Single authored papers occupy second place with 44.77 percent.

Table-5.5

Authorship-wise distribution of citations in journals

Single author			Multiple Authorship														
Year	Single	%	Two	%	Three	%	Four	%	Five	%	Six	%	Total	%	Total	%
1965-70	3	60.00	2	40.00	0	0	0	0	0		0	0	2	40.00	5	100
1971-75	2	66.67	0	0	0	0	1	33.33	0		0	0	1	33.33	3	100
1976-80	5	71.43	0	0	2	28.57	0	0	0		0	0	2	28.57	7	100
1981-85	12	54.55	10	45.45	0	0.00	0	0	0		0	0	10	45.45	22	100
1986-90	15	62.50	5	20.83	3	12.50	0	0	1	4.17	0	0	9	37.50	24	100
1991-95	24	70.59	4	11.76	5	14.71	0	0	1	2.94	0	0	10	29.41	34	100
1996-2000	46	53.49	28	32.56	7	8.14	4	4.65	1	1.16	0	0.00	40	46.51	86	100
2001-05	75	39.89	75	39.89	26	13.83	4	2.13	6	3.19	2	1.06	113	60.11	188	100
2006-10	62	36.47	62	36.47	25	14.71	1	0.59	4	2.35	16	9.41	108	63.53	170	100
2011-12	0	0.00	4	66.67	1	16.67	1	16.67	0	0.00		0.00	6	100.00	6	100
	244	44.77	190	34.86	69	12.66	11	2.02	13	4.32	18	5.81	301	55.23	545	100

5.1.2. Average number of Authors per citation (Author/Article ratio) and Degree of Collaboration:

The growth in the proportions of both collaborative papers and the number of authors in a discipline depends to some extent on the type of research. The average number of authors per citation denotes a rough estimation of the extent of the collaboration in a discipline. Table 5.6 presents the average number of authors per citation in Library and information science. The highest fluctuate somewhat in the beginning, but later show a

marked increase. The highest author/article ratio is 2.50 (during 2011-12), and the average author/article ratio for the period under the study is 1.92.

Table-5.6

Average Number of Authors per citation in journals

Reference Period	Total No. Of Citations	Total No. Of Authors	Percentage
1965-70	5	7	1.4
1971-75	3	6	2
1976-80	7	11	1.57
1981-85	22	32	1.45
1986-90	24	39	1.63
1991-95	34	52	1.53
1996-2000	86	144	1.67
2001-05	188	361	1.92
2006-10	170	381	2.24
2011-12	6	15	2.50
Total	545	1048	1.92

5.2. Ranking and Scattering of Cited Journals

The ranked list is essentially a practical tool designed to aid the practicing librarians and researchers in selecting the journals of maximum utility in relation to their coverage of nascent and important literature in particular subject fields. In this section, the ranking, productivity and scattering of cited journals in Library and information science are discussed.

5.2.1. Ranked list of Cited Journals:

The ranked list of journals in the field of Library and Information Science is presented in Table 5.7. The journals on the table may be considered as the preferred channel for the communication of new knowledge in the Library and Information Science.

It is observed from the table-5.7 that the Journal Citations cited by the researchers in the field of Library and Information Science are distributed among 74 journals. Out of these, Scientometric occupies the first rank with 13.58 percent in first rank, followed by journal of Annals of Library and Information studies (10.09%), in the second rank SRELS Journal of Information Management (3.85%), Third rank, Annals of Library Science and Documentation (3.49), fourth rank Library Review and Resources sharing and Information Networks . Both journals are in (3.12%) fifth rank and the remaining all are below 3%.

Table-5.7

Ranking of Journals

S.No.	Rank	Title of the Journal	Country	Number of Citations	Percentage	Cumulative Citations	Cumulative Percentage
1	1	Scientometric	Netherland	74	13.58	74	13.58
2	2	Annals of Library and Information studies.	India	55	10.09	129	23.67
3	3	SRELS Journal of Information Management	India	21	3.85	150	27.52
4	4	Annals of Library Science and Documentation	India	19	3.49	169	31.01
5	5	Library Review	UK	17	3.12	186	34.13
6	5	Resour. Share & Info. Networks	USA	17	3.12	203	37.25
7	6	Electro. Lib	UK	16	2.94	219	40.19
8	7	IASLIC Bulletin	India	12	2.20	231	42.39
9	8	Interlending & Document Supply	UK	11	2.02	242	44.41
10	9	DESIDOC.J.Lib& Info Tech	India	9	1.65	251	46.06
11	9	Geomatics and Info Sci	China	9	1.65	260	47.71
12	9	J. Inter. Lib. Loan, Docu. Deli & Electro. Reserve	UK	9	1.65	269	49.36
13	9	Reference Services Review	UK	9	1.65	278	51.01
14	10	Medical, and Reference Services Quarterly	UK	8	1.47	286	52.48
15	10	J. Informetrics. Sci	Netherland	8	1.47	294	53.95
16	11	Academic Exchange Quarterly	USA	7	1.28	301	55.23
17	11	College & Research Libraries	USA	7	1.28	308	56.52
18	11	Indian Journal of Information, Library and Society	India	7	1.28	315	57.80
19	11	J. Info. SCI. Tech	USA	7	1.28	322	59.08
20	11	Journal of Information Science	UK	7	1.28	329	60.37
21	11	The International Information & Library Review	USA	7	1.28	336	61.65
22	12	Journal of Medical Library Association	USA	6	1.10	342	62.75
23	12	Journal of Library and Information Science	Brazil	6	1.10	348	63.86
24	12	Reference & User Services Quarterly,	USA	6	1.10	354	64.96
25	12	Bull. MED. Lib. Asso	UK	6	1.10	360	66.06
26	13	Malaysian Journal of Library & Information Science	Malaysia	5	0.92	365	66.97
27	13	New Library World	UK	5	0.92	370	67.89
28	13	The Journal of Academic Librarianship	Netherland	5	0.92	375	68.81
29	14	Herald of Library Science	India	4	0.73	379	69.54
30	14	Lib. Coll. Acq. And Tech. Serve	USA	4	0.73	383	70.28
31	14	Lib. Mgt	UK	4	0.73	387	71.01

32	14	Quart. J. Nat. Lib Islamic Repub. Iran	Iran	4	0.73	391	71.75
33	14	Science & Technology Libraries	UK	4	0.73	395	72.48
34	15	A bibliometric Study." Annals of Library and Information Studies	India	3	0.55	398	73.03
35	15	Annual. Lib. Info. Stud	India	3	0.55	401	73.58
36	15	Info.Process&Mgt	UK	3	0.55	404	74.13
37	15	J. Lib. Admin	UK	3	0.55	407	74.68
38	15	J. Of. Amer. Soc for InfSci Tech.	USA	3	0.55	410	75.23
39	15	Library journal	UK	3	0.55	413	75.78
40	15	Nature	UK	3	0.55	416	76.33
41	15	Scientific & Tech Info Process	UK	3	0.55	419	76.88
42	16	35 Journal with 2 Citations		70	12.84	489	89.73
43	17	56 Journal with 1 Citations		56	10.28	545	100.00

5.3. Productivity of Cited Journals:

The productivity of Cited Journals is measured by grouping all the journal citations in four groups containing roughly the same number of citations. The productivity of cited journals in the field of Library and information science is presented in the table 5.8. It is observed from the table that 25% total citations are contributed by two journals in the first group. The average productivity of each journal in the first, second, third and fourth groups is 64.50, 14.00, 4.97 and 1.47 respectively. This marked difference confirms the decreasing productivity of individual journals in the ranked list.

Table - 5-8

Productivity of Cited Journals

S.No.	Percentage of Citations	No of Citations	No of Journals covered	Percentage of Journals	Average Productivity of Journals
1	0-25%	129	2	1.52	64.50
2	26-50%	140	10	7.58	14.00
3	51-75%	144	29	21.97	4.97
4	76-100%	132	90	68.18	1.47
	Total	545	132	100.00	4.13

5.4. Applicability of Bradford's law of Scattering:

The verbal formulation of the Bradford's law of scattering is also tested by dividing the total number of citations in each field into three zones. The basis for choosing the three zones is that the variation is found to be minimum among the number of citations in each zone. The number of zones having almost the same of citations is shown in below table 5.9

It is observed from the table that there are 5 journals, sharing 3.79 percent of total cited journals. The next zone is represented by 24 journals which share 18.18 percent of total cited journals and the last zone is represented by 103 journals which share 78.03 percent of total cited journals. Each zone has approximately one third of the total citations. Hence the journal distribution as per the Bradford's law reveals the ratio as 5: 24:103.

Data conforming to the verbal formulation should show a more or less a constant ratio with an input of journal titles increasing geometrically. It is observed from the above that the number of journal titles in each zone is not increasing geometrically. Hence it is concluded that the dispersion of journal titles in Library and Information science does not satisfy the verbal formulation of Bradford's law of scattering.

Table 5-9

Bradford's zones

Zones	No of. Citations	No of journals	Cumulative No citations	Cumulative Journals
1	186	5	186	5
2	179	24	365	29
3	180	103	545	132

5.5. Obsolescence of Literature:

Obsolescence is a characteristic of scientific and technical nature. Studies of ageing of obsolescence of documents commonly assess the decline in the use of a representative set of documents over time. Such studies help the librarians in deciding the documents that are to be kept or discarded in order to maintain the need based collection in libraries. In order to compare the speed of decay in different subjects, half-life is used as a measure. Half-life refers to "the time during which one-half of the current active literature was published".

5.5.1. Age-wise distribution of citations:

The age-wise distribution of citations to journals in Library and Information Science is presented in the table 5.10. It is observed from the table that a citation has been made in a journal which was published 33 years ago. The article which still evidenced interest after 33 years was published in 1979. About 85 percent of journal citations are 15 years old.

Table-5.10

Distribution of Citations by Age

S.No.	Age	Number of Citations	Cumulative Number	Cumulative Percentage
1	0	13	13	2.39
2	1	40	53	9.72
3	2	51	104	19.08
4	3	54	158	28.99
5	4	45	203	37.25
6	5	35	238	43.67
7	6	46	284	52.11
8	7	42	326	59.82
9	8	29	355	65.14
10	9	17	372	68.26
11	10	28	400	73.39
12	11	19	419	76.88
13	12	21	440	80.73
14	13	9	449	82.39
15	14	5	454	83.30
16	15	12	466	85.50
17	16	9	475	87.16
18	17	11	486	89.17
19	18	6	492	90.28
20	19	4	496	91.01
21	20	3	499	91.56
22	21	3	502	92.11
23	22	5	507	93.03
24	23	4	511	93.76
25	24	2	513	94.13
26	25	13	526	96.51
27	26	4	530	97.25
28	27	2	532	97.61
29	28	2	534	97.98
30	29	3	537	98.53
31	30	3	540	99.08
32	31	1	541	99.27
33	32	3	544	99.82
34	33	1	545	100.00

6. Finding and Conclusion:

This investigation brought out the following points:

i).   The researchers used the different bibliographic form-wise distribution of articles cited by the researchers, 791 citations are cited by the researchers in 12 bibliographic forms. Highly cited articles in journal citations, i.e. 68.90% Next Electronic resources, articles cited 13.02% and the remaining are having a very low percentage.

ii).   The researcher used 791subject citations , highly cited subjects is in library and information science 736 articles 93.05%. The researcher cited not only Library science articles. He is cited Computer science 35articles 4.42%, Social Science and Atmospheric Science each 3 articles each 0.38%, Virtual Environment, physics, Mobile Communication Internet Adoption and Economics each 2 articles each 0.25% and Management Studies Higher Education, Environmental Science and E-Business each 1articles 0.13%.

iii).   Regarding Language-wise distribution of articles, the researcher cited only two languages, Highly cited language is in English 98.74%. Chinese language articles cited only 1.26%.

iv).   In the country-wise distribution of articles, the researcher cited 16 countries articles for his research in the USA (261) 33 % of articles, UK (217) 27.43% of the articles, India (201) 25.41% Netherland (66) 8.34% and other remaining 12 countries article cited by the researchers is below 2%.

v).   Multiple authors (2-6 authors) are the highest in number, comprising 55.23 percent of the total citations. Single -authored papers occupy second place with 44.77 percent.

vi).   Average number of Authors per citation is the highest author/article ratio is 2.50 (during 2011-12), and the average author/article ratio for the period under the study is 1.92.

vii).   In the Ranking of Journals, the Scientometric occupies the first rank with 13.58 percent, followed by journal of Annals of Library and Information Studies (10.09%), in the second rank SRELS Journal of Information Management (3.85%), Third rank Annals of Library Science and Documentation (3.49), fourth rank Library Review and Resources sharing and Information Networks both journals are (3.12%) in fifth rank and remaining all are below 3%.

viii). Productivity of cited journals is 25% percent. Total citations are contributed by two journals in the first group. The average productivity of each journal in the first, second, third and fourth groups is 64.50, 14.00, 4.97 and 1.47 respectively. This marked difference confirms the decreasing productivity of individual journals in the ranked list.

ix).   Applicability of Bradford's law of Scattering is 5 journals, sharing 3.79 percent of total cited journals. The next zone is represented by 24 journals which share 18.18 percent of total cited journals and the last zone is represented by 103 journals which share 78.03 percent of total cited journals. Each zone has approximately one third of the total citations. Hence the journal distribution as per the Bradford's law reveals the ratio as 5:24:103.

x).   Age-wise distribution of citations is observed from the table that a citation has been made in a journal which was published 33 years ago. The article which still evidenced interest after 33 years was published in 1979. About 85percent of journal citations are15 years old.

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