

Libraries at University of Nebraska-Lincoln
Library Philosophy and Practice (e-journal)

University of Nebraska - Lincoln

Year 2008

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and Information Science Submitted to
University of Pune: A Pilot Study

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Citation Analysis of Theses in Library and Information Science Submitted to University of Pune: A Pilot Study

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Introduction

Citation analysis is a worthwhile area of research. "Citation analysis" refers to references in one text to another text, with information on where that text can be found. Citation analysis is useful for understanding subject relationships, author effectiveness, publication trends, and so on. The first recorded citation analysis was Gross and Gross (1927) who looked at citation patterns to determine the journals to be subscribed to and back volumes to be acquired for the library of Pomona College. They studied the citation frequency in the references given in the *Journal of the American Chemical Society* (Amudhavalli 1997). With citation analysis one can evaluate and interpret citations received by articles, authors, institutions, and other indications of scientific activity (Ravichandra Rao 1993).

Citation analysis is also a way to understand users. Studying references cited by your faculty's publications or your students' papers shows you the types of sources most commonly used and valued locally in their disciplines (Curtis 2005). It makes use of bibliographic references, which are an essential part of scientific communication (*Encyclopedia of Library and Information Science*, 1998). Citation analysis is a major area of bibliometric research, which uses various methods of citation analysis to establish relationships between authors or their work (*Ane's Encyclopedic Dictionary of Library and Information Science*, 2006).

Objectives of the Study

The study objectives are:

- To determine the principal forms of literature used in dissertations by LIS doctoral students
- To prepare a ranked list of periodicals based on frequency of use by doctoral students.
- To determine country-wise distribution of literature used by doctoral students.
- To determine the age distribution of literature used by doctoral students.
- To study authorship patterns in citations.
- To determine language-wise distribution of citations
- To determine subject-wise distribution of citations.

- To determine publisher-wise distribution of citations.

Methodology

Twenty-seven LIS dissertations submitted to the University of Pune between 1982 and 2005 were selected a source of data. A total of 6,257 citations were found in all 27 dissertations. Data compiled includes year of publication of articles, and journal subject, language of journal, publication status, place of publication, and publisher of the journal taken from the online version of Ulrich's International Periodical Directory (<http://www.ulrichsweb.com>).

All references (bibliographies) were photocopied and each reference was categorized according to format or genre, i.e., book, journal, report, conference proceedings, newspaper, thesis/dissertation, and reference book. A list of periodicals was compiled and data was entered in SPSS.

Hypotheses

PhD students prefer periodical literature as a source of information.

PhD students give less importance to non-periodical forms of literature.

PhD students prefer journals published in developed countries.

Data

Distribution of Physical Forms of Publication

Table 1 summarizes the forms of publication cited.

Table 1: Forms of Publication used by Doctoral Students

Forms of Publication			Cumulative	
	Citations	Percent	Citations	Percent
Journal	2639	42.2	2639	42.2
Book	1950	31.2	4589	73.3
Web	357	5.7	4946	79.0
Reference book	352	5.6	5298	84.7
Proceedings	337	5.4	5635	90.1
Reports	292	4.7	5927	94.7
Thesis/Diss.	257	4.1	6184	98.8
Newspaper	22	.4	6206	99.2
Interviews	21	.3	6227	99.5
Pamphlets	9	.1	6245	99.8
Manuscripts	3	.0	6254	100.0
Not Identified	18	.3	6257	100.0
Total	6257	100.0		

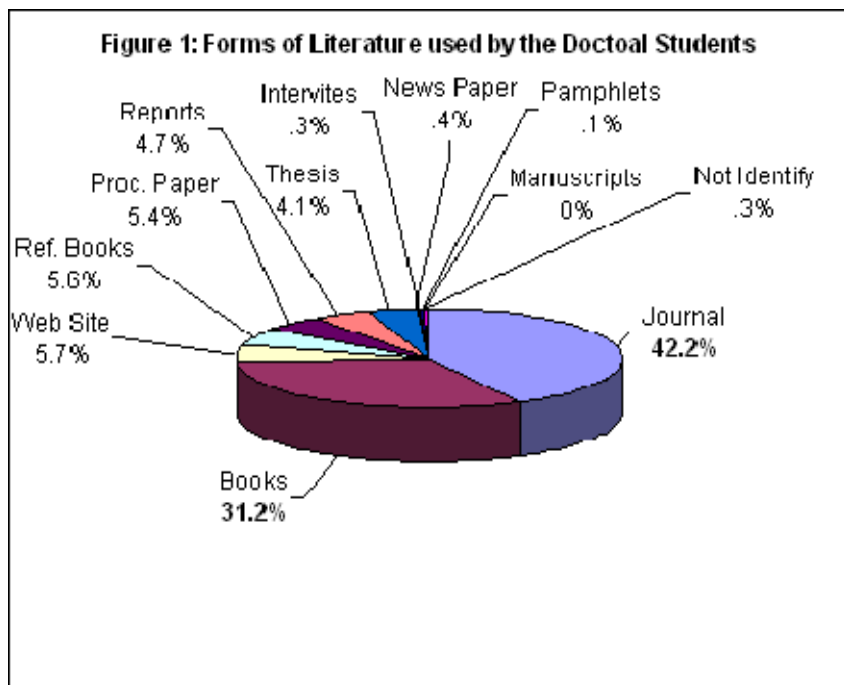


Table 1 shows that 2,639 (42.2%) citations out of 6,257 were from journals, followed by books with 1,950 (31.2%).

Ranked List of Journals

Journals are essential for research but their increasing cost demands that librarians study their quality, usefulness, and suitability to a particular group of users. The ranking list is a practical tool to help select journals of maximum utility in relation to their coverage of new and important literature in a particular subject area. The ranked list of journals in the field of LIS is presented in Table No 2. Journals cited more than twice appear in the table. Titles are arranged in their decreasing order.

Table 2: Ranked List of Cited Journals

Sr. No	Name of Journals	Rank	Citations	Percent	Cumulative	
					Citations	Percent
1	College and Research Libraries	1	141	5.3	141	5.3
2	Scientometrics	2	129	4.9	270	10.2
3	Journal of American Society for Information Science	3	113	4.3	383	14.5
4	Journal of Documentation	4	99	3.8	482	18.3
5	Aslib Proceedings	5	82	3.1	564	21.4
6	Library Quarterly	6	78	3.0	642	24.3
7	Library Trends	7	62	2.3	704	26.7
8	ILA Bulletin	8	61	2.3	765	29.0
9	Library Science With a slant to Documentation	9	54	2.0	819	31.0
10	Herald of Library Science	10	50	1.9	869	32.9
11	Information Development	11	48	1.8	917	34.7
12	Vayu Mandal	12	46	1.7	963	36.5
13	Library and Information Science Abstracts	13	43	1.6	1006	38.1
14	Bulletin of Medical Library Association	14	41	1.6	1047	39.7
15	Library Journal	14	41	1.6	1088	41.2
16	Special Libraries	15	38	1.4	1126	42.7
17	Library Herald	16	37	1.4	1163	44.1
18	International Library Review	17	32	1.2	1195	45.3
19	Information Processing and Management	18	31	1.2	1226	46.5
20	Libri	19	30	1.1	1256	47.6
21	Sahitya Shakar (Marathi)	20	29	1.1	1285	48.7
22	Resource Sharing and Information Networks	21	28	1.1	1313	49.8
23	Journal of Academic Librarianship	22	27	1.0	1340	50.8
24	Computers in Libraries	22	27	1.0	1367	51.8
25	University News	22	27	1.0	1394	52.8
26	Journal of Library and Information Science	23	26	1.0	1420	53.8
27	IASLIC Bulletin	24	25	.9	1445	54.8
28	Library Resources and Technical Services	25	23	.9	1468	55.6
29	UNESCO Bulletin for Libraries	26	22	.8	1490	56.5
30	American Libraries	26	22	.8	1512	57.3
31	Machine Translation	26	22	.8	1534	58.1

32	Journal of Librarianship and Information Science	27	21	.8	1555	58.9
33	International Cataloguing and Bibliographic Control	27	21	.8	1576	59.7
34	Science	27	21	.8	1597	60.5
35	Journal of Information Science	28	20	.8	1617	61.3
36	Indian Librarian	28	20	.8	1637	62.0
37	Program	29	17	.6	1654	62.7
38	Information Today	29	17	.6	1671	63.3
39	Library Hi Technology	30	16	.6	1687	63.9
40	Social Studies of Science	30	16	.6	1703	64.5
41	IFLA	31	15	.6	1718	65.1
42	Journal of Librarianship	31	15	.6	1733	65.7
43	Journal of Education for Libarianship	31	15	.6	1748	66.2
44	Library Association Record	31	15	.6	1763	66.8
45	Journal of Medical Systems	32	14	.5	1777	67.3
46	Library and Information Science Research	32	14	.5	1791	67.9
47	Interlending and Document Supply	32	14	.5	1805	68.4
48	Library Review	33	13	.5	1818	68.9
49	Drexel Library Quarterly	33	13	.5	1831	69.4
50	Indian Economic Journal	33	13	.5	1844	69.9
51	Wilson Library Bulletin	33	13	.5	1857	70.4
52	Collection Management	34	12	.5	1869	70.8
53	Science and Technology Library	34	12	.5	1881	71.3
54	Daedalus	34	12	.5	1893	71.7
55	International Information and Library Review	35	10	.4	1903	72.1
56	Wis-meb. Journal	35	10	.4	1913	72.5
57	Online	35	10	.4	1923	72.9
58	IEEE Expert	35	10	.4	1933	73.2
59	American Documentation	35	10	.4	1943	73.6
60	Journal of American Society for Information Science and Tech	36	9	.3	1952	74.0
61	Cataloguing and Classification Quarterly	36	9	.3	1961	74.3
62	Centre for Library and Information Studies	36	9	.3	1970	74.6
63	Administrative Science Quarterly	36	9	.3	1979	75.0
64	Medical Reference Services	37	8	.3	1987	75.3
65	E-content (Formerly Database)	37	8	.3	1995	75.6
66	Advanced Technology Libraries	37	8	.3	2003	75.9
67	Canadian Library Journal	37	8	.3	2011	76.2
68	Journal of Education for Library and Information Science	37	8	.3	2019	76.5
69	Online Review	37	8	.3	2027	76.8
70	Journal of Higher Education	37	8	.3	2035	77.1
71	Annals of Library and Information Studies	38	7	.3	2042	77.4

72	Satyakatha	38	7	.3	2049	77.6
73	Timeless Fellowship	38	7	.3	2056	77.9
74	ALA Bulletin	38	7	.3	2063	78.2
75	Vachanalaya	38	7	.3	2070	78.4
76	Information Technology and Libraries	38	7	.3	2077	78.7
77	Lucknow Librarian	38	7	.3	2084	79.0
78	American Society for Information Science Bulletin	38	7	.3	2091	79.2
79	Journal of Political Economy	38	7	.3	2098	79.5
80	DESIDOC Bulletin of Information Technology	38	7	.3	2105	79.8
81	OCLC Syatems and Services	39	6	.2	2111	80.0
82	Library Management	39	6	.2	2117	80.2
83	Int. Inf. Comm. and edu.	39	6	.2	2123	80.4
84	Manohar	39	6	.2	2129	80.7
85	Maharashtra Sahitya Patrika	39	6	.2	2135	80.9
86	Alochana	39	6	.2	2141	81.1
87	Education for Information	39	6	.2	2147	81.4
88	Nature	39	6	.2	2153	81.6
89	American Sociological Review	39	6	.2	2159	81.8
90	Health Libraries Review	40	5	.2	2164	82.0
91	Asian Libraries	40	5	.2	2169	82.2
92	Annals of Library Science	40	5	.2	2174	82.4
93	Journal of Indian Library Association	40	5	.2	2179	82.6
94	Maitra	40	5	.2	2184	82.8
95	Communication of the ACM	40	5	.2	2189	82.9
96	American Economic Review	40	5	.2	2194	83.1
97	Biometrika	40	5	.2	2199	83.3
98	Economic Journal	40	5	.2	2204	83.5
99	DELNET Newsletter	40	5	.2	2209	83.7
100	IEEE Transactions on Engineering Management	40	5	.2	2214	83.9
101	Indian Journal of Physical Anthropology and Human Genetics	40	5	.2	2219	84.1
102	Academic Medicine	41	4	.2	2223	84.2
103	Lib Software	41	4	.2	2227	84.4
104	Information Services and Use	41	4	.2	2231	84.5
105	Samikshak	41	4	.2	2235	84.7
106	Prabhuprabhat	41	4	.2	2239	84.8
107	Library Miscellany	41	4	.2	2243	85.0
108	Library Science	41	4	.2	2247	85.1
109	Scientific American	41	4	.2	2251	85.3
110	Journal of Advanced Nursing	41	4	.2	2255	85.4
111	Catalogue and Indiex	41	4	.2	2259	85.6
112	Knowledge Organization	41	4	.2	2263	85.8

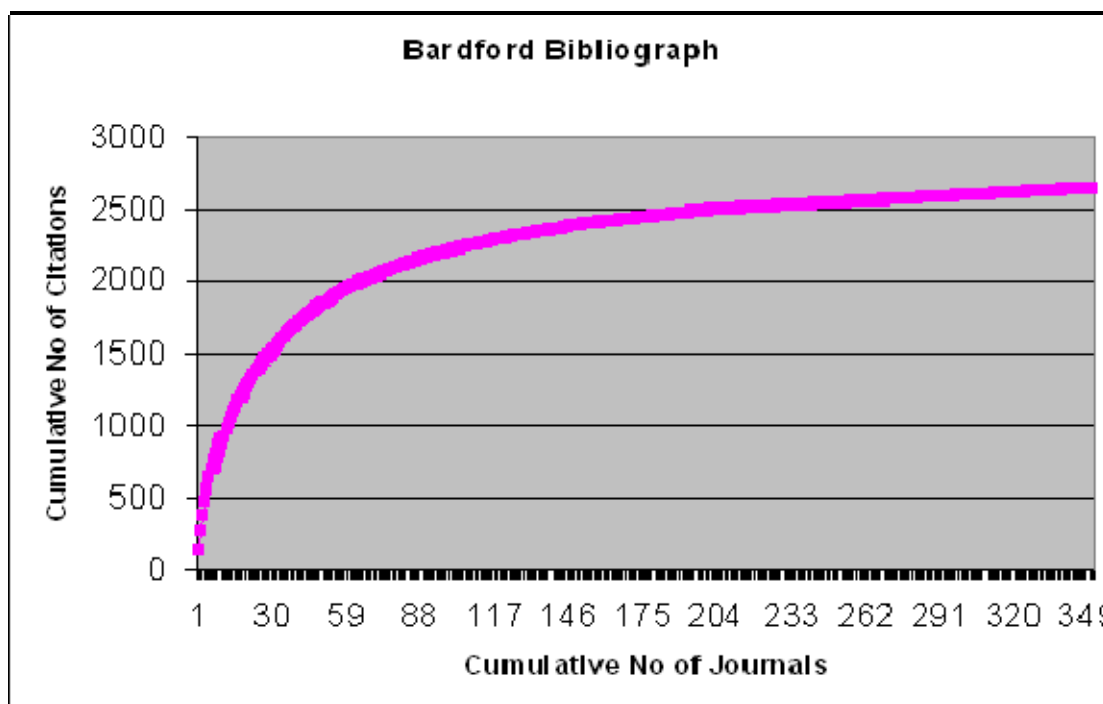
113	Knowledge Quest	41	4	.2	2267	85.9
114	Library Collections, Acquisitions, and Technical Services	41	4	.2	2271	86.1
115	Microcompute	41	4	.2	2275	86.2
116	Technical Services Quarterly	41	4	.2	2279	86.4
117	Mezhdunarodnyi Forum Po Informatli	41	4	.2	2283	86.5
118	American Journal os Sociology	41	4	.2	2287	86.7
119	Chemical Abstracts	41	4	.2	2291	86.8
120	Canadian Journal of Information and Lib. Sci.	41	4	.2	2295	87.0
121	Energy Abstracts	41	4	.2	2299	87.1
122	Journal of Economic Issues	41	4	.2	2303	87.3
123	Journal of Economic Literature	41	4	.2	2307	87.4
124	Research Policy	41	4	.2	2311	87.6
125	Science International	41	4	.2	2315	87.7
126	The Electronic Library	42	3	.1	2318	87.8
127	Journal of Library administration	42	3	.1	2321	87.9
128	Navbharat	42	3	.1	2324	88.1
129	Public Library Journal	42	3	.1	2327	88.2
130	Samaj Probhobahn Patrika	42	3	.1	2330	88.3
131	British Journal of Academic Librarianship	42	3	.1	2333	88.4
132	Catholic Library World	42	3	.1	2336	88.5
133	Computer Networks	42	3	.1	2339	88.6
134	Information Studies	42	3	.1	2342	88.7
135	OCLC News Letter	42	3	.1	2345	88.9
136	Reference and User Services Quarterly	42	3	.1	2348	89.0
137	Sesame Bulletin	42	3	.1	2351	89.1
138	American Journal of Small Business	42	3	.1	2354	89.2
139	Forestry Abstracts	42	3	.1	2357	89.3
140	Journal of Human Resources	42	3	.1	2360	89.4
141	Libraries and Cultural Record	42	3	.1	2363	89.5
142	Science Reporter	42	3	.1	2366	89.7
143	Social Science Information	42	3	.1	2369	89.8
144	Sociology	42	3	.1	2372	89.9
145	Span	42	3	.1	2375	90.0
146	Mini Foxie Newsletter	42	3	.1	2378	90.1
147	Souh African Journal of Library and Information Science	42	3	.1	2381	90.2
201	54 Journals have Two Citations	43	54x2=108	5.2	2435	95.5
351	150 Journals have one Citations	44	150x1=150	4.5	2639	100
	Total		2639	100.0		

Table 2 reveals that the most cited journal by LIS researchers is *College and Research Libraries*, which was cited 141 times, more than 5.3% of the total percentage of citations, followed by *Scientometrics*, at 129 (4.9%), *Journal of American Society for Information Science*, 113(4.3%), *Journal of Documentation*, 99 (3.8%), *Aslib Proceedings*, 82 (3.1%), *Library Quarterly*, 78 (3.0%), and *Library Trends* with 62 (2.3%).

Bradford's Law of Scattering

Bradford in 1934 described a scattering pattern in applied geophysics. He plotted the partial sum of references against the natural logarithm of the partial sums of number of journals and noticed that the resulting graph was a straight line. On the basis of this observation, he suggested the following linear relation to describe a scattering phenomenon: $F(x)=a+b \log X$, where $F(x)$ is the cumulative number of references contained in the first X -most productive journals. "a" and "b" are constants, Bradford, thus, based on a semi-logarithmic group argued that:

If scientific journals are arranged in order of decreasing productivity of articles on a given subject, they may be divided into a nucleus of periodicals more particularly devoted to the subject and several groups or zones containing the same number of articles as the nucleus when zones will be 1:n:n²... where 1 represents the number of journals in the nucleus and 'n' is a multiplier.



In the present study, 11 journals covered 917 articles, the next 55 journals covered 914 articles, and the next 300 journals covered 770 articles. That is, 11 journals covered one-third of the total citations, the next 41 journals accounted for another one-third, and the final 300 covered the remaining third. Thus, the first zone or 'nucleus' contains 11 journals, followed by the second zone with 55, and the third with 300 journals. The zones form an approximately geometric series in the form. 11:55:300

Here, 55= 11x5 and 300= 11x25=11x5x5

i.e. 11:11 x5:11x5x5

or $11:11 \times 5:11 \times 5^2$

Substituting $5 = n$

$11:11n^2:11n^3$

i.e. $1:n:n^2$

Where 11 represents the number of journals in the nucleus and $n=5$ is a multiplier.

Bradford's Law of Scattering is confirmed by this data

Geographic Distribution

Geographical analysis of citations provides information about the countries active in a subject field and their relative contribution. Table 3 shows the geographical distribution of 351 ranked journals covering 2,639 citations.

Table 3: Geographic Distribution

Country	No. of Journal	Percentage	No. of Citations	Percentage
USA	131	37	1076	40.8
India	88	25	651	24.7
UK	71	20	560	21.2
Hungary	1	0	129	4.9
Netherland	10	3	53	2.0
Germany	5	2	40	1.5
France	3	2	25	.9
Canada	9	3	22	.8
Portugal	1	0	20	.8
Australia	5	2	14	.5
South Africa	2	1	7	.3
Pakistan	2	1	5	.2
Jordan	2	1	5	.2
Russia	1	0	4	.2
Slovakia	2	1	3	.1
Belgium	2	0	3	.1
Romania	1	1	3	.1
Taiwan	2	1	3	.1
Malaysia	1	0	2	.1
Denmark	1	0	2	.1
Thailand	1	0	2	.1
Hong Kong	2	0	2	.1
Japan	1	0	1	.0
Iran	1	0	1	.0
Sri Lank	1	0	1	.0
Ireland	1	0	1	.0
Nigeria	1	0	1	.0
Yugoslavia	1	0	1	.0
Bulgarian	1	0	1	.0
Brazil	1	0	1	.0
Total	351	100.0	2639	100

One quarter, or 88 of the journals, covering 651 (24.7%) citations were from India. The US ranks first among foreign countries with 131 (37 %), while 71 (20%) journals, covering 560 (21.2%) citations are from the UK.

Age of Citations

The age distribution of journal citations is given in Table 4.

Table 4 : Age of Citations

Time Span	No.of Citation	Percentage	Cumulative Citation	Cumulative percentage
2005-1996	563	21	563	21
1995-1986	764	30	1327	51
1985-1976	615	23	1942	74
1975-1966	408	15	2350	89
1965-1956	170	6	2520	95
1955-1946	19	1	2539	96
1945-1936	57	2	2596	98
1935-1926	15	.7	2611	98.7
1925-1916	18	1	2629	99.7
1915-1906	9	.2	2638	99.9
1905-1902	1	.1	2639	100
Total	2639	100		

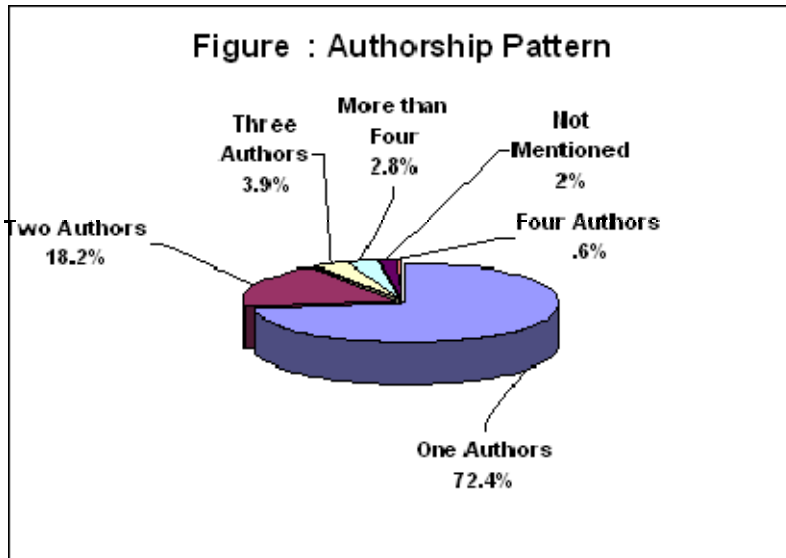
Out of 2,639 citations, 764 were cited during 1986-1995.

Authorship Patterns

The characteristics of subject literature consist of not only the basic publishing patterns but the authors. Authorship has been analyzed to determine the percentage of single and multiple authors. Table 5 shows the authorship pattern distribution of 351 ranked journals covering 2,639 articles.

Table 5: Authorship Patterns

No. of Authors	No. of Articles	Percent	Cumulative Percent
One Authors	1911	72.4	72.4
Two Authors	480	18.2	90.6
Three Authors	104	3.9	94.5
More than Four	75	2.8	97.4
Not Mentioned	54	2.0	99.4
Four Authors	15	.6	100.0
Total	2639	100.0	



Most of the articles have one author: 72.4 percent.

Language distribution

Table 6 shows the language distribution of 2,639 citations.

Table 6 : Language Distribution

Sr. No	Language	Citations	Percent
1	English	2485	94.2
2	Marathi	118	4.5
3	French	12	.5
4	Russian	6	.2
5	Dutch	5	.2
6	Chinese	3	.1
7	Hindi	2	.1
8	German	2	.1
9	Romanian	2	.1
10	Persian	1	.0
11	Urdu	1	.0
12	Bulgarian	1	.0
13	Portuguese	1	.0
	Total	2639	100

Nearly all citations are in English: 2,485 (94.2%), followed by Marathi with 118 (4.5%).

Subject Distribution of Citations

Subject distribution of core journals in LIS is presented in Table 7. The LIS literature is scattered among various subjects. LIS doctoral students used a multitude of disciplines, including science, medicine, economics, psychology, etc.

Table 7: Subject Distribution

Sr. No	Subject	No of Citation	Percent
1	Library Science	1906	72.2
2	Science	191	7.2
3	Medical Science	73	2.8
4	General	64	2.4
5	Economics	61	2.3
6	Literature	60	2.3
7	Computer Science	53	2.0
8	Meteorology	52	2.0
9	Education	51	1.9
10	Sociology	29	1.1
11	Humanities	13	.5
12	Social Sciene	11	.4
13	Psychology	9	.3
14	Energy	8	.3
15	Engineering	8	.3
16	Anthropology	6	.2
17	Politics	5	.2
18	Biology	5	.2
19	Geology	5	.2
20	Chemistry	5	.2
21	Forests	3	.1
22	Mathematics	3	.1
23	Agricultural	3	.1
24	Publishing and Book Trade	3	.1
25	Agriculture	3	.1
26	Microbiology	1	.0
27	Communication	1	.0
28	Religions	1	.0
29	Geography	1	.0
30	Philosophy	1	.0
31	Military	1	.0
32	Architecture	1	.0
33	Pharmacy	1	.0
34	Marathi	1	.0
	Total	2639	100.0

Nearly three quarters of the citations are from LIS subjects, followed by 191 (7.2%) in science, 73 (2.8%) citations from medicine, and other 469 (17.8%) citations from 31 subjects.

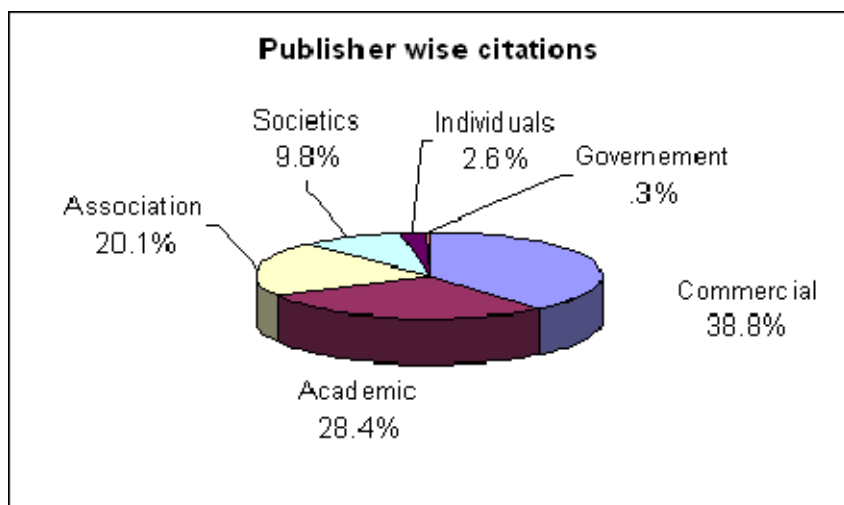
Publisher Distribution

The decision to acquire library resources is sometimes based on the type of organization publishing the materials. To learn more about the publishers cited in LIS dissertations, publishers were categorized as commercial, academic, association, societies, individuals, and government.

Table 8 shows the publisher distribution of 2,639 citations.

Table 8: Publisher Distribution

Sr. No	Type of Publisher	No. of Citation	Percent
1	Commercial	1024	38.8
2	Academic	749	28.4
3	Association	531	20.1
4	Society	259	9.8
5	Individual	68	2.6
6	Government	8	.3
	Total	2639	100



Commercial publishers were the most frequently cited. They were closely followed by academic publishers, and then associations, societies, and individuals.

Findings and Conclusion

More than 6,000 citations from 27 doctoral dissertations were analyzed. The following conclusions are drawn:

- Nearly half of the citations recorded are from journal articles: 2,639 (42.2%)
- Nearly three quarters of the journal articles were from LIS journals, with the remainder from 33 other subject areas.
- *College and Research Libraries* is the most cited journal, followed by *Scientometrics*.
- Most of the citations are from 55 journals out of the total number.

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