

CITATION ANALYSIS OF LIBRARY AND INFORMATION SCIENCE DOCTORAL THESES SUBMITTED TO NORTH-EASTERN HILL UNIVERSITY, MEGHALAYA

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ABSTRACT -

The purpose of this study is to analyze the citations appended to the twenty (20) Library and Information Science (LIS) doctoral theses submitted to North-Eastern Hill University (NEHU) between 1994- 2018; available in the Shodhganga, a repository of Indian university electronic theses and dissertations. A total of 2,693 citations are examined on various parameters like cited bibliographic forms of literature, chronological distribution of the journal, and book citations, the half-life of journal and book citations, rank-list, the applicability of Bradford's law. Journals received the highest number of citations among all bibliographic forms cited in LIS doctoral theses of NEHU from 1994 to 2018. The half-life of journal and book citations is 15.98 years and 20.06 years, respectively. *College and Research Libraries* is the most frequently cited journal in LIS doctoral theses at NEHU.

Keywords: Citation analysis, Shodhganga, LIS, Doctoral theses, NEHU

INTRODUCTION

Research is an essential component of every subject. It allows a deeper understanding of a subject and uncovers hidden possibilities. The university is the hub of higher education, engaging in research and development in every field. Research & developmental activities are getting maximum exposure from universities and other research institutes across the globe. Many research institutions are always ready to assist and support research at various levels. In India, UGC and other research organizations support research at various levels (M. Phil., Ph.D., etc.) (Mulla&Konnur, 2013). The doctoral thesis is considered a primary source of information. The Ph.D. degree is one of the highest academic degrees awarded by the universities to a research scholar. It is an acknowledgment of completing a study with some new findings or maybe the modification of an existing fact.

The doctoral thesis serves as a testament to the researcher's ability to engage in an extensive research project (Thavamani & Pushparaj, 2013).

Citation analysis is gaining popularity as time passes. It can be both a quantitative and a qualitative study. Citations are the references cited at the end of an article or research paper. During the preparation of an article, an author must consult different sources of information to validate their points. The author always cites useful sources among all the sources of information as references in their studies. The author chooses a few relevant and vital references and cites them in their study. The references or citations in the article allow cross-checking of the facts and also give credit to the creator. Citation analysis is a technique of bibliometrics, that studies the references cited in an article. It analyzes the different types of literature, sources of information, etc. Citation analysis helps to find out core references in any subject domain (Deshmukh, 2011). Analyzing a doctoral thesis is one of the best ways to assess the various cited bibliographic forms of literature (Zipp, 1996). The present study emphasizes the citation analysis of LIS doctoral theses submitted to NEHU during 1994 to 2018. This study will help to identify the various bibliographic forms used by the LIS researchers of NEHU in their doctoral theses.

Department of library and information science, north-eastern hill university

Meghalaya was divided from Greater Assam and had given a status of an independent state of India in 1973. In the same year, the North-Eastern Hill University (NEHU) was established in Shillong, the capital of Meghalaya. NEHU is the only

central university in Meghalaya state. After twelve years of the establishment of NEHU, the Library and Information Science Department started in 1985 with a two-year integrated Master's degree course (MLISc). NEHU was the first university to offer a two-year Integrated Master's degree program in Library and Information Science in India. The Ph.D. programme in Library and Information Science at NEHU was started in 1989 and L.P. Pathak was the first scholar to receive a Ph.D. degree in 1994 (Khongtim & Naga, 2019).

REVIEW OF LITERATURE

Vimala & Reddy (1997) assessed the half-life of journals and books submitted to Sri Venkateswara University from 1962 to 1994, where the half-life was found to be 12 years and 13.7 years. Ngah & Sze (1997) reviewed 104 master's and doctoral theses and dissertations submitted to four humanities disciplines—religion and philosophy; history; language and literature. Among all forms of bibliographic literature, 52 percent of book citations received the most attention. Sheshrao & Khaparde (2011) studied thirty (30) Physics doctoral theses accepted by Dr. Babasaheb Ambedkar Marathwada University during 2004-2008. A total of 5726 citations were analyzed and it revealed that 77.07 percent of citations were cited from journals followed by 12.56 percent from book citations and so on. The highest 31.73 percent citations and the lowest 0.17 percent citations were cited from the year group 1991-2000 and 1901-1910 respectively. Singh & Bebi (2013) revealed that books received the highest 67.23 percent followed by journals with only 22.20 percent. Singh et al., (2018) studied 91 LIS doctoral theses submitted to DLIS, AMU during 1998-2016. In 2009 the highest

number of theses (20.98%) were submitted. Thavamani&Pushparaj (2013) examined the growth and development and research output of LIS doctoral degrees in northeastern states of India during 2007-2011. A total of 21 doctoral degrees were awarded from northeastern Indian universities during the study period. NEHU has contributed the most doctoral degrees in LIS (38.09%) among all Northeastern universities. Several studies have examined citations within doctoral theses in different subject domains and for various periods. Kaur& Rattan(2018) analyzed 92 doctoral theses in economics containing 9053 citations submitted to Panjabi University, Patiala from 2000-2014. The study revealed that the journals were the most cited form in economics with 49.39 percent. Sengupta et al., (2019) represented the contribution of ETD's by the state universities in Maharashtra in India's Shodhganga repository. Out of 12 universities, 11 have signed MOU for Shodhganga and only 8 universities have contributed 181 ETD's in the LIS discipline. SavitribaiPhule Pune University (SPPU) has contributed the highest number of ETD's in the Shodhganga repository. Dr. N.J. Deshpande of SPPU has supervised the highest number of LIS doctoral theses. Mir &Sevukan (2021) examined the availability, visibility, impact, and trend of LIS Ph.D. theses deposited on Shodhganga. In India, 96 universities from 20 states contribute to the Shodhganga repository. Tamil Nadu has the highest number of universities offering doctoral studies in LIS and contributed the highest number of LIS theses. The ManonmaniamSundaranar University has contributed the highest number of Ph.D. theses. Balasubramanian P. and Lawernee Mary of the ManonmaniamSundaranarUniversity

supervised the highest number of doctoral theses (14 each).

OBJECTIVES

The primary objective is to analyze the citations appended to the doctoral theses of LIS submitted to NEHU, Meghalaya, during 1994- 2018. The other objectives are

- i. To find out cited bibliographic forms of literature in LIS doctoral theses
- ii. To find out the half-life of journal and book citations of LIS doctoral theses
- iii. To prepare a rank list of journals cited in LIS doctoral theses
- iv. To test the applicability of Bradford's Law of scattering to the journal citations of LIS doctoral theses

SCOPE OF THE STUDY

The present study aimed to investigate 2693 citations attached to twenty (20) Library and Information Science (LIS) doctoral theses submitted to North-Eastern Hill University (NEHU), Meghalaya from 1994 to 2018 and available in the Shodhgangarepository until December 2018.

METHODOLOGY

Shodhganga is a repository of doctoral theses produced by Indian universities, which is maintained by the INFLIBNET centre. At present 627 universities have signed the MoU and 533 universities are contributing to the repository. A total of 3,45,550 theses are uploaded to the Shodhganga repository till 4th March 2022 (<https://shodhganga.inflibnet.ac.in/>). The primary data was collected from INFLIBNET's

Shodhganga repository. The Twenty theses were uploaded to the Shodhganga repository by the Department of Library and Information Science of North-Eastern Hill University (NEHU) during 1994-2018. Moreover, the researchers have collected the list of doctoral awardees from the respective department. The theses were downloaded from the repository in pdf format. Furthermore, the citations attached to those doctoral theses are identified and then systematically entered into the MS-Excel sheet for further analysis. The present study analyzed 2,693 citations appended in 20 LIS doctoral theses. The citations appended at the end of the doctoral theses were considered for the present study. In case of its unavailability, the chapter-wise references are counted as citations and considered for the study. If both types of references are unavailable (chapter-wise or citations appended at the end as the references); the chapter-wise footnotes and appended list of bibliographies available in the theses are considered appropriate to standardize the

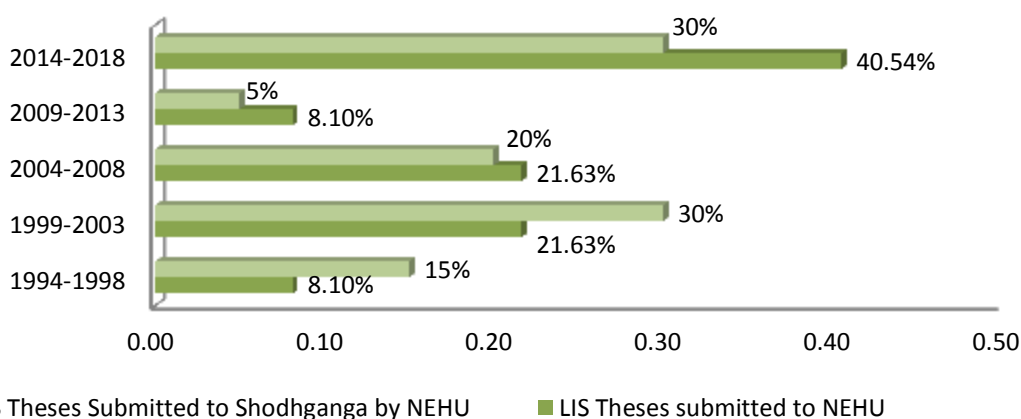
study The different cited forms of literature are divided into nine groups, viz; journals, books, conference proceedings/ seminars/ symposiums, web resources, theses & dissertations, reports, encyclopedias/dictionaries/glossaries/handbooks, others, and unidentified. The “others” group contains different information sources like pamphlets, souvenirs, newsletters, working papers, etc. The “unidentified” group embraces untraceable citations due to its inconsistent nature.

RESULTS AND FINDINGS

Year-wise distribution of LIS doctoral theses

Figure 1 shows the year-wise distribution of LIS doctoral theses submitted to NEHU and their availability in the Shodhganga repository during 1994-2018. It reveals that a total of 37 LIS doctoral theses were submitted to NEHU, whereas only 20 LIS doctoral theses were uploaded to the Shodhganga repository during the study period.

Figure 1: Year-wise distribution of LIS Doctoral Theses, NEHU



Cited Bibliographic forms of literature

Table 1 reveals the different bibliographic forms cited sources used in the Library and Information Science (LIS) doctoral dissertations submitted to NEHU during 1994-2018. Out of 2,693 citations, journals are the highly cited sources (63.98%),

followed by books (17.27%), conference proceedings/seminars/symposiums (7.39%), web resources (3.04%), theses & dissertations (2.71%), reports (2.49%), others (1.71%), encyclopedias/dictionary/glossary/ handbooks (1.00%) and unidentified (0.41%) citation.

Table 1: Bibliographic forms of Citations (NEHU)

Sl. No.	Forms	Number of Citations	Cumulative Citation	Percentage (%) of Citations	Cumulative percentage (%) of Citations
1	Journals	1723	1723	63.98	63.98
2	Books	465	2188	17.27	81.25
3	Conference Proceedings/ Seminars/Symposium	199	2387	7.39	88.64
4	Web Resources	82	2469	3.04	91.68
5	Theses & Dissertations	73	2542	2.71	94.39
6	Reports	67	2609	2.49	96.88
7	Others	46	2655	1.71	98.59
8	Encyclopedia/Dictiona ry/Glossary/ Handbook	27	2682	1.00	99.59
9	Unidentified	11	2693	0.41	100.00
	Total	2693			

Half-Life of Journal and Book Citations of NEHU

The rate of half-life can be calculated by using the formula devised by B.K. Sen in 1999(Sen, 1999). The formula is as follows:

Half-life $T = Y + y$

Here “Y” denotes the number of a whole year and “y” is the fraction of a year which can be calculated by the formula

Again, to calculate the “y” the below formula is used: $(a-b) / (c-b)$

Here “a” is the representation of 50% of the cited references

“b” is the cumulative number of references of the subcritical year

“C” is the cumulative number of references for the critical year

Critical year= where 50% of references reach counted from the base year and

The subcritical year= is the previous year of the critical year

Half-Life of Journal Citations of NEHU:

Half-life $T = Y + y$; $Y=15$

$$a=1723/2=861.5(\approx 862); b=778; c=863; y= (a-b) / (c-b); y=(862-778) \div (863-778); y=0.98$$

$$T=Y+y$$

$$=15+0.98$$

$$=15.98$$

Applying the above formula, the half-life of Journal citations of NEHU has been calculated

based on Table 2. The half-life of journal citations of NEHU has been calculated as 15.98 years. It further discloses that 15.43 percent of the citations are 7 years old. More than 50 percent of the citations are 16 years old and 75.06 percent of LIS citations are 25 years old.

Table 2: Half-Life of Journals of NEHU

Sl. No.	Year	Age of Citations	No. of Citations	Cum. Citations	% of citations	Cum.%
1	2017	0	6	6	0.36	0.36
2	2016	1	17	23	1.00	1.36
3	2015	2	19	42	1.10	2.46
4	2014	3	30	72	1.74	4.20
5	2013	4	41	113	2.39	6.59
6	2012	5	51	164	2.97	9.56
7	2011	6	44	208	2.56	12.12
8	2010	7	57	265	3.31	15.43
9	2009	8	60	325	3.48	18.91
10	2008	9	64	389	3.71	22.62
11	2007	10	66	455	3.83	26.45
12	2006	11	62	517	3.60	30.05
13	2005	12	73	590	4.24	34.29
14	2004	13	51	641	2.97	37.26
15	2003	14	54	695	3.13	40.39
16	2002	Y=15	83	b=778	4.82	45.21
17	2001	16	85	c=863	4.93	50.14
18	2000	17	76	939	4.41	54.55
19	1999	18	61	1000	3.54	58.09
20	1998	19	52	1052	3.02	61.11
21	1997	20	48	1100	2.80	63.91
23	1996	21	58	1158	3.38	67.29
24	1995	23	44	1202	2.56	69.85
25	1994	24	20	1222	1.67	71.52
26	1993	25	61	1283	3.54	75.06
27	1992	26	34	1317	1.98	77.04
28	1991	27	34	1351	1.98	79.02
29	1990	28	31	1382	1.80	80.82
30	1989	29	23	1405	1.33	82.15
31	1988	30	22	1427	1.28	83.43
32	1987	31	28	1455	1.63	85.06

33	1986	32	29	1484	1.69	86.75
34	1985	33	17	1501	1.00	87.75
35	1984	34	16	1517	0.93	88.68
36	1983	35	19	1536	1.10	89.78
37	1982	36	11	1547	0.64	90.42
38	1981	37	25	1572	1.45	91.87
39	1980	38	14	1586	0.09	91.96
40	1979	39	16	1602	0.93	92.89
41	1978	40	17	1619	1.00	93.89
42	1977	41	11	1630	0.64	94.53
43	1976	42	8	1638	0.47	95.00
44	1975	43	8	1646	0.47	95.47
45	1974	44	13	1659	0.76	96.23
46	1973	45	5	1664	0.30	96.53
47	1972	46	8	1672	0.47	97.00
48	1971	47	7	1679	0.41	97.41
49	1970	48	1	1670	0.07	97.48
50	1969	49	9	1689	0.52	98.00
51	1968	50	3	1692	0.18	98.18
52	1967	51	4	1696	0.23	98.41
53	1966	52	3	1699	0.18	98.59
54	1965	53	2	1701	0.12	98.71
55	1964	54	5	1706	0.30	99.01
56	1963	55	1	1707	0.06	99.07
57	<1962	>56	16	1723	0.93	100.00
			1723		100	

Half-Life of Book citations of NEHU

The half-life of book citations of LIS doctoral theses of NEHU has been calculated based on Table 3. Again, applying the above formula, the half-life of book citations of NEHU has been

calculated as 20.06 years. It also reveals that 10.17 percent of citations are 8 years old. More than 30 percent of citations are 15 years old and almost 59.98 percent of cited literature is 27 years old. Again, 80.63 percent of citation is found 39 years old.

Table 3: Half-Life of Book citations of NEHU

Sr. No	Year	Age of Citations	No. of Citations	Cum. Citations	% of citations	Cum.%
1	2014	0	1	1	0.22	0.22
2	2013	1	4	5	0.87	1.09
3	2012	2	6	11	1.30	2.39
4	2011	3	2	13	0.43	2.82
5	2010	4	6	19	1.30	4.12

6	2009	5	7	26	1.51	5.62
7	2008	6	10	36	2.16	7.78
8	2007	7	6	42	1.30	9.08
9	2006	8	5	47	1.09	10.17
10	2005	9	12	59	2.59	12.76
11	2004	10	17	76	3.67	16.43
12	2003	11	5	81	1.09	17.52
13	2002	12	12	93	2.59	20.11
14	2001	13	17	110	3.67	23.78
15	2000	14	18	128	3.88	27.66
16	1999	15	12	140	2.59	30.25
17	1998	16	17	157	3.67	33.92
18	1997	17	30	187	6.45	40.37
19	1996	18	14	201	3.01	43.38
20	1995	19	11	212	2.37	45.75
21	1994	Y=20	18	b=230	3.88	49.63
23	1993	21	5	c=235	1.09	50.72
24	1992	23	9	244	1.94	52.65
25	1991	24	9	253	1.94	54.59
26	1990	25	17	270	3.67	58.26
27	1989	26	1	271	0.22	58.47
28	1988	27	7	278	1.51	59.98
29	1987	28	7	285	1.51	61.49
30	1986	29	11	296	2.37	63.85
31	1985	30	8	304	1.72	65.57
32	1984	31	9	313	1.94	67.51
33	1983	32	7	320	1.51	69.01
34	1982	33	9	329	1.94	70.95
35	1981	34	8	337	1.72	72.67
36	1980	35	8	345	1.72	74.39
37	1979	36	7	352	1.51	75.89
38	1978	37	9	361	1.94	77.83
39	1977	38	7	368	1.51	79.33
40	1976	39	6	374	1.30	80.63
41	1975	40	7	381	1.51	82.14
42	1974	41	4	385	0.61	82.75
43	1973	42	8	393	1.72	84.47
44	1972	43	6	399	1.30	85.77
45	1971	44	2	401	0.43	86.20
46	1970	45	8	409	1.72	87.92
47	1969	46	3	412	0.65	88.57
48	1968	47	3	415	0.65	89.21
49	1967	48	5	420	1.09	90.30

50	1966	49	4	424	0.87	91.17
51	1965	50	2	426	0.43	91.60
52	1964	51	2	428	0.43	92.03
53	1963	52	1	429	0.22	92.25
54	1962	53	2	431	0.43	92.68
55	1961	54	2	433	0.43	93.11
56	1960	55	2	435	0.43	93.54
57	1959	56	2	437	0.43	93.97
58	1958	57	1	438	0.22	94.18
59	1957	58	4	442	0.87	95.05
60	1956	59	1	443	0.22	95.27
61	<1955	> 59	22	465	4.73	100.00
			465		100.00	

Rank-list of Journals

A total of 1723 journal citations cited in the LIS doctoral theses of NEHU are scattered over 555 journals. The most frequently used journals in LIS doctoral theses are listed in Table 4. The College and Research Libraries have received the highest number of citations and stand in the first

rank with 3.83 percent followed by Library Management and Library Philosophy & Practicewith 2.26 percent each, Library Trends with 2.21 percent of total citations, and so on. It is also observed that the top-ranked journals have received very fewer citations in LIS doctoral theses.

Table 4 : Rank-list of Journals

Name of the Journal	Country	No. of Citations	% of Citations	% of Cum. citations
College and Research Libraries	USA	66	3.83	3.83
Library Management	UK	39	2.26	6.09
Library Philosophy & Practice	USA	39	2.26	8.36
Library Trends	USA	38	2.21	10.56
Journal of Documentation	UK	36	2.09	12.65
Library and Information Science Research	UK	36	2.09	14.74
Media Asia	Philippines	35	2.03	16.77
Annals of Library and information studies	India	32	1.86	18.63
Journal of Academic Librarianship	UK	29	1.68	20.31

Journal of the American Society for Information Science and Technology	USA	28	1.63	21.94
ASLIB Proceedings	UK	27	1.57	23.50
Library Review	UK	27	1.57	25.07
The Electronic Library	UK	26	1.51	26.58
Journal of Broadcasting and Electronic Media	UK	24	1.39	27.97
Library Quarterly	USA	22	1.28	29.25
Journal of Librarianship and Information Science	UK	21	1.22	30.47
New Library world	UK	20	1.16	31.63
Libri	USA	18	1.04	32.68
DESIDOC Journal of Library & Information Technology	India	17	0.99	33.66
Journal of Marketing Research	USA	16	0.93	34.59
Library Journal	USA	16	0.93	35.52
Serials Review	UK	16	0.93	36.45
Serials Librarian	USA	16	0.93	37.38
Annual review of information science and technology (ARIST)	USA	15	0.87	38.25
D-Lib Magazine	USA	15	0.87	39.12
Media, Culture and Society	UK	14	0.81	39.93
Information Processing and Management	USA	12	0.70	40.63
Journal of Applied Psychology	USA	12	0.70	41.32
Journal of Communication	USA	12	0.70	42.02
Personnel Psychology	USA	12	0.70	42.72
Herald of Library Science	India	11	0.64	43.35
Journal of Education for Library and Information Science	Canada	11	0.64	43.99
6 journals with 10 citations		60	3.48	47.47
5 journals with 9 citations		45	2.61	50.09
9 journals with 8 citations		72	4.18	54.27

3 journals with 7 citations		21	1.22	55.48
7 journals with 6 citations		42	2.44	57.92
8 journals with 5 citations		40	2.32	60.24
16 journals with 4 citations		64	3.71	63.96
30 journals with 3 citations		90	5.22	69.18
92 journals with 2 citations		184	10.68	79.86
347 journals with 1 citation		347	20.14	100
		1723	100	

7.5 Applicability of Bradford's Law

Table 5 shows Bradford's Zones of Journal citations cited in LIS doctoral dissertations of NEHU. According to the productivity of articles,

Bradford divided journals into three zones based on the productivity of articles, with an equal number of citations in each zone. It will represent each zone as 1: n: n².

Table 5: Decreasing Frequency of Journals (NEHU)

Sl. No.	Ranks	Number of Journals	Cumulative Number of Journals	Number of Citations	Total Number of Citations	Total Cumulative Number of Citations	Percentage (%) of Citations	Cumulative Percentage (%)	Log Cumulative Number of journals
1.	1	1	1	66	66	66	3.83	3.83	0.00
2.	2	2	3	39	78	144	4.53	8.36	0.477
3.	3	1	4	38	38	182	2.21	10.56	0.602
4.	4	2	6	36	72	254	4.18	14.74	0.778
5.	5	1	7	35	35	289	2.03	16.77	0.845
6.	6	1	8	32	32	321	1.86	18.63	0.903

7.	7	1	9	29	29	350	1.69	20.32	0.954
8.	8	1	10	28	28	378	1.62	21.94	1.000
9.	9	2	12	27	54	432	3.13	25.07	1.079
10.	10	1	13	26	26	458	1.50	26.57	1.114
11.	11	1	14	24	24	482	1.45	28.02	1.146
12.	12	1	15	22	22	504	1.28	29.30	1.176
13.	13	1	16	21	21	525	1.21	30.51	1.204
14.	14	1	17	20	20	545	1.16	31.67	1.230
15.	15	1	18	18	18	563	1.04	32.71	1.255
16.	16	1	19	17	17	580	0.99	33.70	1.279
17.	17	4	23	16	64	644	3.71	37.41	1.362
18.	18	2	25	15	30	674	1.74	39.15	1.398
19.	19	1	26	14	14	688	0.81	39.96	1.415
20.	20	4	30	12	48	736	2.79	42.75	1.477
21.	21	2	32	11	22	758	1.27	44.02	1.505
22.	22	6	38	10	60	818	3.49	47.51	1.580
23.	23	5	43	9	45	863	2.61	50.12	1.633
24.	24	9	52	8	72	935	4.18	54.30	1.716
25.	25	3	55	7	21	956	1.21	55.51	1.740
26.	26	7	62	6	42	998	2.43	57.94	1.792
27.	27	8	70	5	40	1038	2.32	60.26	1.845

28.	28	16	86	4	64	1102	3.71	63.97	1.934
29.	29	30	116	3	90	1192	5.22	69.19	2.064
30.	30	92	208	2	184	1376	10.68	79.87	2.318
31.	31	347	555	1	347	1723	20.13	100.00	2.744

Table 6 represents the three Bradford zones of journals cited in LIS doctoral theses of NEHU. The first zone includes 18 journals with 563 citations, 98 journals with 539 citations, and 439

journals with 621 citations. Bradford's law of equal distribution of journals does not apply to the final distribution of journals as calculated using the Bradford multiplier of 5.44.

Table 6: Distribution of Bradford Zones (NEHU)

Zones	No. of Journals	Cum. No. of Journals	No. of Citations	% of Citations	Cum. No. of Citations	Cum. % of Citations	Bradford's Multiplier
Zone 1	18	18	563	32.67	563	32.67	1
Zone 2	98	116	539	31.29	1102	63.96	5.44
Zone 3	439	555	621	36.04	1723	100	24.38

According to Bradford's Law formula (Bradford, 1948)

(Here 'F' denotes 'Findings', 'R' denotes 'Results', and 'E' denoted 'Expected results')

$$F=1: n: n^2$$

$$R=1:5.44:24.38$$

$$E= 1:5.44:29.59 \neq 1: n: n^2$$

Therefore, the present data set of NEHU does not fit well with Bradford's law of equal distribution of journals. Again, Leimkuhler's model of Bradford's distribution has been adopted for the same data set to verify the distribution of journals.

Leimkuhler's model of Bradford's distribution of Journal citations (NEHU)

Bradford's multiplier (K) for Leimkuhler's model is calculated by using Egghe's formula (Egghe, 1990).

Egghe's formula for calculating K is,

$$K = (e^y Y_m)^{1/p} \text{ where, } \{e^y = 1.781 \text{ (Euler's No)}\}$$

Here, Y_m = no of citations in the most productive journal i. e. $Y_m = 66$

P = Bradford's group of number of zones of distribution i. e. $P = 3$

$$K = (1.781 * 66)^{1/3}$$

$$= (117.546)^{1/3}$$

$$K = 4.89$$

Leimkuhler's model of Bradford's distribution is based on this formula (Leimkuhler, 1980)

$R_0 = T (K-1)/(Kp-1)$ here, T= Total number of journals which is 555 (Table 5)
 $= 555 * [(4.89-1) / \{(4.89)^3-1\}]$
 $= 555 * \{3.89 / (116.930169-1)\}$
 $= 555 * (0.0335546824)$
 $= 18.62$

Hence, $R_0=18.62$

It also reveals the core group as per Leimkuhler’s model of Bradford’s distribution, which contains 6.40 (≈ 19) journals.

Therefore, the modified Bradford’s distribution as per Leimkuhler’s model can be as categorized by the following formula

$= R_0: R_0 * K: R_0 * K^2$
 $= 18.62: 18.62 * 4.89: 18.62 * (4.89)^2$
 $= 18.62: 91.05: 445.25$
 $= 554.92 (\approx 555)$
 $\% \text{ Error} = \{(555 - 554.92) / 555\} * 100$
 $= (0.08 / 555) * 100$
 $= 0.01$

So, the % of error is 0.01 which is negligible therefore we can accept it and the modified zones of distributed journals will be as follows listed in Table 11:

Table 7: Distribution of Journals, NEHU (Leimkuhler’s Model of Bradford zones)

Different zones	Number of Journals	Cumulative Number of Journals	Number of Citations	Percentage (%) of Citations	Cumulative Number of Citations	Cumulative percentage (%) of Citations
First zone	19	19	580	33.67	580	33.67
Second zone	91	110	778	45.15	1358	78.82
Third zone	445	555	365	21.18	1723	100

Table 7 discloses the modified journal distributions as per Leimkuhler’s model of Bradford zones. Bradford’s multiplier for Leimkuhler’s distribution (K) is found as 4.89 and the number of journals in the nucleus zone of Bradford is calculated as 18.62. The modified Bradford’s distribution zones given by Leimkuhler are 19:91:445. The % of Error (0.01) is found negligible. Therefore, Leimkuhler’s new modified Bradford distribution can be accepted.

CONCLUSION

Citation studies in different subject domains should be conducted on a regular basis on diverse

subjects to determine the relevance of documents in those subjects. The rank list of journals is an effective tool for finding important journals on a subject. It also reveals that College and Research Libraries is the most frequently cited journal followed by Library Management in LIS doctoral theses at NEHU. It is found that the Annals of Library and Information Studies is the only Indian-originated journal to rank ninth among the most cited journals in LIS doctoral theses during the study period. The present dataset for the distribution of journals in Bradford’s law does not fit well. Therefore, the same data set was tested with Leimkuhler’s model of Bradford’s

distribution. The journal distribution as per Leimkuhler's model consists of 19 core journals. The second and third zone comprises 91 and 445 journals respectively.

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