

Citation Analysis of Theses in Economics Submitted to Punjabi University, Patiala during 2000-2014

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ABSTRACT

The present study is based on 9053 citations appended to 92 doctoral theses submitted to the Department of Economics, Punjabi University, Patiala, during 2000-2014. The main objective of the study is to investigate authorship pattern of the citations, format of literature cited, electronic/print form of citations, chronological distribution of citations, geographical distribution of book and core journal citations. A ranked list of journals in economics is also compiled in order to find out the most referred journal. It is found that journals are the most consulted resources with 49.39 per cent citations in the field of economics. Bradford's law of scattering is applicable to the present study with Bradford multiplier as 11.327.

Keywords: Citation analysis; Core journals; Bradford law of scattering; Economics

1. INTRODUCTION

An essential part of any research article is the list of references which point to the prior publications. A manuscript cannot be written in vacuum; a long list of references is used in its preparation. Usually citations and references are used interchangeably. But Smith has made a distinction "A reference is the acknowledgment that one document gives to another; a citation is the acknowledgment that one document receives from another". A citation implies a relationship between the cited and citing document (s). The study of these types of relationship is called citation analysis¹.

Citation counts measure the impact of scientific activity². It is used to study the characteristics of recorded knowledge³. It is also one of the popular methods to identify core references in a particular subject. One can evaluate and interpret citations received by articles, authors, institutions, etc. which help to identify the quality of the information sources⁴.

Citation analysis is a way to understand the users what type of documents are used by the researchers and faculty members in writing their theses, research articles, project reports etc.⁵. The present study focuses on the citation analysis of theses submitted to the Department of Economics, Punjabi University, Patiala during the period 2000-2014. It will help to find out the use pattern of documents by the researchers of economics.

2. LITERATURE REVIEW

Raut⁶, *et al.* revealed the various forms of publications, authorship trend, most referred periodicals and geographical distribution of the *Strategic Management Journal* during the

period 2005-2006. It was found that maximum citations were used from journals and average citations per article came out to be 63.15. Authors preferred single authorship in books whereas in journals they preferred joint authorship. *Strategic Management Journal*, *Academy of Management and Administrative Science Quarterly* were the three most cited journals among the authors of this journal. The core journals identified were mainly from USA and UK

Sudhler⁷ tested the Bradford law on the journal citations of 79 doctoral theses in physics submitted to the Indian Institute of Science, Bengaluru for the period 2004-08. Out of the total 11,319 reference, 690 were periodical references. *Physical Review-B* with 9.53 per cent citation, followed by *Physical Review-A* with 7.69 per cent citation and *Astrophysical Journal* with 5.47 per cent citation, were the most preferred journals by the scholars. Leimkuhler model was employed for verification of Bradford law, the law was found valid for the journal distribution with value of k as 12.6.

Trayambakrao and Sonwane⁸ examined 2876 citation contained in 34 PhD theses in economics submitted to Dr Babasaheb Ambedkar Marathwada University Library. Books were the most preferred form of citations with 57.86 per cent of citation. Single authorship was dominant over multiple authors as 72.81 per cent of the citation were single authored. The use of web citations was 0.9 per cent only.

Singh and Bebi⁹ highlighted the authorship pattern, forms of literature cited, country-wise scattering of citations, distribution of Indian and foreign citations of 25 PhD theses in sociology submitted to the University of Delhi during 1995-2010. There were 5766 citation appended to 25 theses. A ranked list of journals identified 30 core journal which disclosed that *Economic & Political Weekly* was the most

(137 time) cited journal. Maximum citations were book citations with 67.2 per cent citation and about 45 per cent citation were from India. 83.94 per cent of the citation were single authored.

Amritpal and Rattan¹⁰ analysed 17 doctoral theses in library and information science submitted to Punjabi University, Patiala till 2013. The findings of the research revealed that journal citations were the maximum (48.43 per cent) and authors preferred to work in isolation as 59.41 per cent reference were single authored. More than 49 per cent of the book citations were of Indian origin. Journal citations were more recent than book citations. *College and Research Libraries* was the most referred journal by the LIS researchers and the data of journal distribution fitted well with Bradford distribution.

Mahajan and Kumar¹¹ examined 36 PhD theses of history submitted to Panjab University, Chandigarh, during the period 2000-2012. It was revealed that there were 8488 citation contained in 36 theses. Books were the most cited form of citation with 54.16 per cent of citation. The use of electronic resources was 1.6 per cent only. There was dominance of single authorship over multiple authors. The journal *Economic & Political Weekly* was ranked one among the researchers of history. Half-life period of book and journal citations was 35 and 21 year, respectively. More than 58 per cent books and 64.47 per cent journal were of Indian origin. Bradford law of scattering fitted well to this study.

3. OBJECTIVES

The present study has been carried out to fulfil the following objectives.

- To find the form of the cited documents in economics
- To study the authorship pattern of the documents in the literature of economics
- To examine the use of electronic resources in economics
- To observe the chronological distribution of citations in economics
- To determine the half-life of documents in economics
- To find geographical distribution of book citations and core journals
- To prepare a ranked list of journals in order to find the most cited journals in economics
- To test the validity of Bradford law to the present journal distribution in economics.

4. HYPOTHESES

The following hypotheses have been formulated for the present study:

- Books and journals are the major source of information in economics literature
- The share of electronic resources is very less but in the changing environment the trend of using these resources is increasing
- The half-life period of book citations is more than journal citations
- Researchers prefer foreign books as compared to Indian books.

5. RESEARCH METHODOLOGY

The data is collected from 92 theses in economics submitted to Punjabi University, Patiala during the period 2000-2014. There are 9053 reference used in these theses. Each reference of each thesis is analysed manually to find out format of the citations, authorship pattern, year, geographical distribution of book citations along with core journals and electronic/print form of citations. The references are also checked for duplicate references as these are excluded from the study. The resultant data is recorded into MS-Excel spread sheets. The recorded data is tabulated and presented in the form of tables as per the objectives of the study i.e. authorship pattern, form of citations, geographical distribution of book citations and so on. A ranked list of journals is also prepared to find out the core journals. The place of publication of the journal is found from online as well as off line resources of Bhai Kahn Singh Nabha Library, Punjabi University, Patiala. The half-life period of documents is calculated using Sen¹² formula.

6. ANALYSIS AND DISCUSSION

There are a total of 92 theses submitted to the Department of Economics, Punjabi University, Patiala during 2000-2014. The total number of citations are 9053 and the average number of citations per thesis is 98.4.

6.1 Year-wise Distribution of Theses

Table 1 shows year-wise submission of the PhD theses in the Department of Economics during 2000-2014. The highest number of theses, i.e. 15 are submitted in the year 2013 whereas the least number of theses, i.e. 1 is submitted in 2005. The average citations per thesis has improved from 75.33 to 89.62. The maximum average citations is 167.3 and minimum 62.5 in the years 2009 and 2002 respectively. The overall average citations per thesis has come out to be 98.4.

6.2 Form of Cited Documents

Table 2 reveals the format of 9053 citation cited in the PhD theses of economics during 15 year. Journals comprise the highest citations (49.39 per cent) followed by book citations (14.44 per cent); chapters from a book (13.85 per cent); web-sites (5.14 per cent); govt. publications (4.55 per cent); working papers (3.35 per cent) and so on as indicated in table 2. Looking at the 5 group of period (each 3 year) the use of journals is almost the same showing a decline of very less percentage. The use of books has also declined from 22.39 per cent to 17.7 per cent. Similarly, the use of Government publications and others has also decreased. The use of book chapters has shown an upward trend from 6.26 per cent to 21.9 per cent and then downward to 6.73 per cent. The use of web resources is continuously increasing from 0 per cent to 8.07 per cent. Similarly, the use of working papers has increased from 0 per cent to 4.05 per cent.

6.3 Authorship Pattern

The authorship of 259 citations is not available. Therefore, these are excluded from the authorship pattern of citations. Authorship pattern of the cited documents is represented by

Table 1. Year-wise submission of theses and average no. of citations

Year	Theses (per cent)	Citations	Average citations
2000	3 (3.26)	226	75.33
2001	2 (2.17)	176	88
2002	2 (2.17)	125	62.5
2003	2 (2.17)	164	82
2004	5 (5.44)	511	102.2
2005	1 (1.09)	123	123
2006	3 (3.26)	220	73.33
2007	5 (5.44)	326	65.2
2008	7 (7.61)	621	88.71
2009	3 (3.26)	502	167.3
2010	9 (9.78)	884	98.22
2011	11 (11.96)	1372	124.7
2012	11 (11.96)	1047	95.18
2013	15 (16.3)	1591	106.1
2014	13 (14.13)	1165	89.62
	92 (100)	9053	98.4

Table 3 which indicates that the researchers of economics prefer single authored documents for writing their theses as more than 63 per cent of the cited documents are single authored followed by two authors with 25.44 per cent citation, three authors with 7.87 per cent and more than three authors with 3.58 per cent. Year-wise distribution of authorship pattern indicates that the use of single authored documents has decreased from 81.65 per cent to 42.07 over the period of fifteen year with slight fluctuations. It shows contrasting results to the overall authorship pattern of the economics documents.

6.4 Electronic Resources

To show the use of electronic resources over a period of fifteen years, the whole period is divided into three groups in Table 4. Each group is of five years. It is evident from this table that the use of electronic resources keeps on increasing from one group of period to another starting from 0.25 per cent in

Table 3. Year-wise distribution of authorship pattern

Year	SA (per cent)	2 Authors	3 Authors	>3 Authors	TMA (per cent)	Total
2000	178(81.65)	31	2	7	40(18.35)	218
2001	102(57.95)	47	21	6	74(42.05)	176
2002	101(80.8)	20	3	1	24(19.2)	125
2003	93(57.05)	49	15	6	70(42.95)	163
2004	397(79.56)	83	12	7	102(20.44)	499
2005	69(57.02)	40	9	3	52(42.98)	121
2006	129(59.45)	49	15	24	88(40.55)	217
2007	202(62.73)	75	35	10	120(37.27)	322
2008	405(65.75)	162	38	11	211(34.25)	616
2009	319(63.67)	148	29	5	182(36.33)	501
2010	615(70.04)	203	49	11	263(29.96)	878
2011	886(65.73)	318	111	33	462(34.27)	1348
2012	694(67.18)	228	84	27	339(32.82)	1033
2013	901(60.63)	394	123	68	585(39.37)	1486
2014	459(42.07)	390	146	96	632(57.93)	1091
	5550 (63.11)	2237 (25.44)	692 (7.87)	315 (3.58)	3244 (36.89)	8794

SA-Single authors; TMA-Total no. of multiple authors

the first five year, it is augmented to 6.88 per cent in the last five year. The overall use of electronic resources is 4.94 per cent.

6.5 Chronological Distribution of Citations

Table 5 indicates that the highest number i.e. about 1/3rd of citations belong to publications published during 1995-2004 followed by 2046 citation (22.6 per cent) during 2005-2014, 1687 citation (18.63 per cent) during 1985-1994, 1073 citation (11.85 per cent) during 1975-1984 and 643 citation (7.1 per cent) during 1965-1974. The percentage of citations which belong to the period before 1905 is very small i.e. 0.16 per cent which indicates that the researchers of economics prefer current literature in contrast to archival literature. Date of origin of 2.01 per cent citations is not given.

Table 2. Form of citations

FC	2000-02 (per cent)	2003-05 (per cent)	2006-08 (per cent)	2009-11 (per cent)	2012-14 (per cent)	NC	POC	CC	PCC
JL	268 (50.85)	370 (46.36)	632 (54.16)	1348 (48.88)	1853 (48.72)	4471	49.39	4471	49.39
BK	118 (22.39)	116 (14.54)	112 (9.59)	288 (10.44)	673 (17.7)	1307	14.44	5778	63.82
BCh.	33 (6.26)	143 (17.92)	218 (18.68)	604 (21.9)	256 (6.73)	1254	13.85	7032	77.68
CP	7 (1.33)	24 (3.01)	51 (4.37)	42 (1.52)	84 (2.21)	208	2.3	7240	79.97
Ths	5 (0.95)	7 (0.88)	29 (2.49)	31 (1.12)	68 (1.79)	140	1.55	7380	81.52
WS	-	5 (0.63)	9 (0.77)	144 (5.22)	307 (8.07)	465	5.14	7845	86.66
DIC	2 (0.38)	2 (0.25)	1 (0.09)	-	-	5	0.05	7850	86.71
ENC	-	1 (0.12)	2 (0.17)	-	-	3	0.03	7853	86.74
RPT	8 (1.52)	23 (2.88)	15 (1.29)	70 (2.54)	65 (1.71)	181	2	8034	88.74
NP	11 (2.09)	5 (0.62)	6 (0.51)	4 (0.15)	42 (1.11)	68	0.75	8102	89.5
GP	52 (9.87)	50 (6.27)	27 (2.31)	60 (2.18)	223 (5.86)	412	4.55	8514	94.05
YB	-	2 (0.25)	-	-	-	2	0.02	8516	94.07
WP	-	8 (1.01)	5(0.43)	136 (4.93)	154 (4.05)	303	3.35	8819	97.42
OTH	23 (4.36)	42 (5.26)	60(5.14)	31 (1.12)	78 (2.05)	234	2.58	9053	100
TTL	527 (100)	798 (100)	1167(100)	2758 (100)	3803 (100)	9053	100		

FC-Form of citations; NC-No. of citations; POC-per cent age of citations; CC-Cum. citations; PCC-%age of Cu. citations; JL-Journals; BK-Books; BCh.-Book Chapters; CP-Conference Proceedings/Seminars/Workshops; Ths-Theses; WS-Websites; DIC-Dictionaries; ENC-Encyclopaedias; RPT-Reports; NP-Newspapers; GP-Govt. Pub.; YB-Yearbooks; WP-Working papers; OTH-Others; TTL-Total

Table 4. Electronic resources

Year	Electronic resources (per cent)	Print resources (per cent)	Total citations
2000-04	3 (0.25)	1199 (99.75)	1202
2005-09	27 (1.51)	1765 (98.49)	1792
2010-2014	417 (6.88)	5642 (93.12)	6059
	447 (4.94)	8606 (95.06)	9053

Table 5. Chronological distribution of citations

Year	Citations (per cent)	Cumulative citations (per cent)
Before 1905	14 (0.16)	14 (0.16)
1905-1914	3 (0.03)	17 (0.19)
1915-1924	3 (0.03)	20 (0.22)
1925-1934	20 (0.22)	40 (0.44)
1935-1944	26 (0.29)	66 (0.73)
1945-1954	84 (0.93)	150 (1.66)
1955-1964	273 (3.02)	423 (4.67)
1965-1974	643 (7.1)	1066 (11.78)
1975-1984	1073 (11.85)	2139 (23.63)
1985-1994	1687 (18.63)	3826 (42.26)
1995-2004	2999 (33.13)	6825 (75.39)
2005-2014	2046 (22.6)	8871 (97.99)
NA	182 (2.01)	9053 (100)
Total	9053 (100)	

6.6 Half-life or Obsolescence of Literature

As per Sen (1999) the half-life period will be integral number consisting of whole years plus a fraction of a year. e.g. 3.25. It can be represented as

$$T = Y + y \quad (1)$$

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

$$(a-b)/(c-b) \quad (2)$$

Here, a is the 50 per cent of the references, b is the 50 per cent of the cumulative number of references of the subcritical year and c is the cumulative number of references of the critical year. Critical year is the year in which 50 per cent of the citations are reached counted from the base year. Subcritical year is the year previous to critical year.

Putting the value of y in Eqn. (1), we get the formula for half-life period.

$$T = Y + (a-b)/(c-b)$$

The half-life period has been calculated based on Table 6. From the data of this table, the value of $Y = 17$; $a = 9053/2 = 4526.5$ (say 4527); $b = 4365$ and $c = 4639$. The half-life period of economics citations has been calculated as 17.59 year. Similarly, the half-life period of books and journals has been calculated which is 21.74 and 18.72 year, respectively. This table also discloses that 10.7 per cent of the citations are 7 year, old. More than 26 per cent of the citations are 11 year, old and 53.7 per cent of the literature is 19 years old.

6.7 Geographical Distribution of Book Citations in Economics

Based on the observations of Table 7, it is inferred that the

Table 6. Distribution of economics citations in reverse chronological order

Age (Years)	Year	Citations (per cent)	Cumulative citations (per cent)
1	2014	2 (0.02)	2 (0.02)
2	2013	20 (0.22)	22 (0.24)
3	2012	70 (0.77)	92 (1.02)
4	2011	148 (1.63)	240 (2.65)
5	2010	200 (2.21)	440 (4.86)
6	2009	218 (2.41)	658 (7.27)
7	2008	312 (3.45)	970 (10.7)
8	2007	334 (3.69)	1304 (14.4)
9	2006	353 (3.9)	1657 (18.3)
10	2005	389 (4.3)	2046 (22.6)
11	2004	352 (3.89)	2398 (26.5)
12	2003	333 (3.68)	2731 (30.2)
13	2002	326 (3.6)	3057 (33.8)
14	2001	347 (3.83)	3404 (37.6)
15	2000	386 (4.26)	3790 (41.9)
16	1999	290 (3.2)	4080 (45.1)
Y = 17	1998	285 (3.15)	b=4365 (48.2)
18	1997	274 (3.03)	c=4639 (51.2)
19	1996	218 (2.41)	4857 (53.7)
>19	<1996	4196 (46.3)	9053 (100)

total number of book citations are scattered over 36 countries. India is leading with 43.15 per cent of the book citations. Second position is bagged by USA with 18.21 per cent, third by UK with 10.64 per cent, fourth by Switzerland with 4.9 per cent and so on as is clear from Table 7. Overall preference is for foreign books.

Table 7. Geographical distribution of book citations in economics

Rank	Country	Citations (per cent)
1	India	564 (43.15)
2	USA	238 (18.21)
3	UK	139 (10.64)
4	Switzerland	64 (4.9)
5	Netherlands	20 (1.53)
6	Canada	13 (0.99)
7	France	8 (0.61)
8	Australia	9 (0.69)
9	Russia	9 (0.69)
10	Pakistan	7 (0.54)
11	China	6 (0.46)
12	Sweden	6 (0.46)
13	Germany	4 (0.31)
14	Italy	3 (0.23)
15	Philippines	3 (0.23)
16	Denmark	2 (0.15)
17	Japan	2 (0.15)
18	Kenya	2 (0.15)
19	Nepal	2 (0.15)
20	New Zealand	2 (0.15)
21	South Africa	2 (0.15)
22-36	Fifteen countries with one citation each	15 (1.15)
	NA	187 (14.31)
	Total	1307 (100)

6.8 Ranked List of Journals in Economics

A total of 4471 journal citation cited by research scholars in economics are scattered in 1012 journal. List of journals which are most frequently cited by the researchers of economics is given in Table 8 which depicts the ranked list of journals in economics. It is obvious from this table that *Economic and Political Weekly* occupies rank 1st among the researchers of economics with 18.25 per cent of journal citations followed by *Indian Journal of Agricultural Economics* (7.81 per cent), *Indian Journal of Labour Economics* (4.32 per cent), *American*

Table 8. Ranked list of journals in economics

#	Journals	Citations (per cent)	Cumulative citations (per cent)
1	<i>Economic and Political Weekly</i>	816 (18.25)	816 (18.25)
2	<i>Indian Journal of Agricultural Economics</i>	349 (7.81)	1165 (26.06)
3	<i>Indian Journal of Labour Economics</i>	193 (4.32)	1358 (30.37)
4	<i>American Economic Review</i>	74 (1.66)	1432 (32.03)
5	<i>The Economic Journal</i>	52 (1.16)	1484 (33.19)
5	<i>Indian Economic Review</i>	52 (1.16)	1536 (34.35)
6	<i>Kurukshetra</i>	51 (1.14)	1587 (35.5)
7	<i>Economic Development & Cultural Change</i>	48 (1.07)	1635 (36.57)
8	<i>World Development</i>	47 (1.05)	1682 (37.62)
8	<i>Indian Cooperative Review</i>	47 (1.05)	1729 (38.67)
9	<i>Indian Economic Review</i>	44 (0.98)	1773 (39.66)
10	<i>Review of Economics and Statistics</i>	41 (0.92)	1814 (40.57)
11	<i>Journal of Educational Planning & Administration</i>	40 (0.89)	1854 (41.47)
12	<i>Indian Journal of Economics</i>	39 (0.87)	1893 (42.34)
13	<i>Foreign Trade Review</i>	38 (0.85)	1931 (43.19)
14	<i>Journal of Development Studies</i>	36 (0.81)	1967 (43.99)
15	<i>Man & Development</i>	35 (0.78)	2002 (44.78)
16	<i>Population and Development Review</i>	33 (0.74)	2035 (45.52)
17	<i>Journal of Political Economy</i>	32 (0.72)	2067 (46.23)
17	<i>Yojana</i>	32(0.72)	2099 (46.95)
18	<i>Rural Sociology</i>	31(0.69)	2130 (47.64)
19	<i>Artha Vijnana</i>	26(0.58)	2156 (48.22)
20	<i>Indian Journal of Agricultural Marketing</i>	24(0.54)	2180 (48.76)
20	<i>Journal of Industrial Economics</i>	24 (0.54)	2204 (49.3)
21	<i>Agricultural Situation in India</i>	22 (0.49)	2226 (49.79)
21	<i>Journal of Rural Development</i>	22 (0.49)	2248 (50.28)
22	<i>Econometrica</i>	21(0.47)	2269 (50.75)
22	<i>Journal of Development Economics</i>	21(0.47)	2290 (51.22)
23	<i>Khadigramodyog</i>	20(0.45)	2310 (51.67)
24	<i>Financing Agriculture</i>	19(0.42)	2329 (52.09)
24	<i>Social Welfare</i>	19(0.42)	2348 (52.52)
25	<i>Oxford Economic Papers</i>	17(0.38)	2365 (52.9)
26	<i>Asian Economic Review</i>	16(0.36)	2381 (53.25)
26	<i>Quarterly Journal of Economics</i>	16(0.36)	2397 (53.61)
26	<i>Social Change</i>	16(0.36)	2413 (53.97)
27	<i>Agricultural Marketing</i>	15(0.34)	2428 (54.31)
27	<i>JPC Bulletin on Iron & Steel</i>	15(0.34)	2443 (54.64)
27	<i>Social Scientists</i>	15(0.34)	2458 (54.98)
28	<i>Agricultural Economics Research Review</i>	14(0.31)	2472 (55.29)
28	<i>Demography India</i>	14(0.31)	2486 (55.60)
28	<i>Journal of Small Business Management</i>	14(0.31)	2500 (55.92)
28	<i>The Bihar Journal of Agricultural Marketing</i>	14(0.31)	2514 (56.23)
29	<i>Manpower Journal</i>	13(0.29)	2527 (56.52)
29	<i>Quality Assurance in Education</i>	13(0.29)	2540 (56.81)
29	<i>Review of Economic Studies</i>	13(0.29)	2553 (57.10)
30	<i>International labour Review</i>	12 (0.27)	2565 (57.37)
30	<i>Economic Affairs</i>	12 (0.27)	2577 (57.64)
30	<i>Higher Education</i>	12 (0.27)	2589 (57.91)
30	<i>Indian Journal of Dairy Science</i>	12 (0.27)	2601 (58.17)
30	<i>Indian Journal of Regional Science</i>	12 (0.27)	2613(58.44)
30	<i>International Labour Organisation</i>	12 (0.27)	2625 (58.71)
31	<i>The Manchester School of Economics and Social Studies</i>	11 (0.25)	2636 (58.96)
31	<i>IASSI Quarterly</i>	11 (0.25)	2647 (59.2)
31	<i>Oxford Bulletin of Economics and Statistics</i>	11 (0.25)	2658 (59.45)
31	<i>Sarvekshana</i>	11 (0.25)	2669 (59.7)
32	<i>Indian Dairyman</i>	10 (0.22)	2679 (59.92)
32	<i>International Research Journal of Economics & Finance</i>	10 (0.22)	2689 (60.14)
32	<i>Journal of Economic Literature</i>	10 (0.22)	2699 (60.37)
32	<i>Journal of Higher Education</i>	10 (0.22)	2709 (60.59)
32	<i>Journal of Indian education</i>	10 (0.22)	2719 (60.81)
32	<i>Kisan World</i>	10 (0.22)	2729 (61.04)
32	<i>Margin</i>	10 (0.22)	2739 (61.26)
32	<i>RBI Bulletin</i>	10 (0.22)	2749 (61.49)
32	<i>The Indian Journal of Social Work</i>	10 (0.22)	2759 (61.71)
33	<i>Anvesak</i>	9 (0.2)	2768 (61.91)
33	<i>Economica</i>	9 (0.2)	2777 (62.11)
33	<i>Health Policy and Planning</i>	9 (0.2)	2786 (62.31)
33	<i>Journal of Agricultural Economics</i>	9 (0.2)	2795 (62.51)
33	<i>Journal of Banking and Finance</i>	9 (0.2)	2805 (62.72)
33	<i>Pakistan Development Review</i>	9 (0.2)	2813 (62.92)
33	<i>Social Science Medicine</i>	9 (0.2)	2822 (63.12)
33	<i>World Bank Economic Review</i>	9 (0.2)	2831 (63.32)
34	<i>Population Studies</i>	8 (0.18)	2839 (63.5)
34	<i>Asian Development Review</i>	8 (0.18)	2847 (63.68)
34	<i>Cambridge Journal of Economics</i>	8 (0.18)	2855 (63.86)
34	<i>Development & Change</i>	8 (0.18)	2863 (64.03)
34	<i>European Journal of Operation Research</i>	8 (0.18)	2871 (64.21)
34	<i>IBA Bulletin</i>	8 (0.18)	2879 (64.39)
34	<i>Journal of Monetary Economics</i>	8 (0.18)	2887(64.57)
34	<i>Mainstream</i>	8 (0.18)	2895 (64.75)
34	<i>PSE Economic Analyst</i>	8 (0.18)	2903(64.93)
34	<i>Social Action</i>	8 (0.18)	2911(65.11)
34	<i>Southern Economist</i>	8 (0.18)	2919(65.29)
35	11 journal cited 7 time	77 (1.72)	2996(67.01)
36	16 journal cited 6 time	96 (2.15)	3092(69.16)
37	19 journal cited 5 time	95 (2.12)	3187(71.28)
38	43 journal cited 4 time	172 (3.85)	3359(75.13)
39	56 journal cited 3 time	168 (3.76)	3527(78.89)
40	160 journal cited twice	320 (7.16)	3847(86.05)
41	624 journal cited once	624(13.95)	4471(100)

Economic Review (1.66 per cent) and *The Economic Journal* and *Indian Economic Review* each (1.16 per cent). First two journals cover more than 26 per cent of the journal citations; five journals cover about 1/3rd of the journal citations. About 1/3rd of the journal citations are covered by 5 journal. Therefore, these journals are identified as core journals. Three journals out of the 5 core journal are from India, one (each) is from USA and UK.

6.9 Application of Bradford Law of Scattering to Journal Distribution

For application of Bradford's law, the citations were divided into three zones ($p=3$) and the value of k i.e. Bradford multiplier has been calculated using the following mathematical formula,

$$k = (e^y y_m)^{1/p} \quad (3)$$

$$k = (1.781y_m)^{1/p}$$

In the present data distribution y_m i.e. the number of citations of the most productive item = 816. From Eqn. (3) the value of k is 11.327

And r_0 = the number of journals in the nucleus of Bradford is calculated as

$$r_0 = T(k-1)/(k^p-1) \quad (4)$$

here, T = Total number of journals

$$r_0 = 7.196$$

$$r_1 = 81.509$$

$$r_2 = 923.252$$

The Bradford distribution can be written as 7.196: 7.196 (11.327): 7.196 (11.327)².

The findings of this calculation are shown in Table 9. Table 9 indicates that the number of journals in the nucleus is 7 with 1587 journal citations. Zone 1 contains 82 journals with 1374 article citations and zone 2 contains 1510 journal citations. The exact number of Bradford multiplier for each group is calculated by dividing the number of journals in the given group by its preceding group. The value of k for the two groups is 11.714 and 11.256 which is very close to Bradford multiplier 11.327 calculated from the formula devised by Egghe¹³⁻¹⁴. This shows that the journal distribution in the theses submitted to the Department of Economics, Punjabi University Patiala, is as per Bradford distribution.

7. TESTING OF HYPOTHESES

All the four hypotheses are put to test and the following conclusions are drawn.

- Hypotheses 1 says that books and journals are the major source of information in economics literature. In the

present study, books and journals together form 63.82 per cent of the total citations which validates hypothesis 1.

- Hypothesis 2 says that the share of electronic resources is very less but in the changing environment, the trend of using these resources is increasing. The use of electronic resources increases from 0.25 per cent in 2000-2004 to 6.88 per cent in 2010-2014 indicating that the trend of using electronic resources is increasing. It authenticates hypothesis 2.
- Hypothesis 3 says that the half-life period of book citations is more than journal citations. The half-life period of books is 21.74 years whereas it is 18.72 years for journals which clearly reveals that half-life of book citations is more than journals proving hypothesis 3 to be true.
- Hypothesis 4 says that the researchers prefer foreign books as compared to Indian books. The use of Indian books is 43.15 per cent and rest of the books are of foreign origin showing preference for foreign books. This verifies hypothesis 4.

8. FINDINGS AND CONCLUSIONS

The study analysed 92 theses in economics submitted to the Department of Economics, Punjabi University, Patiala during the period 2000-2014. The average citations per thesis is 98.4 which indicates that the economics researchers are not referring much of the available literature. It is disclosed that the journals are the most cited sources with 49.39 per cent of the citations. The year-wise distribution of authorship pattern indicates that the trend is changing from single authored documents to multiple authored documents. As 50 per cent of the literature cited is 17.59 year old which indicates the preference of researchers for current literature. The half-life period of books and journals is 21.74 and 18.72 year, respectively which shows that the half-life period of books is more than journals. The journal distribution is as per Bradford law of scattering and identifies 7 core journal. Journals increase from one zone to another with multiplier 11.327. The trend of using electronic resources is increasing. The actual use of electronic documents is much higher than revealed from citations. Students do not know how to cite electronic documents. They have also not followed uniform pattern of citations. Therefore, training should be given to students about citing of electronic documents as well as using uniform referencing pattern of documents.

Further this type of study is useful in identifying the core journals which are used by the researchers in economics. The study considers only economics theses, further research should be conducted in other subjects as well as comparison among other subjects of social sciences and sciences.

Table 9. Scattering of journals and citation distribution in economics

Zones	Journals	Cumulative number	Journal citations	Cumulative journal citations	Bradford multiplier
Core Zone	7	7	1587	1587	-
Zone 1	82	89	1374	2961	11.714
Zone 2	923	1012	1510	4471	11.256
Total	1012		4471		

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