SCHOLARLY TRENDS OF LIS RESEARCH IN INDIA: A SCIENTOMETRICS STUDY BASED ON WEB OF SCIENCE DURING THE PERIOD OF 2005-2014

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ABSTRACT:

An analysis of 421 papers published by Indian scientists and indexed by Web of Science in the discipline of Library and information Science during 2005-2014, indicates that the Indian output increased significantly in the later period. In earlier the quantity of scientific publications was less but it increased gradually after many ups and downs, 2014 is the year which possesses more number of articles. Total 421 papers associated with 132 national academic institutions, 93 research institutes/centres and 11 scientific agencies were analysed and found 120 papers of total 421 were published in collaboration with 120 international academic/research institutes/ scientific agencies. CSIR is the most prolific institute with 64(15.2%) papers. In the case of international collaboration 54(12.82%) of total papers were collaborated with North American countries. In discipline wise study,

out of the total publications, 44% of LIS researches were scattered into Computer Science discipline in which information theory, applications and methods were prominent studies followed by 15% papers scattered into management, 4% into communication and telecommunications, 2% into geography, 1% from social science and medicine.

KEYWORDS: RCI, CPP, scientometrics, collaborative co-efficient and co-authorship index (CAI)

1. INTRODUCTION:

Noruzi and Abdekhoda (2013) stated that academic and industrial interests are increasing in the impartial evaluation of scholarly research and global ranking of universities. Publication and citation counts have been used to assess the scientific production of countries and regions. While publication data have always formed a key component of research evaluation, they do not give any indication as to the quality of scientific research. On the other hand, although citation data have some inherent biases, especially towards publishing in English, it is often stated that a well-cited paper is used more by researchers, and it is probably considered more relevant to their scholarly work. During the last few decades, extensive studies have been conducted to analyze the research publications in terms of number of authors, gender of authors, length of articles, affiliations, citations, co-citations, word frequencies, co-occurred words and trends in research areas by considering one or more academic venues. These types of analyses are usually done by the bibliometric and scientometric methods.

Hood and Wilson (2001) explained that Scientometric analysis is a type of research method used to quantify the state-of-the-art of a particular field. In the field of LIS, scientometric studies have been widely used to identify patterns and trends as well as to detect gaps. Scientometrics was first defined by Nalimov as developing "the quantitative methods of the research on development of science as an informational process". It is a discipline which analyses scientific publications to explore the structure and growth of science. The scientometric techniques used to analyze various quantitative or qualitative aspects of a scientific publication. Some of the main themes include ways of measuring research quality and impact, understanding the processes of citations, mapping scientific fields and the use of various indicators in research policy and management. Scientometrics focuses on communication in the sciences, the social sciences, and the humanities along with several related fields. It also studies the evolution of science through some quantitative measures of scientific information, as the number of scientific articles published in a given period of time, their citation impact, etc.

Price (1978) stated 'the orientation of scientometrics towards system analysis and practical management of science should encompass all the aspects of the functioning of science susceptible to quantitative evaluation, namely the amount of scientific results, number of scientists, number and structure of scientific institutions, financial support, intensity and direction of scientific relations efficiency of research, etc.' It utilizes quantitative analysis and statistics to describe the trends of publications within a discipline or body of the subject field.

2. LITERATURE REVIEW

Looking at all LIS doctoral theses listed in the University News for the a period of seven years, Mahapatra and Sahoo (2004), analyzed the research trends like areas of research, growth pattern and productivity of universities and they identified that highest number of researches have been carried out on "User Study" and also found that, 'Bibliometrics and Citation Analysis' are the most interested areas of research by the LIS professionals. Patra & Chand (2009) has investigated LIS research trends in

SAARC and ASEAN countries on the basis of LISA, for the period of 1967-2005.They identified that India is at the top among SAARC countries with 3,367 publications while Singapore is at the top among the ASEAN countries with 750 publications. No significant trend in publications have been observed in both regions. However SAARC dominates over ASEAN. Three-time phased exponential growth has been observed in both regions, first may be due to initial formative years of LIS as a subject and its introduction in educational institutes, second, in 1990's perhaps because of impact of ICT and its application in libraries, and third is due to the advancement of Internet and Web technology. Another study on Doctoral dissertations by Shivalinghaiah et.al (2009) based on dissertation indexed in four sources namely Inflibnet, Vidyanidhi, University News and a web-based survey. They analyzed that South Indian Universities have produced more doctoral researches as compared to North India and research themes related to academic and public libraries received the most research focus and some sub-fields such as library services, library professionals, open source utilization, digitization technology, and exploring metadata have got attention. Rana, Reshma (2011) investigated research trends and patters of Doctoral research both at national level and within the Department of Library and Information Science, Punjab University, Chandigarh for the period of 1957-2009. She analyzed the year-wise and university-wise growth rate of Ph D theses in India in which seventy universities were awarded 623 degrees in library science during 1957-2009 giving an average of about nine degrees per university and 1990s is the highest productive year, the research areas such as library use studies and user studies, university libraries, public libraries, information storage and retrieval, personnel and bibliometrics were among the most popular research topics, their combined share being more than two-fifths in total research works awarded during the study period. Sivakumaren et. al (2011) conducted a study to investigate the research trends of LIS in Tamilnadu. They analyzed gender, designation, research scheme and research programme-wise Ph.D theses and M. Phil Dissertations. The study found that majority of researches has been completed by Librarians in the Ph.D programme and most of the researchers are doing research on "Bibliometrics/ Scientometrics/ Webometrics, followed by "Electronic Resources/Digital Libraries" and "User Studies/Information Literacy" in various Universities/Colleges in Tamil Nadu. It is further found that little attention was given for the areas such as "Library Management" and "Public Libraries". In this review we concentrate on scientometrics as that is the field most directly concerned with the exploration and evaluation of scientific research. In fact, traditionally these fields have concentrated on the observable or measurable aspects of communications- external borrowing of books rather than in-library usage; citation of papers rather than their reading- but currently online access and downloads provide new modes of usage and this leads to development in webometrics and altmetrics.

3. OBJECTIVES OF THE STUDY

The following objectives have been framed for the study:
- To depict the growth of scholarly publications in LIS during the period 2005-2014.
- To examine the authorship pattern and nature of collaborative research.
- To identify the authors productivity and their impact on scholarly world.
- To determine the collaboration with other continents and countries.
- To examine scattering of LIS publications into other disciplines.
- To analyze the affiliated institutions wise publications.
- To find out the most preferred publications.

4. SOURCE DATABASE & METHODOLOGY

The data for the present study was retrieved from Web of Science online database which is published by Thomson Reuters, USA. Web of Science, Core Collection provides to researchers, administrators, faculty, and students with quick, powerful access to the world's leading citation databases. Authoritative, multidisciplinary content covers over 12,000 of the highest impact journals worldwide including open access journals and over 1,50,000 conference proceedings. It has current and retrospective coverage in the sciences, social sciences, arts and humanities, with coverage since 1900 till now.

In advanced search options Field Tag of "Research Area" was used in Web of Science database for retrieving data on "Library and Information Science" during 2005–2014. With these efforts, a total of 96,736 publications were displayed and these results were refined by 'India' as country and 'Article, Proceeding paper and Review', in document type and thereafter 421 Indian publications were downloaded. Each publication contained English language citations with detailed bibliographic information, e.g. year, author, name of publications, author's affiliation, country and language etc. The retrieved records were analyzed by Microsoft Excel.

4.1 Collaborative Coefficient (CC)

To measure the nature of collaborative research in a single step is termed as collaborative coefficient. This method is based on fractional productivity defined by Price and Beaver. It is given by following formula:

$$CC = 1 - \frac{\sum_{j=1}^{k} \left(\frac{1}{j}\right) f_j}{N}$$

Fj = the number of j authored research papers;
N = total number of research papers published; and
k = the greatest number of authors per paper.

According to *Ajiferuke,* CC tends to zero as single authored papers dominate and to 1-1/j as j-authored papers dominate. This implies that higher the value of CC, higher the probability of multi or mega authored papers.

4.2 Co-Authorship Index (CAI)

To obtain the proportional output of single, double, multi and mega-authored papers for different years is suggested by Garg & Padhi and similar methodology was also suggested by Price and Beaver they used this method.
CAI={ $(N_{ij}/N_{io})/(N_{oj}/N_{oo})$ }x 100
where,
Nij: Number of papers having j authors for the year i;
Nio: Total output of year i;
Noj: Number of papers having j authors for all years;
Noo: Total number of papers for all authors and all years;
J= 1,2,3.........n
CAI= 100

CAI= 100 implies that co-authorship in a particular year for a particular type of authorship corresponds to the world average, CAI>100 reflects higher than average co-authorship efforts and

CAI<100 lower than average co-authorship. For calculating CAI the entire data was divided into four blocks as single authored, two authored, three-authored and more than three-authored publications.

4.3 Relative Citation Impact (RCI)

RCI is a measure of both the influence and visibility of a nation's research in the global perspective. Relative citation impact can be defined as the average citations of a country's papers in LIS field divided by the world average in the corresponding field during the same period. The formula to calculate RCI suggested by Yi, Qi and Wu:

$$RCI = (c_{ij}/p_{ij})/(w_{cj}/w_{pj})$$

RCI = 1 denotes that a country's citation rate is equal to world citation rate; RCI < 1 indicates that a country's citation rate is less than the world citation rate and also implies that the research efforts are higher than its impact; and RCI > 1 indicates that a country's citation rate is higher than the world's citation rate and also implies high-impact research in that country.

5. DATA ANALYSIS AND INTERPRETATION

5.1. YEAR-WISE GROWTH OF PUBLICATIONS

Figure 1 provides the AGR of number of publications for the period of 2005-2014.

$$\text{Average Growth Rate} = \frac{\text{end value} - \text{first value}}{\text{first value}} \times 100$$

Figure 1 presents the annual distribution and average growth pattern of LIS publications. Fluctuation is seen throughout the study period. The compound annual growth rate (CAGR) (calculated using the formula available at www.investopedia.com/calculator/cagr.aspx) was found to be 9.88% during the period 2005–2014. The AGR for publications has been increasing trend from 10 in 2005 to 92.5 in 2014. However, the AGR decreased -30 in 2007 and it again increased to 65.21 in 2008. Since then, there is fluctuation as illustrated in figure1. The reason for the fluctuation is that there was no constant growth of publication except in 2014.

The study analysis for the period 2005 – 2014 indicates that year in which less than 50 papers were published, were first six years i.e. 2005 (30), 2006 (33), 2007 (23), 2008 (38), 2009 (40) and 2010 (48) which increased in 2011 (51) again decreased to less than 50 in 2012 (41) and 2013 (40) after that it was increased at the average rate of 92.5% in 2014 (77). In beginning the quantity of scientific publications were less but it increased gradually even though there were ups and downs in few years and 2014 is the year which possess more number of articles.

Figure1. Year Wise Publications
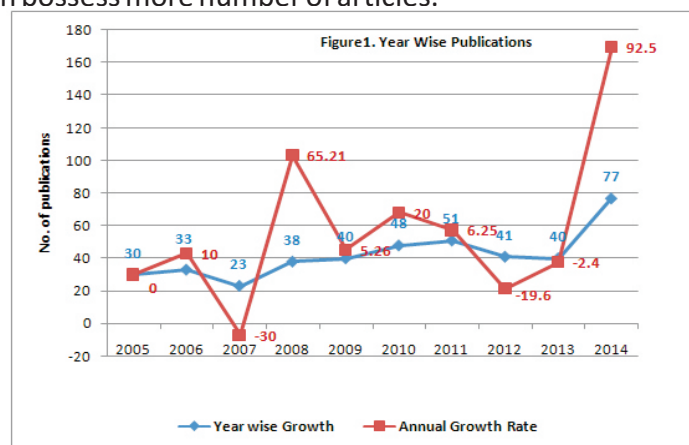
5.2. AUTHORSHIP PATTERN AND NATURE OF COLLABORATIVE RESEARCH

Table 1 present that out of 421 publications, 108(25.65%) were single authored papers, 169(40.14) two authored papers, 95(22.56%) three authored papers and 49(11.63%) more than three authored papers. The authorship pattern clearly shows that 65.79% publications were contributed by single and double authored.

Table 1 shows year wise CAI and CC of LIS publications by single, two, three and more than three authors. The average value of collaborative research is 0.56. It is indicated that in 2005, 2006, 2008, 2010, 2011 and 2012, value of CC was more than average (0.56). This implies that during these years, higher values of CAI are either for two, three or more than three authored papers. The year 2007, 2009, 2013 and 2014 have low values of CC.

Table 1 shows that the CAI value for more than three authored paper is higher (200) in 2005 but suddenly trend of this authorship pattern dropped to less than average value and since 2012 it started increasing. From the beginning of the study period the trend of three authorship pattern was less than average but it is being increased gradually to more than average value. The trend of CAI for two authored papers were less than average except in 2005, 2008, 2009 and 2013. There were fluctuations in the value of CAI for single authored papers. In the early 2 years(2005, 2006) the value of single authored papers were more than average but there was decrease in this value in 2007-2009 which increased again gradually from 2010 to 2012 with a sudden drop in value in 2013 to just 5 papers, again a rise of 14 papers in 2014.

Table 1. Authorship Pattern

Year	Single-Author (CAI)	Two-Author (CAI)	Three-Author (CAI)	>Three-Author (CAI)	Total	Collaborative coefficient (CC)
2005	9 (117)	14 (116)	0	7 (200)	**30**	0.59
2006	15 (177)	12 (90)	3 (40)	3 (78)	**33**	0.69
2007	5 (85)	8 (87)	8 (154)	2 (75)	**23**	0.52
2008	9 (92)	21 (138)	7 (82)	1 (23)	**38**	0.58
2009	8 (78)	18 (112)	10 (111)	4 (86)	**40**	0.53
2010	15 (122)	18 (93)	12 (111)	3 (54)	**48**	0.60
2011	16 (122)	17 (83)	14 (122)	4 (67)	**51**	0.59
2012	12 (114)	13 (79)	9 (97)	7 (147)	**41**	0.57
2013	5 (49)	18 (112)	11 (122)	6 (129)	**40**	0.48
2014	14 (71)	30 (97)	21 (121)	12 (134)	**77**	0.51
Total	**108**	**169**	**95**	**49**	**421**	**0.56**

5.3 PROLIFIC AUTHORS AND THE IMPACT OF THEIR RESEARCH OUTPUT

Total research output was produced by more than 500 Indian authors. Table 2 lists the top 10 authors in which Gagan Pratap produced the highest 20 (4.7%) of total output and received 125 citations followed by Suresh Kumar with 12 (2.85%) and 47 citations, Vinit Kumar 11 (2.61%) and 31 citations, BM Gupta 10 (2.37) and 39 citations, K.C. Panda and B.S. Kademani 8 papers, Anil Sagar 7 papers and last three of top ten authors produced 6 papers. Out of the top ten authors listed below only three authors had higher than average RCI. Among these authors, highest CPP and RCI were for Deepa Mani (2.71) of ISB, Information System Group, Hyderabad, Andhra Pradesh, Gagan Pratap (1.36) of CSIR, Natl Inst. Interdisciplinary Sci & Technol, Thiruananthapuram, Kerala, and I K Ravichandra Rao of ISI, DRTC, Bangalore, Karnataka

Table 2. Top 10 authors (by TP) with scientometric indicators

SN	AUTHOR	INSTITUTION	TNP (%)	TNC	CPP	RCI
1.	Prathap, Gangan	CSIR, Natl Inst. Interdisciplinary Sci & Technol, Thiruananthapuram, Kerala	20(4.75)	125	6.25	1.36
2.	Kumar, Suresh	CSIR, Natl Inst. Sci. Technol & Dev. Studies NISTADS, New Delhi	12(2.85)	47	3.92	0.85
3.	Kumar, Vinit	Bundelkhand Univ, Dr Ranganathan Inst Lib & Informat Sci, Jhansi, Uttar Pradesh	11(2.61)	31	2.82	0.61
4.	Gupta, B M	Natl Inst Sci Technol & Dev Studies, New Delhi 110012	10(2.37)	39	3.90	0.85
5.	Panda, K C	Sambalpur univ, Dept Lib & Info Sci, Sambalpur 768019, Odisha	8(1.90)	16	2.0	0.43
6.	Kademani, B S	BARC, Sci Info. Resource Division, Bombay 400085, Maharastra	8(1.90)	27	3.38	0.73
7.	Sagar, Anil	BARC, Sci Info. Resource Division, Bombay 400085, Maharastra	7(1.66)	21	3.00	0.65
8.	Rao, I K Ravichandra	ISI, DRTC, Bangalore 560059, Karnataka	6(1.42)	36	6.00	1.30
9.	Mani, Deepa	ISB, Information System Group, Hyderabad, Andhra Pradesh	6(1.42)	75	12.50	2.71
10.	Madalli, D P	ISI, DRTC, Bangalore 560059, Karnataka	6(1.42)	5	0.83	0.18

Note: TNP- total number of publications; TNC-total number of citations; CPP- citations per paper; RCI-relative citation impact .

5.4 NUMBER OF NATIONAL INSTITUTES AND INTERNATIONAL COLLABORATED INSTITUTES

Table 3 presents the total 421 publications which came from 236 academic institutions, research centres and scientific agencies located in different parts of India in which 120 publications were published in collaboration with 120 international academic institutions, research centres and scientific agencies.

Table 3. National institutes and international collaborated institutes

Type of Institution	Academic Institution	Research Institute/Centre	Scientific Agency	Total
National	132	93	11	236
International	109	10	1	120
Total	**241**	**103**	**12**	**356**

5.5 PROLIFIC INSTITUTIONS AND ITS IMPACT

Table 4 lists the 20 most prolific institutions that contributed more than half (62%) of the total publications and obtained more than half 1204 (62.15%) of total citations. Remaining 216 institutes out of 236 institutes, produced the rest of the publications. Table indicates that seven institutions had higher CPP value than the average (4.60) and remaining 13 institutions had less than average value. The value of CPP was highest (12.73) for IIT Delhi followed by INDIAN SCH BUSINES (9.53) and University of Mysore (8.50). The value of RCI also follows the similar trends. Based on the low values of RCI Punjab University, University of Delhi, Sambalpur University and others that received the low CPP and RCI value, can be inferred that the impact of research for these institutes are not commensurate with their output. This may be a possible reason for low values of CPP and RCI for these institutes that their papers appeared in low impact factor journals.

Table 4. Top 20 institutions (by TP) with scientometric indicators

SN	INSTITUTION	TNP (% of 421)	TNC	CPP	RCI
1.	COUNCIL OF SCIENTIFIC INDUSTRIAL RESEARCH CSIR INDIA	64(15.2)	311	4.86	1.05
2.	INDIAN STATISTICAL INSTITUTE	27(6.41)	71	2.63	0.57
3.	NATIONAL INSTITUTE OF SCIENCE TECHNOLOGY DEVELOPMENT STUDIES INDIA	24(5.70)	100	4.17	0.90
4.	NATIONAL INSTITUTE OF SCIENCE COMMUNICATION INFORMATION RESOURCES INDIA	19(4.51)	114	6.00	1.30
5.	INDIAN SCH BUSINESS	15(3.56)	143	9.53	2.07
6.	BHABHA ATOMIC RESEARCH CENTER	12(2.85)	35	2.92	0.63
7.	INDIAN INSTITUTE OF MANAGEMENT AHMEDABAD	10(2.37)	39	3.90	0.84
8.	UNIVERSITY OF DELHI	10(2.37)	17	1.70	0.37
9.	SAMBALPUR UNIV	9(2.13)	16	1.78	0.38
10.	MANAGEMENT DEV INST GURGAON	9(2.13)	38	4.22	0.92
11.	CSIR NATL INST SCI COMMUN INFORMAT RESOURCES	8(1.90)	38	4.75	1.03
12.	ALIGARH MUSLIM UNIVERSITY	8(1.90)	33	4.12	0.89
13.	INDIAN INSTITUTE OF TECHNOLOGY IIT KHARAGPUR	7(1.66)	15	2.14	0.46
14.	INDIAN INSTITUTE OF TECHNOLOGY IIT DELHI	7(1.66)	87	12.43	2.70
15.	INDIAN INSTITUTE OF SCIENCE IISC BANGLORE	7(1.66)	51	7.29	1.73
16.	UNIVERSITY OF PUNE	6(1.42)	14	2.33	0.50
17	UNIVERSITY OF MYSORE	6(1.42)	51	8.50	1.85
18.	BANARAS HINDU UNIVERSITY	6(1.42)	16	2.67	0.58
19.	PANJAB UNIVERSITY	5(1.18)	4	0.80	0.17
20.	INDIRA GANDHI NATL OPEN UNIV	5(1.18)	11	2.20	0.48
	Sub-total	264(62.71)	1204	4.56	0.99
	Other 216 institutions	157(37.29)	733	4.67	1.01
	TOTAL	421(100)	1937	4.60	1.00

## 5.6 INTERNATIONAL COLLABORATION OF LIS PUBLICATIONS

Table 5 investigated the various continents collaborating with India in LIS domain. It is observed that total 120 (28.5%) of total publications(421), collaborated with other countries, and 54 (12.82%) of Indian publications have collaborated with North American continents followed by 34 (8.07%) with Europe, 26 (6.17%) with Asian, 3 (0.71%) with Africa, 2 (0.47%) with Australia and 1 (0.23) with S. American continent. And it is also observed that highest 51(12.11%) publications have collaborated with United State of America and second 8 (1.90%) publications with England U.K. followed by Belgium and China 6 (1.42%) and rest 49 (11.65%) publications with other countries.

Table 5. Continents wise Collaboration of LIS Publications

N. AMERICA		EUROPE		ASIA		AFRICA		AUSTRALIA		S. AMERICA	
Country	Pub.	Country	Pub.	Country	Pub	Country	Pub	Country	Pub.	Country	Pub.
USA	51	ENGLAND	8	SINGAPORE	6	SWAZILAND	1	AUSTRALIA	2	BRAZIL	1
CANADA	2	BELGIUM	6	PEOPLES R CHINA	6	S. AFRICA	1				
ANTIGUA BARM	1	NETHERLANDS	5	SAUDI ARABIA	3	KENYA	1				
		GERMANY	3	BANGLADESH	3						
		FRANCE	3	SOUTH KOREA	2						
		SWITZERLAND	2	PAKISTAN	2						
		ITALY	2	IRAN	2						
		FINLAND	2	TAIWAN	1						
		SPAIN	1	QATAR	1						
		NORWAY	1								
		DENMARK	1								
54 (12.82%)		34 (8.07%)		26 (6.17%)		3 (0.71%)		2 (0.47%)		1 (0.23%)	

5.7 SCATTERING OF LIS RESEARCH INTO OTHER DISCIPLINES

In the scattering of the LIS research into other disciplines Figure 2. shows that 44% of LIS researches were scattered into Computer Science discipline in which information theory, applications and methods were studied followed by 15% scattered into management, 4% into communication and telecommunications, 2% into geography, 1% in social science and medicine.

Interdisciplinary Distribution of LIS Publications
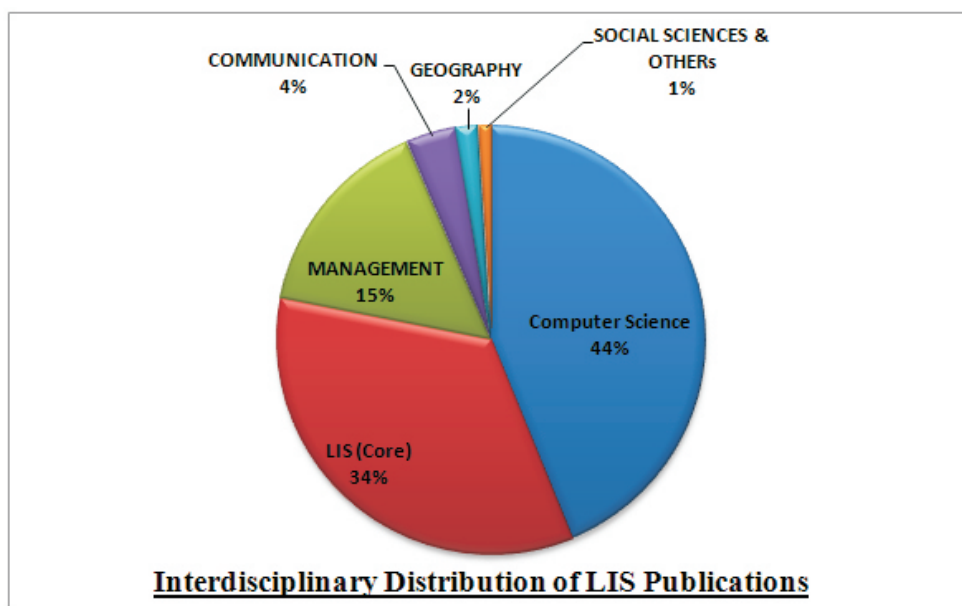
5.8 PUBLICATIONS BY JOURNAL PUBLISHING COUNTRIES

Analysis of LIS publications published by Indian scientists indicates that these papers were scattered in 59 journal titles published from abroad in which highest 28 journals are from England followed by 20 journals from USA and remaining 11 journals from other four countries. Table 6 presents the analyzed data for the distribution of output by various journals publishing countries. It indicates that the highest number of papers 227(54%) appeared in journals which originating from the UK, followed by Netherlands 82(19.48%) and USA 78(18.53%). This indicates that more than 90% of the papers published by Indian LIS scientists, appeared in journals published from these three scientifically advanced countries of the World.

Table 6. Distribution of LIS Publications by Journal Publishing Country

Journal Publishing Country	Number of Journals	Number of Papers (%)
England	28	227 (53.9)
Netherlands	5	82 (19.48)
USA	20	78 (18.53)
Germany	4	17 (4.04)
Malaysia	1	16 (3.80)
Canada	1	1 (0.24)
TOTAL	*59*	*421 (100)*

5.9 DISTRIBUTION OF PAPERS ACCORDING TO IMPACT FACTOR

Table7 indicates distribution of papers according to impact factor which shows that more than half (53.68%) of the papers were published in low impact factor journals and 43.94% of total papers published in medium impact factor journals and rest 2.37% in high and very high impact factor journals. Table 8 presents total 20 most productive journal out of which 8 journals with 139 papers published in medium impact factor journals and rest 12 journals having 179 publications were in low impact factor journals. Based on this analysis we can infer that Indian LIS research productivity is of medium quality and very few publications have got high and very high impact factor. As the quality of the publication is indicated by the impact factor, they must improve their publication quality.

Table7. Distribution of publications according to range of impact factor (IF) of journals

Range of Impact Factor	Number of Papers	% 0f Papers
0-1 (Low)	226	53.68
>1- =3 (Medium)	185	43.94
>3 - =5 (High)	7	1.66
>5 (Very High)	3	0.71
Total	421	100

Table 8. Most preferred journals used for research

SN	INSTITUTION	TNP	Impact Factor
1.	SCIENTOMETRICS	70(16.62)	2.18
2.	ELECTRONIC LIBRARY	57(13.53)	0.53
3.	PROGRAM ELECTRONIC LIBRARY AND INFORMATION SYSTEMS	38(9.02)	0.65
4.	JOURNAL OF KNOWLEDGE MANAGEMENT	17(4.03)	1.58
5.	MALAYSIAN JOURNAL OF LIBRARY INFORMATION SCIENCE	16(3.80)	0.23
6.	INFORMATION SYSTEMS RESEARCH	12(2.85)	2.43
7.	LIBRARY HI TECH	12(2.85)	0.59
8.	TELECOMMUNICATIONS POLICY	11(2.61)	1.41
9.	INFORMATION TECHNOLOGY MANAGEMENT	9(2.13)	NA
10.	KNOWLEDGE ORGANIZATION	9(2.13)	0.58
11.	INTERNATIONAL JOURNAL OF INFORMATION MANAGEMENT	8(1.90)	1.55
12.	INFORMATION TECHNOLOGY FOR DEVELOPMENT	7(1.67)	0.55
13.	INTERNATIONAL JOURNAL OF GEOGRAPHICAL INFORMATION SCIENCE	7(1.67)	1.65
14.	JOURNAL OF INFORMATION SCIENCE	7(1.67)	1.15
15.	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	7(1.67)	1.84
16.	ONLINE INFORMATION REVIEW	7(1.67)	0.91
17	ASLIB PROCEEDINGS	6(1.42)	0.67
18.	INTERLENDING DOCUMENT SUPPLY	6(1.42)	NA
19.	JOURNAL OF ACADEMIC LIBRARIANSHIP	6(1.42)	0.44
20.	JOURNAL OF THE ASSOCIATION FOR INFORMATION SCIENCE AND TECHNOLOGY	6(1.42)	NA
	SUB-TOTAL	318(75.54)	
	OTHERS 30 journals	103(24.46)	

5.10 CITATION ANALYSIS OF PAPERS

Citation rates reflect the impact of published work on the scholarly communities. The impact of research can be assessed by making citation counts of the papers received over period of time. Table 9 presents that 102(24.23%) out of 421 total publications did not get any citation and the rest were cited one, two or more times. Of the total cited papers 233(55.35%) were cited between 1 and 5 times and 42(9.96%) were cited between 6-10 times. Thus two-thirds (65.31%) of the total publications were cited between 1 to 10 times. Remaining (34.69%) were cited more than 10 times.

Table 9.Frequency of Citations

No. of times cited	No. of papers cited	% of papers
0	102	24.23
1	91	21.62
2	55	13.06
3	30	7.13
4	29	6.89
5	28	6.65
6	10	2.37
7	8	1.90
8	11	2.61
9	10	2.37
10	3	0.71
11-15	17	4.04
16-20	10	2.37
20+	17	4.04
Total	421	100

6. CONCLUSION

1. The annual growth rate fluctuated during the period of study, though the output as seen, in the early stage the quantity of scientific publications were less but it increased gradually even though there are ups and drop downs in few years and 2014 is the year which possess highest number of articles of the study period.

2. 44% of 421 LIS papers were scattered into Computer Science discipline in which information theory, applications and methods were prominent followed by 15% scatterring into management, 4% into communication and telecommunications, 2% into geography, 1% in social science and medicine.

3. CSIR was the highest prolific institute and IIT Delhi got the highest CPP while Punjab University, University of Delhi, Sambalpur University and others received the low CPP and RCI value.

4. Gagan Pratap was the most prolific author and Deepa Mani has got the highest CPP and RCI.

5. More than half (53.68%) of papers were published in low impact factor journals and 43.94% of total papers published in medium impact factor journals and rest 2.37% in high and very high impact factor journals i.e. publications of highest impact factors are negotiable as compared to low and medium impact factor journals.

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