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Publication Growth of Library and Information Science Research in India (2008-2016): A Bibliometric Analysis

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Abstract: Research active status of Library and Information Science (LIS) in India has been studied using publications indexed in the Scopus database. "Library and Information Science" as a search term in the All field tag fetched 387 records and the period of coverage from 2008 to 2016. The downloaded data were analyzed using MS Excel and VOS Viewer software applications. The analysis revealed that there are 160 authors from among 35 countries; 112 journals; 7 types of documents; 160 institutions; 1931 times cited by local and global references. 65.37% of publications are scholarly articles. The highest productive year is 2015 (Citation -183) and lowest is 2008 and 2009 (Citation-106 and 185). Of the 35 countries, India stands first, United State and Canada in the second and third places respectively. "Annals of Library and Information Studies", "DESIDOC Journal of Library and Information Technology", "Library Philosophy and Practice" are the most productive journals involved in this study. Among the 160 authors, "Mukherjee, B." has earned the highest h- index value. "University of Delhi" dominates other institutions in terms of a number of records.
Keywords: Library, Information Science, Bibliometrics, India, Social Science.

INTRODUCTION

The concept of the bibliometric study was first coined by Pritchard [1] as "the application of mathematical and statistical methods to books and other media". It involves the analysis of a set of publications characterized by bibliographic variables such as the author(s), the place of publication, the associated subject keywords, and the citations.

The methods of bibliometrics (and the closely related specialism of informetrics, scientometrics and webometrics [2] are used to investigate an increasing range of topics, including the frequency distributions that characterize the use of words and phrases in text databases; the extent to which websites are linked together; longitudinal studies of the development of academic disciplines; and the extent to which individuals, research groups or institutions are published or cited in the literature [3-8]. This last application is of particular current importance as publication and citation measures are increasingly being used as performance indicators relating to the quality of the research of an individual or of an institution. There have been several previous bibliometric studies of information science. One of the very first such studies sought to identify the principal subject areas in the discipline [9] while, more recently, Goodrum *et al.*, [10] and Katerattanakul, Han and Hong [11] have reviewed the discipline's literature. There have also been several bibliometric analyses of specific subject areas, such as XML [12], computer-supported collaborative work [13] and information science [14]. The very basic attribute of bibliometrics governing the relationships between information items and activities has thus made librarians and statisticians to conduct the bibliometric studies. Hence, we are witnessing a large number of bibliometric studies for over last two decades. The present study has been undertaken in order to know the nature and contents of articles in the Library Herald Journal. This paper describes Publication Growth of Library and Information Science Research in India during 2008-2016.

REVIEW OF LITERATURE

Brij M. Gupta and Adarsh Bala [15] observed the research output of India in epilepsy research during 2002-11 on several parameters including the growth, rank and global publications share, citation impact, share of international collaborative papers, contribution of major collaborative partner countries, contribution of various subject-fields, contribution and impact of most productive institutions and authors, media of communication and characteristics of high cited papers. The Scopus Citation Database has been used to retrieve the data for 10 years (2002-11) by searching the

keywords "epilepsy research" in the combined Title, Abstract, and Keywords fields. Among the top 20 most productive countries in epilepsy research, India ranks at 11th position (with 1550 papers) with a global publication share of 2.88% and an annual average publication growth rate of 15.31% during 2002-11. Its global publication share has increased over the years, rising from 2.06% in 2002 to 4.65% during 2011.

Wen *et al.*, [16] in a survey enabled "Scientific production of electronic health record research, 1991–2005" came to the conclusion that numbers of published articles have significantly increased compared to each 5-year period. Most articles were published in English (98%) and were from the region of America (57%). The top 10 of the 374 journals accounted for 41% of the number of published articles. An analysis of the number of articles related to population showed a high publication output for relatively small countries like Switzerland, Netherlands, and Norway. Generally, they found a considerable increase in the literature of "electronic health research" during 1991to 2005.

Meena, M, Nagarajan. M [17], evaluated the Indian malaria research output during 1974–2013 using different bibliometric indicators. Data have been downloaded from the Scopus database for the period1974–2013 using the keywords Indian and malaria in the title and abstract fields. The study examined the pattern of growth of the output, its collaboration with other countries, the profile of different countries in different subfields.

Shubhada Nagarkar [18], studied bibliometric parameters including the number of papers, a number of citations received, institutional collaborations, productivity of journals, subject categories and authorship pattern have been used to carry out the analysis of the research contributions made by the faculty members of the Department of chemistry at University of Pune. The data set was collected from the Web of Science (WoS) database for the period of about 14 years (1999-2012).

Thanuskodi [19] discussed the research output performance of social scientists on social science subjects. The analysis covers mainly the number of articles, authorship pattern, subject wise distribution of articles, average number of references per articles, forms of documents cited, year wise distribution of cited journals etc. Yeoh and Kaur [20] analyze the publication output of Research in Higher Education for subject support in collection development in the light of growing interest in diversified domains of research in higher education. Consequently, analysis of 40 issues of publications revealed a diversified usage pattern of bibliographic reference sources by contributing researchers, with a cumulative total of citations being 8,374. A positive trend in research collaboration of contributing authors, and a steady growth in the use of reference sources, periodicals and web documents in the citations signify the trend of scholarly communication of research works in the electronic age. Similar to other disciplines of research findings, journals and books were the most cited source materials for researchers to thrash out.

Nazim & Ahmed [21] stated in their exploration of 'A Bibliometric Analysis of Nanotechnology Research for the period 1991-2006 that nanotechnology field has seen rapid growth during the period studied, authorship productivity was discovered by using Lotka's law and core journals are discovered with the help of Bradford's law.

Verma, Tamrakar, and Sharma [22] revealed that majority of the articles in the journal are two-authored and the majority of the contributions are from New Delhi. Singh, Mittal, and Ahmad [23] conducted a bibliometric study of literature on digital libraries. The important findings are that most articles (61 percent) are single-authored; author productivity is not in agreement with Lotka's Law, except in one case where the number of articles is three; the maximum number of articles were published in 2003 with English being the most productive language; maximum articles were published in the journal D-lib Magazine; distribution of articles nearly follows Bradford's Law; and the USA ranked first for maximum number of journals. Tiew [24] found that 53% of articles contained journal self-citations, and a tendency is noticed for authors affiliated with the institution publishing the journal to cite the journal. Patra, Bhattacharya, and Verma [25] analyzed the growth pattern, core journals and authors' distribution in the field of bibliometric using data from Library and Information Science Abstract (LISA) and found that the growth of literature does not show any definite pattern.

OBJECTIVES

- To examine the chronological growth of Library and Information Science Research in India from 2008 to 2016;
- To study the authorship pattern of the published literature;
- To identify the type of articles and their numbers.
- To find the growth of literature using RGR and Dt.
- To know the most productive authors
- To know the most referred journal
- To identify the most productive country
- To know the most productive institution

METHODOLOGY

The data for the study were downloaded from the journal's website for nine years from 2008-2016. The data contains the year of publication with the volume number, locations, total number of authors, number of references cited in the article etc. The data

was downloaded by the Web of Science database and using HisCite software for data extraction. Data were examined to meet the objectives mentioned above. For studying some parameters mentioned under the objectives. Complete count method has been followed for the analysis of the data.

RESULTS AND DISCUSSION

Table-1: Year wise publication growth and Citation

S. No	Year	No of Record	cumulative	Percentage (%)	Citation	Cumulative	Percentage (%)	Record Mean	Citation Mean
1	2008	19	19	4.91	49	49	2.54	43	214.55
2	2009	19	38	4.91	183	232	9.48		
3	2010	26	64	6.72	518	750	26.83		
4	2011	28	92	7.24	182	932	9.43		
5	2012	27	119	6.98	105	1037	5.44		
6	2013	51	170	13.18	240	1277	12.43		
7	2014	69	239	17.83	363	1640	18.80		
8	2015	81	320	20.93	185	1825	9.58		
9	2016	67	387	17.31	106	1931	5.49		
Total		387	-	100.00	1931	-	100.00		

Fig-1: Year wise publication growth and Citation

Table-1 Observed that the output of seven years during the period of study from 2008 to 2016. 81 articles were published in 2015 out of 387 publications and has first the position, in 2014 has occupied second position (69 articles), in 2016 has taken third place (67 articles) and in 2013 has published 51 records, in 2011 has published 28 article, in 2012 has published 27 papers and lowest number (i.e. 19 articles) in 2008 and 2009. During the nine years study period, the mean value is 43, the citation mean value is 214.55.

Table-2: Relative Growth Rate and Doubling time

S.No	Year	No of Record	cumulative	W1	W2	RGR	Doubling Time
1	2008	19	19	0.00	2.94	2.94	0.24
2	2009	19	38	2.94	3.64	0.69	1.00
3	2010	26	64	3.64	4.16	0.52	1.33
4	2011	28	92	4.16	4.52	0.36	1.91
5	2012	27	119	4.52	4.78	0.26	2.69
6	2013	51	170	4.78	5.14	0.36	1.94
7	2014	69	239	5.14	5.48	0.34	2.03
8	2015	81	320	5.48	5.77	0.29	2.37
9	2016	67	387	5.77	5.96	0.19	3.65

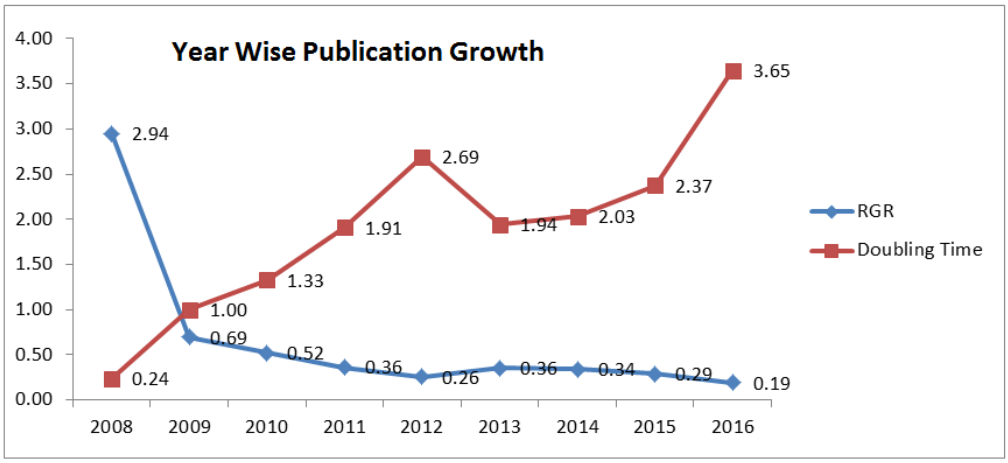


Fig-2: Relative Growth Rate and Doubling time

R(a) = (ln W2 – ln W1) / (t2 – t1)

Where,
W2 and W1 are the cumulative numbers of publications in year's t2 and t1.
Dt = 0.693/R(a)

Table-2 Explained that the sequential distribution relative growth rate and doubling time of Publication Growth of Library and Information Science Research in India from 2008 to 2016. It is observed that the RGR value has been gradually decreased from 2008 to 2012 (2.94 – 0.26), then it has been from 2013-2016 (0.36-0.19). Doubling time value also been increased from 2008-2012(0.24-2.69), further the Dt value in decreased in 2013 then it has been increased from 2014-2016.

Table-3: Author wise Publication (Top 20)

S. No	Author Name	No of Record	Percentage
1	Mukherjee, B.	11	6.875
2	Gul, S.	7	4.375
3	Karthikeyan, M.	6	3.75
4	Vyas, R.	6	3.75
5	Shah, T.A.	5	3.125
6	Thanuskodi, S.	5	3.125
7	Dutta, B.	4	2.5
8	Madhusudhan, M.	4	2.5
9	Panda, K.C.	4	2.5
10	Pujar, S.M.	4	2.5
11	Sen, B.K.	4	2.5
12	Sethi, B.B.	4	2.5
13	Sheeja, N.K.	4	2.5
14	Bhatia, S.	3	1.875
15	Bhoskar, R.D.	3	1.875
16	Bose, S.K.	3	1.875
17	Deshpande, R.M.	3	1.875
18	Dutta, C.	3	1.875
19	Jessy, A.	3	1.875
20	Kumbhar, R.	3	1.875

The above table describes top 20 contributors of Publication Growth of Library and Information Science Research in India from 2008 to 2016. The most productive author is Mukherjee, B.with 11 papers (6.875%). Gul, S.has published 7 (3.75%) with second place s and Karthikeyan M. and Vyas, R. have contributed 6 articles (3.125%) with the third position followed by Shah, T.A Thanuskodi, S, Dutta, B, Madhusudha and others.

Table-3: Authorship Pattern

Author	No of Records	Cumulative	Percentage	DC
Single	48	48	30.00	0.7
Two	82	130	51.25	
Three	17	147	10.63	
Four	7	154	4.38	
Five	2	156	1.25	
Six	2	158	1.25	
Seven	1	159	0.63	
Eight	0	159	0.00	
Nine	0	159	0.00	
Ten	0	159	0.00	
10+	1	160	0.63	
Total	160	-	100.00	

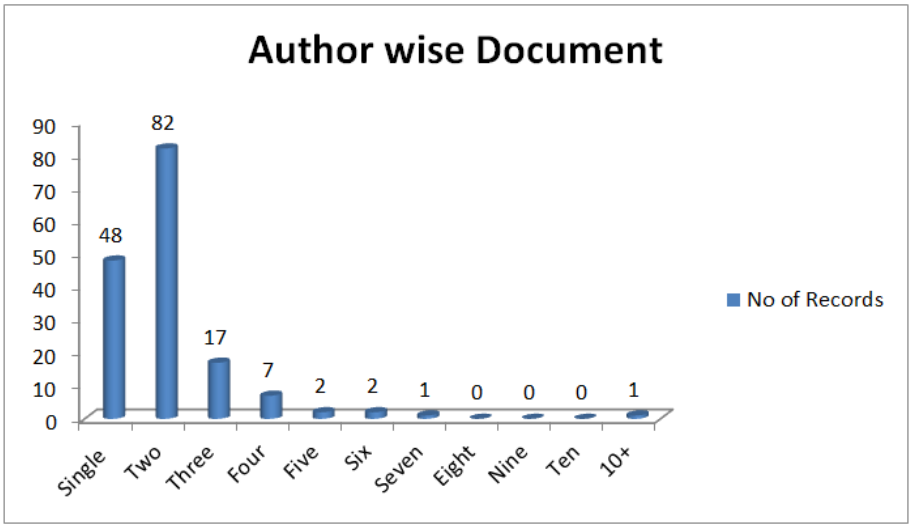
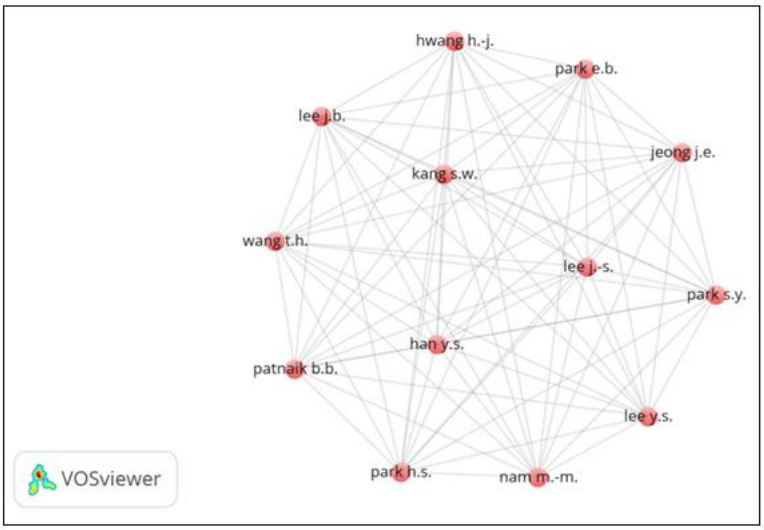


Fig-3: Authorship Pattern

Table-3 Described that double authored contributions (51.25%) are found to be most prime, followed by single authored communications (30%), three authored contribution (10.63%), four authored communications (4.38%). Seven and more than ten authored contributions occupied at least position, the degree of collaboration value is 0.7.



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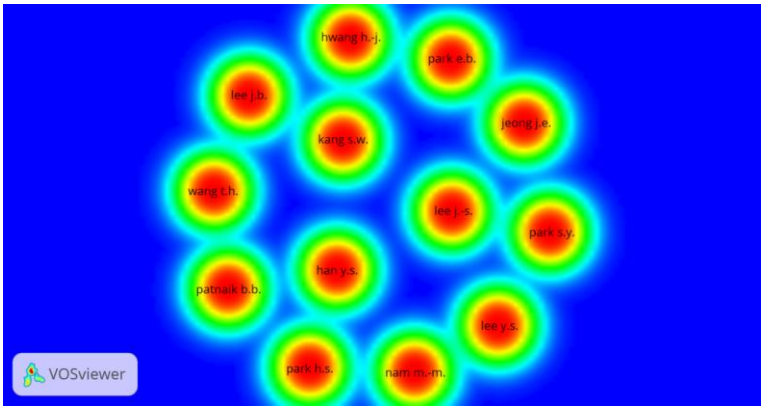
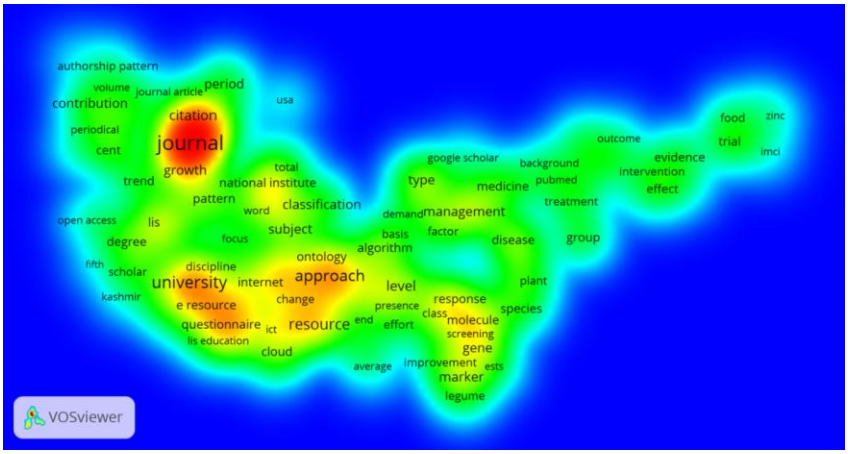


Fig-5:

Table-4: Source Title wise Publication (Top 20)

S. No	Source Title	No of Record	Percentage
1	Annals Of Library And Information Studies	38	9.82
2	Desidoc Journal Of Library And Information Technology	32	8.27
3	Library Philosophy And Practice	21	5.43
4	Electronic Library	12	3.10
5	International Information And Library Review	12	3.10
6	Combinatorial Chemistry And High Throughput Screening	8	2.07
7	Library Hi Tech News	8	2.07
8	Collection Building	6	1.55
9	Lecture Notes In Computer Science Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics	6	1.55
10	Library Review	6	1.55
11	Molecular Biology Reports	6	1.55
12	Knowledge Organization	5	1.29
13	Applied Biochemistry And Biotechnology	4	1.03
14	Communications In Computer And Information Science	4	1.03
15	International Journal Of Control Theory And Applications	4	1.03
16	Journal Of Ethnopharmacology	4	1.03
17	Medicinal Chemistry Research	4	1.03
18	Molecular Breeding	4	1.03
19	Cochrane Database Of Systematic Reviews	3	0.78
20	Genes And Genomics	3	0.78

The above table describes top 20 source-wise Publication Growth of Library and Information Science Research in India from 2008 to 2016. The most productive journal Annales Of Library And Information Studies (9.82%), Desidoc Journal Of Library And Information Technology has occupied second place (8.27%), Library Philosophy And Practice is taken the third position followed by Electronic Library, International Information And Library Review, Combinatorial Chemistry And High Throughput Screening, Library Hi Tech News and other journals. .



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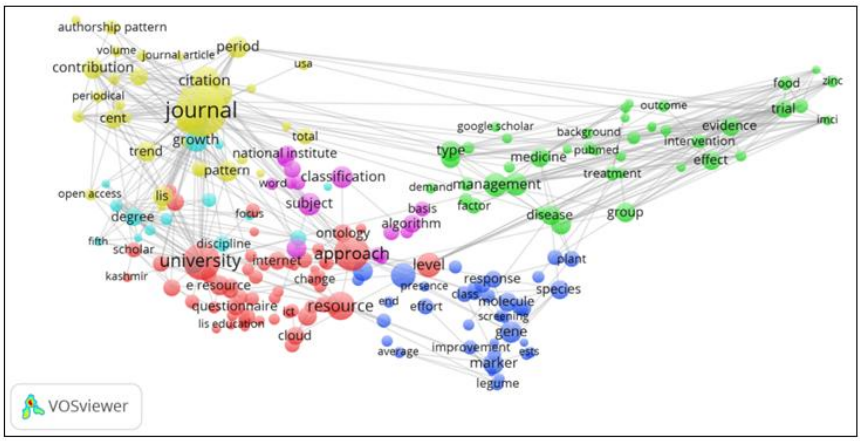

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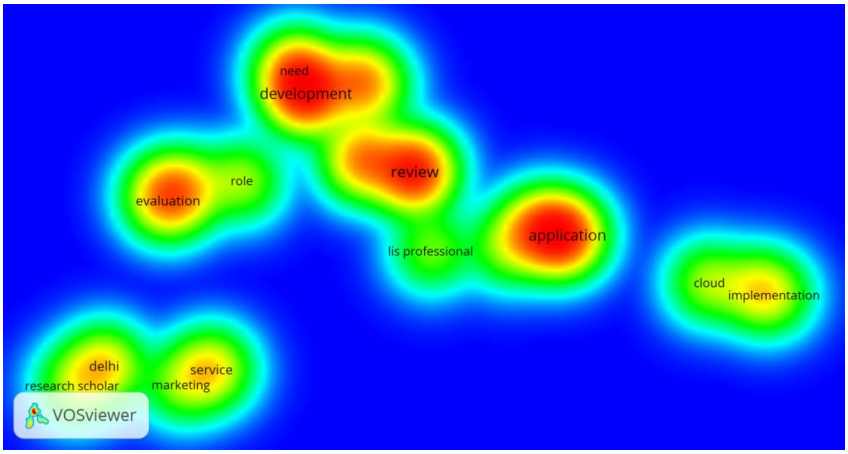

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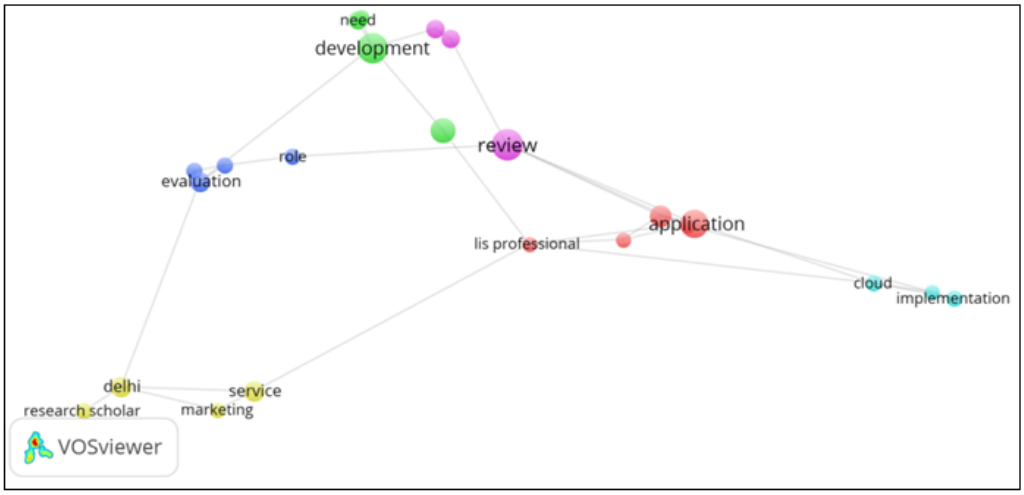

Fig-9:

Table-5: Subject Category wise Publication (Top 20)

S. No	Subject Category	No of Record	Percentage
1	Social Sciences	214	33.81
2	Computer Science	162	25.59
3	Biochemistry, Genetics and Molecular Biology	45	7.11
4	Arts and Humanities	37	5.85
5	Medicine	30	4.74
6	Pharmacology, Toxicology, and Pharmaceutics	29	4.58
7	Agricultural and Biological Sciences	20	3.16
8	Engineering	15	2.37
9	Chemistry	14	2.21
10	Mathematics	10	1.58
11	Business, Management, and Accounting	9	1.42
12	Decision Sciences	8	1.26
13	Immunology and Microbiology	8	1.26
14	Chemical Engineering	7	1.11
15	Economics, Econometrics and Finance	6	0.95
16	Earth and Planetary Sciences	4	0.63
17	Environmental Science	4	0.63
18	Multidisciplinary	3	0.47
19	Health Professions	2	0.32
20	Materials Science	2	0.32

The above table describes top 20 subject-wise Publication Growth of Library and Information Science Research in India from 2008 to 2016. The greatest productive subject is Social Sciences (33.81%), Computer Science has occupied second place (25.59%), Biochemistry, Genetics and Molecular Biology is taken the third position followed by Arts and Humanities, Medicine, Pharmacology, Toxicology and Pharmaceutics Agricultural and Biological Sciences, Engineering, Chemistry and other subjects.

Table-6: Document wise Publication Growth

S. No	Document	No of Record	Percentage
1	Article	253	65.37
2	Conference Paper	57	14.73
3	Review	38	9.82
4	Book Chapter	26	6.72
5	Book	10	2.58
6	Editorial	2	0.52
7	Short Survey	1	0.26
Total		387	100

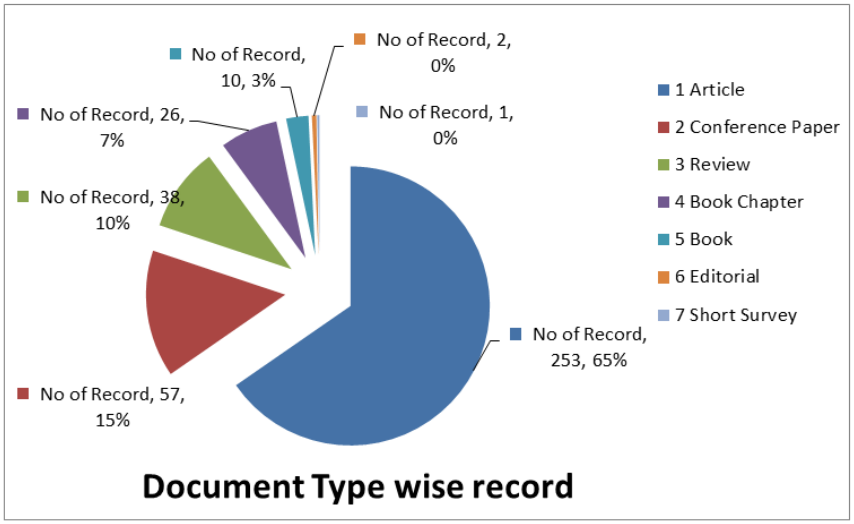

Fig-10:

Table-5 Indicates that type of communications was analyzed to understand how the number of publications has been changed during the period of 2008 – 2016. It is observed that articles (65.37%) are found to be most predominant, conference papers have appeared in second place (14.73%), reviews are taken in third place (9.82%) followed by book chapter, book, editorial and short survey Letters has appeared in the last place (0.26%).

Table-7: Country wise Publication Growth (Top 20)

S.No	Country/Territory	No of Record	Percentage
1	India	387	100.00
2	United States	20	5.17
3	Canada	7	1.81
4	United Kingdom	5	1.29
5	Italy	4	1.03
6	South Korea	3	0.78
7	Cayman Islands	2	0.52
8	Germany	2	0.52
9	Iran	2	0.52
10	Mexico	2	0.52
11	Oman	2	0.52
12	Saudi Arabia	2	0.52
13	Swaziland	2	0.52
14	Switzerland	2	0.52
15	Australia	1	0.26
16	Belgium	1	0.26
17	Brazil	1	0.26
18	China	1	0.26
19	Czech Republic	1	0.26
20	Egypt	1	0.26

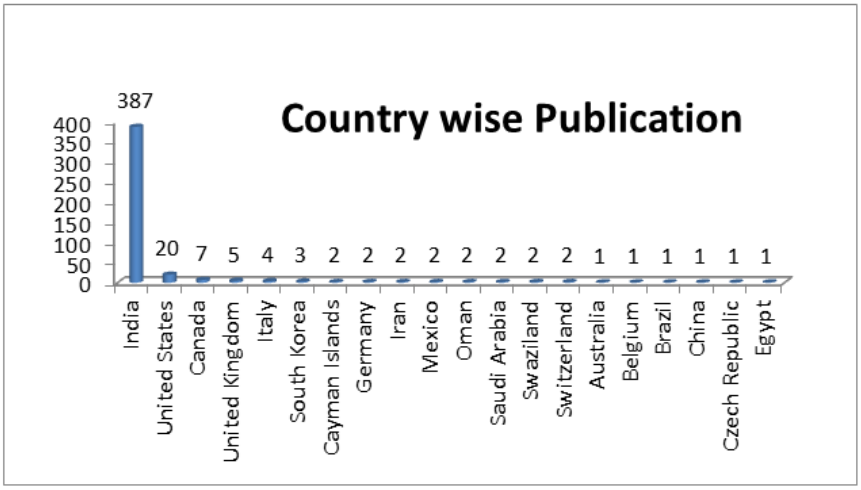

Fig-11:

The above table describes top 20 country-wise Publication Growth of Library and Information Science Research in India from 2008 to 2016. The utmost productive country is India (100%), United States has occupied second place (5.17%), Canada (1.81%) is taken the third position followed by United Kingdom, Italy, South Korea, Cayman Islands, Germany and other countries.

Table-8: Affiliation wise Publication (Top 20)

S. No	Affiliation	No of Record	Percentage
1	University of Delhi	15	3.88
2	University of Kashmir	12	3.10
3	Banaras Hindu University	10	2.58
4	Aligarh Muslim University	9	2.33
5	University of Pune	8	2.07
6	Sambalpur University	7	1.81
7	Jawaharlal Nehru University	7	1.81
8	National Chemical Laboratory India	6	1.55
9	University of Mysore	6	1.55
10	Alagappa University	6	1.55
11	Jadavpur University	6	1.55
12	Anna University	6	1.55
13	University of Calcutta	6	1.55
14	Cochin University of Science and Technology	6	1.55
15	Amrita Vishwa Vidyapeetham University	6	1.55
16	Kuvempu University	5	1.29
17	National Botanical Research Institute India	5	1.29
18	Vidyasagar University	5	1.29
19	Tata Consultancy Services India	5	1.29
20	Indian Statistical Institute Bangalore	5	1.29

The above table describes top 20 affiliation-wise Publication Growth of Library and Information Science Research in India from 2008 to 2016. The highest productive institution is University of Delhi (3.88%), the University of Kashmir has occupied second place (3.110%), Banaras Hindu University (2.58%) is taken the third position followed by Aligarh Muslim University, University of Pune, Sambalpur University, Jawaharlal Nehru University, National Chemical Laboratory India and other institutions.

CONCLUSION

The analysis has identified 81 articles were published in 2015 out of 387 publications and has the first position, It is observed that the RGR value has been gradually decreased from 2008 to 2012 (2.94 – 0.26), then it has been from 2013-2016 (0.36-0.19). Doubling time value also been increased from 2008-2012(0.24-2.69). The publication means value is 43, citation mean is 214.55, multi-authored contribution is more predominant than single-author contributions, when we see the type of articles published during the study period, it is noted that articles are highly referred

by the contributors (65.37%), The most productive author is Mukherjee, B. with 11 papers (6.875%).). The most productive journal is Annals of Library And Information Studies (9.82%), The greatest productive subject is Social Sciences (33.81%), The utmost productive country is India (100%), The highest productive institution is University of Delhi (3.88%),I strongly believe that the study will be a helpful resource to the LIS scholars and information scientist as well as LIS Professionals.

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