

## RESEARCH ON DIGITAL LIBRARIES: A SCIENTOMETRIC ASSESSMENT OF INDIA'S PUBLICATIONS DURING 2000-19

*P. Visakhi,  
B.D.Kumbar  
J. Shivarama*

### **P. Visakhi**

Indian Institute of Science  
Education and Research,  
Mohali, Punjab  
[visakhi@iisermohali.ac.in](mailto:visakhi@iisermohali.ac.in)

### **B.D.Kumbar**

Professor and Chairman,  
Department of Library and  
Information Science, Karnatak  
University, Dharwad, 580 003  
Email: [bdkumbar@yahoo.com](mailto:bdkumbar@yahoo.com)

### **J. Shivarama**

Tata Institute of Social  
Sciences, Mumbai,  
Email: [j.shivarama@tiss.edu](mailto:j.shivarama@tiss.edu)

The study presents a bibliometric assessment of 681 Indian publications on research in digital libraries, as indexed in Scopus database during 2000-19. India's research output on digital library registered 36.95% annual average growth, registered an averaged citation impact to 4.07 citations per paper, accounted for 11.75% share of internationally collaborative papers and ranked 6<sup>th</sup> highest in global publication share (3.53%). Computer science accounted for the highest publications share (60.94%) in India's research output on digital libraries, followed by social sciences (33.33%), engineering (25.99%), mathematics (13.80) and arts & humanities (6.02%) during 2000-19. About 231 organizations and 262 authors contributed to India's research output on digital libraries during 2000-19. The top 20 most productive Indian organizations and authors accounted for 36.71% and 19.24% national publication share and 39.42% and 19.10% national citation share respectively during 2000-19. Of the total publications, only 269 papers are published in 129 journals. The top 15 journals accounted for 55.76% share of national output in journal medium during 2000-19. *Library Philosophy & Practice* contributed the highest number of papers (28) in India's research on digital libraries, followed by *Electronic Library* (27 papers), *DESIDOC Journal of Library and Information Technology* (22 papers),

**Keywords:** Digital library research, India, Publications, Scientometrics, Bibliometrics

## INTRODUCTION

With the advent of electronic publishing and internet technologies, digital libraries have evolved as repositories of digital objects that can integrate text, images, audio, video or other media formats. The digital library allows remote access to digital resources through user-friendly interface<sup>[1]</sup>. By design, digital libraries function both as repositories of digital collections and also as provider of associated digital data services

for access and retrieval. Any digital library comprises components such as: i) digital resources, ii) metadata, iii) links to digital resources, iv) user interface, and v) network connectivity.

Digital library technologies have transformed physical libraries into hybrid libraries as well as paved the way for creation of other types of digital libraries like virtual library, institutional repositories, and digital archives. Initially digital libraries were developed as standalone libraries comprising internally generated databases of digital resources stored on a central server. Representative examples of standalone digital libraries (national and state) include Digital Library of India, National Digital Library of India, and Panjab Digital Library. INDEST (Indian National Digital Library in Engineering Sciences and Technology) is a typical example of a federated digital library. Fundamentally, INDEST is a consortium of autonomous academic libraries in India that encourages access to commonly subscribed journals on a single platform. Harvested digital libraries are basically metadata oriented libraries. Internet Public Library 2 is a typical example of a harvested digital library that allows users to search its various databases and digital libraries. Institutional repositories of National Institute of Oceanography, National Chemical Laboratory are representative examples of Indian efforts of harvested digital libraries constructed using DSPACE digital software.

The drivers of change to DLs are computer professionals, and library professionals connected with digital library technologies. On a global level, advances in e-publishing, digital

technologies and technological applications have enabled digital libraries and digitization to play an important role in preserving and disseminating knowledge in areas like art and culture, education, science and technology, literature and humanities, media and entertainment, and history <sup>[2]</sup>.

In India, a number of digital library initiatives and digitization programs are already in operation across the country. Most of the digital library initiatives are government funded. Glimpses of these digital library programs can be found in a number of review papers published from India over the last 15 years <sup>[3-14]</sup>. Research interests in creating digital library systems, metadata standards, document identifier standards, search and retrieval systems, federated search engines, digital content creation, digitization, digital preservation, copyright and licensing, etc have given rise to significant growth in digital library technologies. Research studies are growing in volume on topics like digital library use, user studies, information seeking behaviour, and digital library impact on education and research. Given these ongoing research trends and development it is considered appropriate that a bibliometric study is undertaken on digital libraries in India to ascertain India's research status in the subject.

## **LITERATURE REVIEW**

Few studies have been undertaken in the past on bibliometric assessment of digital libraries research output both at national and international level. At the international level, Singh, Mittal and Ahmad<sup>[15]</sup> examined global digital library output (1000 records) indexed in LISA Plus database to study the growth characteristics, authorship

patterns, authors' productivity and important contributors, language-wise and year-wise distribution of articles, distribution of journals by country of publication, core journals in a subject area, and indexing term frequencies. Chandrashekara, Mulla, Harinarayana and Ramachandra<sup>[16]</sup> analyzed global digital libraries output (454 records) indexed in Emerald databases during April 1991-March 2009. Lee, Kim and Kim<sup>[17]</sup> examined the digital library research domain, using LISA database during 1994- to 2008. Gupta et al<sup>[18]</sup> analyzed 12104 global publications on digital library research, indexed in Scopus database during 2007-16. Sood, Tiwari and Khanna<sup>[19]</sup> examined growth and development of global digital library publications (17268 records) during 2006-15, using Scopus database. Mahesh and Mittal<sup>[20]</sup> reviewed 63 past Indian published studies on digital libraries. Most articles focus on developing digital libraries and digital collections except for a few studies on copyright issues and management of digital libraries. No studies have touched upon issues such as digital rights management, security and digital library policies. At the national level, Dhawan et al<sup>[21]</sup> examined 424 Indian publications in the domain of digital library research in India, using few bibliometric indicators during 2007-16. The present study is an extended version of the study undertaken by Dhawan et al on digital library research in India, by covering the period of 20 years (2000-19).

### **OBJECTIVES OF THE STUDY**

The objective of the study is examine India's research on digital libraries during 2000-19, using publications data indexed in the Scopus database.

In particular, the focus is study the India's growth, distribution of Indian research output by document and source type, global publication share, citation impact per paper, the share of international collaborative publications and of leading collaborating partner countries, distribution by broad subject areas, publication productivity and citation impact of top 20 top organizations and authors and the identification of modes of communication in research.

### **METHODOLOGY**

The digital library research output from India organizations was retrieved and downloaded from the Scopus database (<http://www.scopus.com>) covering the 20 years period 2000-19. For the retrieval of relevant publications, the search strategy used is based on keyword search. Keyword "digital librar\*" was placed in "Keyword tag" and "Article Title tag" and the search was confined to the publication year from 2000 to 2019. This search strategy was first used for downloading global output on digital libraries. For searching Indian publications data, the main search strategy was refined by "India" as the search term in the "affiliating country tag". The distribution of resultant publications output were classified on several parameters such as publication-year, document type, source type, language-wise, subject-wise, keywords, source title, authorship by personal authors and by organizations, and distribution of international collaborative publications and also leading collaborative countries using various tags in Scopus database. The study used various bibliographical indicators to assess and understand the growth dynamics of India's

research digital libraries. Citations to publications was collected from the date of publications till 25 February 2020.

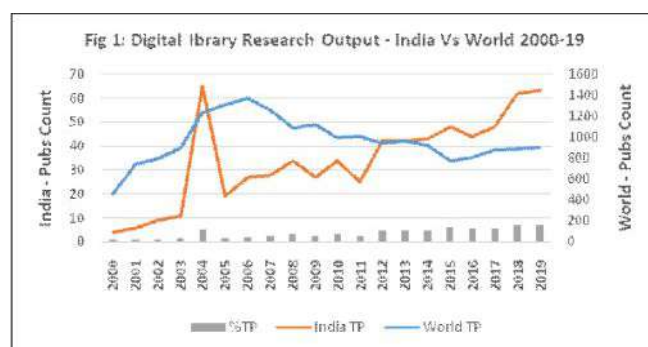
KEY(digital libr\*) OR TITLE(digital libr\*) AND PUBYEAR > 1999 AND PUBYEAR < 2020 (KEY(“digital librar\*”) OR TITLE(“digital librar\*”)) AND PUBYEAR > 1999 AND PUBYEAR < 2020 AND ( LIMIT-TO (AFFILCOUNTRY,”India”))

### ANALYSIS AND RESULTS

The global and India’s research on digital libraries published 19300 and 681 publications in 20 years during 2000-19, as indexed in Scopus database. Their annual output registered 4.91% and 36.95% average growth rate, up from 456 and 4 publications in the year 2000 to 899 and 63 publications in the year 2019. Similarly, their 10-year cumulative output registered absolute growth of -12.09% and 96.09% from 2000-09 to 2010-19. India is ranked at 6<sup>th</sup> position in global output and its global publication share was 3.53% during 2000-19, which increased from 2.24% (2000-09) to 5.0% (2010-19). India’s publications on digital libraries recorded a citation impact per paper (CPP) of 4.07, which decreased from 6.33 CPP (2000-09) to 2.91 CPP (2010-19) (Table 1, Fig 1). Of the total India’s output in digital libraries by document type, 55.21% (376) was published as conference papers, 36.71% (250) as articles, 4.85% (33) as book chapters, 2.64% (18) as reviews, 0.15% (1 each) as book, editorial, letter and note.

**Table 1: World and Indian Publication Output in Research on Digital Libraries during 2000-19**

Year of Publication	World	India					
	TP	TP	TC	%TP	CPP	ICP	ICP(%)
2000	456	4	50	0.88	12.50	1	25.00
2001	741	6	66	0.81	11.00	1	16.67
2002	794	9	172	1.13	19.11	3	33.33
2003	895	11	50	1.23	4.55		0.00
2004	1238	65	102	5.25	1.57	1	1.54
2005	1309	19	209	1.45	11.00	3	15.79
2006	1371	27	179	1.97	6.63	5	18.52
2007	1258	28	122	2.23	4.36	2	7.14
2008	1089	34	199	3.12	5.85	3	8.82
2009	1120	27	307	2.41	11.37	4	14.81
2010	991	34	140	3.43	4.12	4	11.76
2011	1002	25	104	2.50	4.16	1	4.00
2012	938	42	156	4.48	3.71	6	14.29
2013	957	42	114	4.39	2.71	8	19.05
2014	915	43	153	4.70	3.56	8	18.60
2015	773	48	129	6.21	2.69	5	10.42
2016	798	44	123	5.51	2.80	7	15.91
2017	872	48	218	5.50	4.54	8	16.67
2018	884	62	100	7.01	1.61	4	6.45
2019	899	63	77	7.01	1.22	6	9.52
2000-09	10271	230	1456	2.24	6.33	23	10.00
2010-19	9029	451	1314	5.00	2.91	57	12.64
2000-19	19300	681	2770	3.53	4.07	80	11.75



### International Collaboration

India’s share of The international collaborative papers (ICP) share in India’s national output on digital libraries was 11.75%

(80 papers) during 2000-19, which increased from 10.0% in 2000-09 to 12.64% in 2010-19 (Table 1). The 80 international collaborative papers together received 687 citations, averaging to 8.59 citations per paper, much higher over India's average. Among the leading countries contributing to international collaborative papers in India's output, USA topped the list with 37.50% national share (30 papers), followed by U.K. (12.50% and 10 papers), Japan (8.75% and 7 papers), Singapore (7.50% and 6 papers each), Australia (6.25% and 5 papers), etc. during 2000-19.

### Publication Profile of Top 10 Countries

The global digital libraries research have been found to spread in 90 countries. However 75.19% of the global output in this field comes from just 10 most productive countries. The USA leads in global output with 30.93% global publications share, followed distantly by China (8.85% share), U.K. (7.40%), Germany (6.96%), Italy (5.12%) and other five countries from 2.81% to 3.53% during 2000-19. The global publication share increased in China, India, Germany and Italy (from 1.68% to 6.34%), as against decrease in all other countries from 0.07% to 10.87% from 2000-09 to 2010-19 (Table 2, Fig 2).

**Table 2: Global Publication Output & Share of Top 10 Most Productive Countries in Digital Libraries during 2000-19**

Sl. No.	Country Name	Total Publications			Share of Publications		
		2000-09	2010-19	2000-19	2000-09	2010-19	2000-19
1	USA	3699	2270	5969	36.01	25.14	30.93
2	China	605	1104	1709	5.89	12.23	8.85
3	U.K.	905	524	1429	8.81	5.80	7.40
4	Germany	597	746	1343	5.81	8.26	6.96
5	Italy	445	543	988	4.33	6.01	5.12
6	India	230	451	681	2.24	5.00	3.53
7	Spain	400	281	681	3.89	3.11	3.53
8	France	364	259	623	3.54	2.87	3.23
9	Japan	294	252	546	2.86	2.79	2.83
10	Canada	297	246	543	2.89	2.72	2.81
	Total of top 10 countries	7836	6676	14512	76.29	73.94	75.19
	India's total	10271	9029	19300			

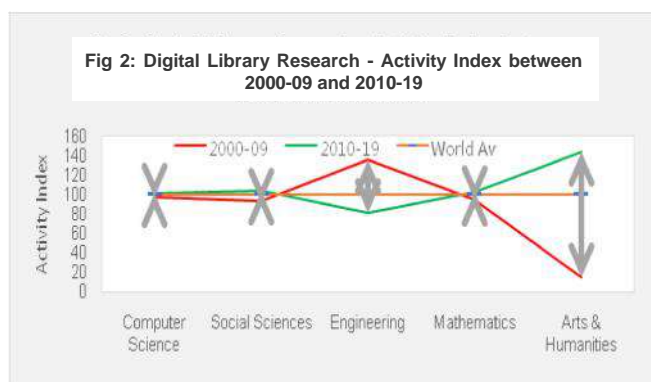
## Subject-Wise Distribution of Research Output

As per the Scopus database classification, the India's publication output on digital libraries research is distributed across 20 sub-fields during 2000-19, but we have presented here output of only top 5 sub-fields during 2000-19 (Table 3). Computer science accounted for the highest publications share (60.94%), followed by social sciences (33.33%), engineering (25.99%), mathematics (13.80%) and arts & humanities (6.02%) during 2000-19. As reflected in computed activity index values from 2000-09 to

2010-19 (world average activity index of a given subject is taken as 100), the sub-fields showing increase in activity were computer science (from 97.03 to 101.51), social sciences (from 92.61 to 103.77), mathematics (from 94.50 to 102.81) and arts & humanities (from 14.44 to 143.63), in contrast to decrease only in subfield engineering (from 135.50 to 81.90) from 2000-09 to 2010-19. Computer science registered the highest citation impact per paper of 4.74 as against the least (1.24) by arts & humanities during 2000-19 (Table 3).

**Table 3: Subject-Wise Breakup of Indian Publications in Digital libraries Research in India during 2000-19**

Sl. No.	Subject*	Number of Papers (TP)			Activity Index		TC	CPP	%TP
		2000-09	2010-19	2000-19	2000-09	2010-19	2000-19		
1	Computer Science	136	279	415	97.03	101.51	1968	4.74	60.94
2	Social Sciences	71	156	227	92.61	103.77	1031	4.54	33.33
3	Engineering	81	96	177	135.50	81.90	436	2.46	25.99
4	Mathematics	30	64	94	94.50	102.81	246	2.62	13.80
5	Arts & Humanities	2	39	41	14.44	143.63	51	1.24	6.02
	Total Indian Output	230	451	681			2770	4.07	
• There is overlapping of literature covered under various subjects TP=Total Papers; TC=Total Citations; CPP=Citations Per Paper									



## Significant Keywords

A number of important keywords (43) have been identified from the literature on digital

libraries in India, which give some idea about the trends of research in the field. These keywords are arranged in the decreasing order of appearance in the literature (Table 4)

## Profile of Top 20 Indian Organizations

231 organizations unevenly participated in India's research on digital libraries during 2000-19: 201 contributed 1-5 papers each, 21 organizations 6-10 papers each, 6 organizations 11-20 papers each and 3 organizations 21-32 papers each. The publication output of top 20

**Table 4: List of Significant Keywords appearing in Literature on Digital Libraries in India during 2000-19**

Sl. No.	Keyword	Frequency	Sl. No.	Keyword	Frequency	Sl. No.	Keyword	Frequency
1	Digital Library	609	16	Computational Linguists	23	31	Query Processing	11
2	Information Retrieval	89	17	Digital Storage	23	32	Content Based Retrieval	11
3	Information Services	73	18	Natural Language Processing Systems	22	33	E-Resources	10
4	Libraries	62	19	Ontology	21	34	Online Searching	9
5	Search Engines	53	20	Semantic Web	19	35	Open Access	9
6	Database Systems	45	21	Text Processing	19	36	Digital Image Storage	8
7	World Wide Web	35	22	Virtual Reality	17	37	Bibliographical Retrieval Systems	7
8	Semantics	33	23	Cloud Computing	14	38	Digital Library Systems	7
9	Metadata	31	24	Electronic Document Exchange	14	39	Digital Repositories	7
10	Information Management	29	25	Social Networks (Online)	14	40	Interoperability	7
11	Computer Software	28	26	Digital Preservation	13	41	Neural Networks	7
12	Internet	27	27	Library Automation	13	42	Query Language	7
13	Information Retrieval Systems	25	28	Websites	13	43	Digital Services	7
14	Open Source Software	25	29	Library Management	12			
15	Information Dissemination	24	30	Institutional Repositories	11			

Indian organizations in digital libraries research varied from 7 to 32 publications and together they contributed 36.71% (250) national publication share and 39.42% (1092) national citation share during 2000-19 (Table 5). On further analysis it was observed that:

- ❖ **Six organizations** registered publications output above the group average of 12.5: Indian Institute of Technology, Kharagpur (32 papers), University of Mysore (22 papers),

International Institute of Information Technology, Hyderabad (21 papers), Anna University, Chennai (19 papers), Indian Statistical Institute, Kolkata (17 papers) and University of Delhi (13 papers);

- ❖ **Eleven organizations** registered citation impact per paper and relative citation index above the group average of 4.37 and 1.07: Indian Institute of Technology, New Delhi (8.25 and 2.03), International Institute of

**Table 5: Profile of Top 20 Organizations in Research on Digital Libraries Research in India during 2000-19**

Sl. No.	Name of the Organization	TP	TC	CPP	HI	ICP	%ICP	RCI
1	Indian Institute of Technology, Kharagpur	32	172	5.38	5	4	12.50	1.32
2	University of Mysore	22	97	4.41	4	4	18.18	1.08
3	International Institute of Information Technology, Hyderabad	21	159	7.57	6	5	23.81	1.86
4	Anna University, Chennai	19	38	2.00	3	1	5.26	0.49
5	Indian Statistical Institute, Kolkata	17	38	2.24	3	1	5.88	0.55
6	University of Delhi	13	89	6.85	7	2	15.38	1.68
7	Jadavpur University, Kolkata	12	17	1.42	2	2	16.67	0.35
8	Indian Institute of Technology, New Delhi	12	99	8.25	4	1	8.33	2.03
9	Indian Statistical Institute, Bangalore	12	76	6.33	5	1	8.33	1.56
10	University of Kashmir, Srinagar	10	12	1.20	2	0	0.00	0.29
11	Indian Institute of Technology, Bombay	9	28	3.11	3	2	22.22	0.76
12	Panjab University, Chandigarh	9	21	2.33	3	0	0.00	0.57
13	Indian Institute of Technology, Roorkee	9	56	6.22	4	1	11.11	1.53
14	Amrita VishwaVidyapeetham	9	8	0.89	1	0	0.00	0.22
15	Banaras Hindu University	8	6	0.75	1	2	25.00	0.18
16	Aligarh Muslim University	8	58	7.25	2	0	0.00	1.78
17	Indian Institute of Engineering Science & Technology, Shibpur	7	32	4.57	2	0	0.00	1.12
18	Information & Library Network Centre, Ahmedabad	7	33	4.71	3	0	0.00	1.16
19	Indian Institute of Science, Bangalore	7	35	5.00	3	0	0.00	1.23
20	Jaypee Institute of Information Technology	7	18	2.57	2	3	42.86	0.63
	Total of 20 organizations	250	1092	4.37	3.25	29	11.60	1.07
	Total of India	681	2770	4.07				
	Share of top 20 organizations in India total output	36.71	39.42					
TP=Total Papers; TC=Total Citations; CPP=Citations Per Paper; HI=h-index; ICP=International Collaborative Papers; RCI=Relative Citation Index								

Information Technology, Hyderabad (7.57 and 1.86), Aligarh Muslim University (7.25 and 1.78), University of Delhi (6.85 and 1.68), Indian Statistical Institute, Bangalore (6.33 and 1.56), Indian Institute of Technology, Roorkee (6.22 and 1.53), Indian Institute of Technology, Kharagpur (5.38 and 1.32), Indian Institute of Science, Bangalore (5.0 and 1.23), Information & Library Network Centre, Ahmedabad (4.71 and 1.16), Indian Institute of Engineering Science & Technology, Shibpur (4.57 and 1.12) and University of Mysore (4.41 and 1.08).

### Profile of Top 20 Authors

292 authors unevenly participated in India's research on digital libraries during 2000-19: 282 authors 1-5 papers each, 9 authors 6-10 papers each and 1 author 12 papers. The publication output of top 20 Indian authors in digital libraries research varied from 4 to 12 publications and together they contributed 19.24% (131) national publication share and 19.10% (529) national citation share during 2000-19 (Table 6). On further analysis it was observed that:

- **Eight authors registered** publications output above the group average of 6.55: S.R. Urs (12 papers), J.Arora (9 papers), P.K. Bhowmick, P. Goyal and A.Mukherjee (9 papers each), M.Singh and C.V. Jawahar (8 papers each) and V.Varma (7 papers);
- **Eight authors registered** citation per paper and relative citation index above the group average (4.04 and 0.99) of all authors: C.V. Jawahar, B.Chanda, S.P.Chowdhury and A.K.Das (6.80 and 1.67 each), S.R. Urs (6.67 and 1.64), A.Mukherjee (5.89 and 1.45), P. Goyal (5.78 and 1.42) and Arora (5.11 and 1.26).

### Medium of Research Communication

Of the total Indian output in the domain of digital libraries research distributed by source type, 43.91% (299 papers) appeared conference proceedings, 39.50% (269) in journals, 11.16% (76) in book series, 5.14% (35) as books and 0.29% (2) as trade publications. 269 papers appeared in 129 journals. Of the total journals, 121 published 1-5 papers each, 4 journals 6-10 papers each and 4 journals 11-28 papers. The top 15 most productive journals accounted for 3 to 28 papers each in digital library research and together accounted for 55.76% share (150 papers) of total output in journal medium during 2000-19, which share increased from 55.43% in 2000-09 to 55.93% in 2010-19. *Library Philosophy & Practice* tops the list as the journal with highest number of papers (28) in digital library, followed Electronic Library (27 papers), DESIDOC Journal of Library and Information Technology (22 papers), International Information and Library Review (14 papers), Program (10 papers), etc. during 2000-19 (Table 7).

**Table 6: Profile of Top 20 Authors in Research on Digital Libraries in India during 2000-19**

Sl. No.	Name of the Author	Affiliation of the Author	TP	TC	CPP	HI	ICP	ICP(%)	RCI
1	S.R. Urs	University of Mysore	12	80	6.67	3	1	8.33	1.64
2	J.Arora	Information & Library Network (INFLIBNET), Ahmedabad	9	46	5.11	4	0	0.00	1.26
3	P.K. Bhowmick	Indian Institute of Technology, Kharagpur	9	4	0.44	1	0	0.00	0.11
4	P. Goyal	Indian Institute of Technology, Kharagpur	9	52	5.78	3	0	0.00	1.42
5	A.Mukherjee	Indian Institute of Technology, Kharagpur	9	53	5.89	3	1	11.11	1.45
6	M.Singh	Indian Institute of Technology, Kharagpur	8	11	1.38	2	0	0.00	0.34
7	C.V. Jawahar	International Institute of Information Technology, Hyderabad	8	120	15.00	5	2	25.00	3.69
8	V.Varma	International Institute of Information Technology, Hyderabad	7	14	2.00	2	0	0.00	0.49
9	P.Bhattacharyya	Indian Institute of Technology, Patna	6	7	1.17	2	0	0.00	0.29
10	A.Ekbal	Indian Institute of Technology, Patna	6	6	1.00	2	0	0.00	0.25
11	B.Chanda	Indian Statistical Institute, Kolkata	5	34	6.80	3	0	0.00	1.67
12	S.P.Chowdhury	Indian Statistical Institute, Kolkata	5	34	6.80	3	0	0.00	1.67
13	A.K.Das	Indian Statistical Institute, Kolkata	5	34	6.80	3	0	0.00	1.67
14	P.P.Das	Indian Institute of Technology, Kharagpur	5	1	0.20	1	0	0.00	0.05
15	T.Ghosal	Indian Institute of Technology, Patna	5	4	0.80	1	0	0.00	0.20
16	S.Saha	Indian Institute of Technology, Patna	5	7	1.40	2	0	0.00	0.34
17	D.K.Sanyal	Indian Institute of Technology, Kharagpur	5	1	0.20	1	0	0.00	0.05
18	M.Sharma	University of Mysore	5	11	2.20	2	0	0.00	0.54
19	G.A.A. Alawi	Aligarh Muslim University	4	5	1.25	2	0	0.00	0.31
20	A.Bagchi	Indian Statistical Institute, Kolkata	4	5	1.25	1	0	0.00	0.31
			131	529	4.04	2.3	4	3.05	0.99
			681	2770	4.07				
			19.24	19.10					

**Table 7: Top 15 Most Productive Journals in Research on Digital Libraries Research in India during 2000-19**

Sl. No.	Name of the Journal	Number of Papers		
		2000-09	2010-19	2000-19
1	Library Philosophy & Practice	2	26	28
2	Electronic Library	23	4	27
3	DESIDOC Journal of Library and Information Technology	0	22	22
4	International Information and Library Review	10	4	14
5	Program	7	3	10
6	Annals of Library & Information Studies	0	8	8
7	Journal of Molecular Graphics & Modeling	0	8	8
8	Library High Tech News	3	4	7
9	Computational Biology & Chemistry	0	5	5
10	Current Science	0	4	4
11	Indian Journal of Science & Technology	3	1	4
12	International Journal of Applied Engineering Research	0	4	4
13	Journal of Academic Librarianship	0	3	3
14	Library High Tech	0	3	3
15	Online Information Review	3	0	3
	Total	51	99	150
	India's Total	92	177	269
	Share of 15 journals in India's total	55.43	55.93	55.76

## SUMMARY AND CONCLUSION

This study examines the India's research output on digital libraries, based on a indexed publications (681) in Scopus database in 20 years during 2000-19. The digital libraries research in the country registered 36.95% annual average growth rate compared to 4.91% growth in global digital library research output during 2000-19. India's ten-year cumulative publication output registered 96.09% absolute growth compared to negative growth of -12.09% global publications output in this area from 1990-09 to 2010-19. India ranked at 6<sup>th</sup> highest position on global publications output and contributed 3.53% share in global output during 2000-19. It registered an averaged citation impact to 4.07 citations per

publication and contributed 11.75% share of its national output to internationally collaborative papers. USA is the leading collaborative country with its 37.50% share of international collaborative papers, followed by U.K. (12.50% and 10 papers), Japan (8.75% and 7 papers), Singapore (7.50% and 6 papers each), Australia (6.25% and 5 papers), etc. during 2000-19.

Computer science contributed the highest publications share (60.94%), among various subjects, in India's research on digital library, followed followed by social sciences (33.33%), engineering (25.99%), mathematics (13.80) and arts & humanities (6.02%) during 2000-19

231 organizations and 282 authors participated in India's research on digital libraries during 2000-19. Of these, the top 20 organizations and authors together contributed 36.71% and 19.24% share in national publication output and 39.42% and 19.10% share in national citation output during 2000-19.

The leading organizations in the domain of India's research on digital library include Indian Institute of Technology, Kharagpur (32 papers), University of Mysore (22 papers), International Institute of Information Technology, Hyderabad (21 papers), Anna University, Chennai (19 papers), Indian Statistical Institute, Kolkata (17 papers) and University of Delhi (13 papers) during 2000-19. Similarly, the leading authors participation in research on this domain include S.R. Urs (12 papers), J.Arora (9 papers), P.K. Bhowmick, P. Goyal and A.Mukherjee (9 papers each), M.Singh and C.V. Jawahar (8 papers each) and V.Varma (7 papers) during the same period. *Library Philosophy & Practice* contributed the highest number of papers (28) in digital library, followed by *Electronic Library* (27 papers), *DESIDOC Journal of Library and Information Technology* (22 papers), *International Information and Library Review* (14 papers), *Program* (10 papers), etc. during 2000-19.

From the above analysis, it was observed that digital libraries research is still not a priority area in the discipline of library and information science. Most of research in India has come from computer science departments, rather than library science departments, of Indian organizations. The research activity in India is also confined only to a select Indian organizations. Only one third of

the research output and one fifth of the citation output in 20 years came from top 20 organizations. The global publications share of the country being just 3.53%. There is an urgent need to encourage and promote digital libraries research in India by providing adequate funding support from the government, which in turn will improve both the quantity of output as well as quality of research.

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