

## Library and information science research trends in India

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The study attempts to trace the research trends in library and information science in India during the period Jan 1990 – June 2010 as reflected through scholarly journals. Co-word analysis is used to identify the core research areas by quantifying the frequency of occurrence and the analysis of co-occurrence of 4735 descriptors assigned to 1408 journal articles of Indian authors indexed in Library and Information Science Abstracts (LISA) database. The Kamada-Kawai algorithm is used for constructing the network of relations between descriptors and making spatial distribution of these. The result shows a research trend focusing on library practice, user services, cataloguing, user studies, university libraries, public libraries, information retrieval, library education, citation analysis, bibliometrics; and moving towards copyright, library technology, digital libraries, institutional repository, CD-ROM databases, and electronic periodicals. The findings indicate that open access, Web 2.0, World Wide Web, Internet, access to information, etc are some of the new areas of that LIS researchers are interested in.

### Introduction

Research is a means of continuously developing a discipline. It endows a discipline with the ability to utilize the knowledge generated in other disciplines. It makes use of scientific methods. In other words, research means systematic investigations to establish facts and reach new conclusions. In the context of library and information science, Tejomurthy and Kumar<sup>1</sup> defined research as the collection and analysis of original data on a problem of librarianship done within library schools according to scientific and scholarly standards.

Libraries and library schools in India have been carrying out research activities on varied topics of library and information science. Dr. S.R. Ranganathan, the father of library science laid the foundation of research in India with his pioneering efforts. He introduced formal education in library and information science discipline in universities. However, the need of dedicated research centres to carry out specialized research has been a subject of discussion. Kanbur<sup>2</sup> felt the need of a centre of advanced study to investigate all aspects of library and information science. Mathew<sup>3</sup> while examining the management, operation, and services of libraries, proposed the establishment of an Indian council of library and information services, research and training to improve the university librarianship courses for

managing and operating libraries efficiently. Subba Rao<sup>4</sup> also called for the formation of an Institute of Advanced Studies in Library Science which can start and coordinate research in libraries. Bhagi<sup>5</sup> proposed an act for providing an integrated system of library, archives and information services and for the establishment, maintenance, organization and development of institutions, departments and centres in each state.

Sardana and Kumar<sup>6</sup> examined the need doctoral research in Indian library schools. They argued a case for carrying out library and information science research in universities and provisioning adequate financial resources and coordinating research activities in India. Mangla and Ranganathan<sup>7</sup> traced the recent trends and key factors contributing to the development of research in India and identified the areas that required attention of researchers.

To strengthen research in library and information science in India, among other things, it is also necessary to know about the areas of research currently being focused on and also identifying emerging areas of research.

There are many ways to identify the core research areas in library and information science. Several studies have been carried out on the research productivity in library and information science.

Bibliometric study of research output is the most commonly used research method in India. Most of these studies used bibliometric techniques such as citation analysis to analyze library and information science research. One of the well known relational bibliometric methods is co-word analysis.

Co-word analysis projects a specific visual representation of the data. It is known that keywords of an article describe its content. Two keywords co-occurring within the same article indicates a link between the topics to which they refer. The presence of many co-occurrences around the same word or pair of words points to a locus of strategic alliance within articles that may correspond to a specific theme. Thus, co-word analysis, an example of a graphical modeling technique illustrates associations between keywords by constructing multiple networks that highlight associations between keywords. Co-word analysis reveals patterns and trends in a specific discipline by measuring the co-occurrence of keywords representative of relevant publications produced in this area.

In this study, co-word analysis method is used because collection of descriptors can provide an overview of the characters of general contents in the particular field and inter-relationship of topics in the field. Therefore, a network has been constructed for reflecting the relations between these descriptors and their spatial distribution. The study does not reflect the quality of research as it is based on the co-word analysis of descriptors assigned to research articles published in journals. The analysis would examine to what extent the research has been done in India and identifies the most prominent area of research, core as well as arid research areas in India, and present an updated view of research areas to interested persons, researchers, professionals, etc.

### **Literature review**

Many research studies have used co-word analysis as an important method to construct conceptual network in different fields. While there are many international studies on co-word analysis, here the focus is only on Indian studies.

Over the last decades, there have been many studies on research productivity in several disciplines viz., agriculture, physics, chemistry, etc. Research studies in library and information science have attracted

many library and information science researchers. Most of the studies investigated the general trends and characteristics of theses and dissertations. There has been an increasing interest in using bibliometric information for assessing or monitoring research activities. Assessment of research activity is necessary for measuring research performance. Doctoral dissertation is one of the indications of research productivity<sup>8</sup>.

Research trends of doctoral research programmes in library and information science and related topics in Indian universities have been analyzed from the year 1950 onwards to find out the growth pattern, productivity of the universities, types of work, research areas, etc<sup>9-11</sup>. Varalakshmi<sup>12</sup> analyzed doctoral research programmes by subject to assess the contributions to the development of a body of theory and applied aspects of the profession. Subject analysis revealed doctoral programmes oriented towards library practice resulting in the stagnation of the theoretical base of the discipline. This shows a need for future library and information science research in India to concentrate on theoretical issues Satija<sup>13</sup> identified major as well as arid areas of research and observed the irrelevance and lack of use of research results in library schools and libraries. This was attributed to a low quality of research work because of lack of cooperation and resources for research.

Several bibliometric studies of research papers have been carried out from time to time from different point of views. Suriya and Kalavathi<sup>14</sup> studied the impact of library resources on the research output using log-linear regression model. Maharana et al<sup>15</sup> measured the amount of web resources used for scholarly contributions in library and information science to study the dependency of library and information science professionals in India on web sources. Barooah<sup>16</sup> attempted bibliometric study of research papers to evaluate the collection development program of the Regional Research Laboratory library, Jorhat. Nazim and Ahmad<sup>17</sup> studied bibliometric analysis of scientific output in information literacy to trace research trends.

Bhattacharya and Basu<sup>18</sup> used co-word analysis for mapping a research area at the micro level. Suitable co-word pairs were constructed using words extracted from the titles in the condensed matter physics discipline. The word and co-word pairs were explored

to understand their linkages with each other through network analysis methods.

The review of the literature shows authors investigating research trends and characteristics in library and information science have mostly used doctoral theses and dissertations for their study and bibliometric techniques for data analysis. The review reflects that not many studies have been carried out using co- word analysis to study the LIS research trends in India. Therefore, there is a need for such type of studies.

### Methodology

Library and Information Science Abstracts (LISA), an international abstracting and indexing tool covers all areas of library and information science. The data for the study was downloaded from LISA database by executing a search on June 30, 2010. In quick search option, all the fields are being searched. The quick search in LISA database using the word “India” and date range from “earliest to current” resulted in 4489 records. The search records were first limited to articles published by Indian authors and further limited to published journal articles eliminating the papers presented in conference proceedings. All the refined result records were saved in tab-delimited text file and imported to Microsoft Excel 2003 for analysis. Finally, 1408 records pertaining to the period 1990 – June 2010 was used for the study. In general, co-word analysis is based on frequency analyses of co-occurrence of keywords extracted from titles, abstracts or text. But in this study, descriptors are selected from the descriptor field found in the records of LISA database.

Descriptor is the keyword/word used to describe the topics in the published literature. Eight hundred and sixteen descriptors in the 1408 bibliographic records indexed in LISA are analyzed. The absolute frequency of each descriptor and analysis of their co-occurrence are studied. An algorithm is applied to ignore descriptors with a frequency of co-occurrence less than ten so that analysis can be focused on most intense relationships. Ninety seven descriptors with frequency equal or more than ten are chosen for co-word analysis. The Kamada-Kawai algorithm is used for constructing the network of relations between the descriptors and making the spatial distribution of these.

It would be in order to mention a limitation of the LISA database. The records from India but that do not have the term ‘India’ mentioned in any of the fields of the LISA database would not have been captured in the search and consequently, some of the papers of Indian authors might have been missed due to limitation of indexing system of LISA database.

### Analysis

This is observed that 1408 journal articles of Indian authors are indexed with 4735 descriptors. The range of descriptors for each record varies from one to eleven. Table 1 shows the 97 most frequent descriptors assigned to these journal articles indexed in LISA.

From the Table 1, it can be seen that areas such as libraries, library collection, library practice and publication output have the focus of research in comparison to areas such as online catalogues, user training, etc.

The analysis of data shows a research trend focusing on libraries, periodicals, library technology, information technology, traditional library science, bibliometrics/ scientometrics and moving towards library materials, professional education, digital library, networks, and so on. Some new areas have emerged such as World Wide Web, Internet, information seeking behavior, online database, electronic publishing, knowledge management, searching, etc.

The analysis of co-occurrence frequency of descriptors identified 21 core research fields. Table 2 shows the list of core research fields with the main descriptors with which these are linked.

Table 2 shows that research studies are being carried out on bibliometrics/scientometrics/informetrics, library technology and public libraries extensively and moving towards areas such as information technology, digital libraries, library automation, distance learning, online information retrieval and knowledge management. Other areas of interest to researchers include agriculture, science & technology and research connected with scientific publications based on bibliometrics, scientometrics, informetrics or webometrics approaches.

Figure 1 shows the network of relationships between descriptors. The large core research area in the centre

Table 1—Frequency of descriptors included in journal articles indexed in Lisa database (1990- June 2010)

Descriptor	Freq.	Descriptor	Freq	Descriptor	Freq
University libraries	132	Electronic periodicals	34	Patents	17
Bibliometrics	110	Universities	33	Research libraries	17
Periodicals	98	Distance learning	30	Science	17
Libraries	94	Information seeking behaviour	29	Faculty	16
Library technology	89	Library staff	29	History	16
Public libraries	82	Theses	29	Learned society and institute libraries	16
Surveys	82	Library consortia	27	Library and information science periodicals	16
Information technology	72	Curricula	26	Organizations	16
Information work	63	Online information retrieval	26	Searching	16
Scientometrics	62	Scholarly publishing	26	Technical services	16
Librarianship	61	Technological university libraries	26	Collection development	15
Electronic media	58	Knowledge management	25	Finance	15
Citation analysis	53	Students	25	Institutional repositories	15
Agriculture	52	CDS/ISIS	23	Librarians	15
Scholarly publications	52	Rural areas	23	Physics	15
Library and Information science	50	Special libraries	23	Marketing	14
Professional education	50	Acquisitions	22	Open access	14
Library materials	49	Digitization	22	User satisfaction	14
Software	48	Information services	22	World Wide Web	14
Articles	47	Scientists	22	Research organizations	13
Digital libraries	47	Authors	21	User needs	13
Research	46	Computers	20	Bibliographic databases	12
Academic libraries	44	Evaluation	20	CD-ROM databases	12
Library management	41	Indian materials	20	Electronic publishing	12
Science & technology	41	Medicine	20	Social Sciences	12
Networks	40	Preservation	19	Community information. services	11
Use	40	Users	19	Databases	11
College libraries	39	Communications technology	18	Information literacy	11
Cooperation	39	Information communication	18	Medical libraries	11
Information centres	39	Research organization libraries	18	Online catalogues	10
User services	39	Author productivity	17	User training	10
User surveys	38	Developing countries	17		
Internet	35	Online databases	17		

of the network is university libraries closely linked together with a high relationship density with acquisition, electronic media, library management, collection development, periodicals, scholarly publications, libraries, librarianship, and library technology. Other core research areas are information technology, knowledge management, distance learning, digital library, etc. The reason could be that either people working in academic institutions are publishing or people are selecting topics related to university libraries most frequently.

## Discussion

An attempt is made to gain some insight in to the subject profile of research in library and information science through descriptors. The descriptors included in the records are examined to ascertain whether the published articles addressed library oriented and non-library oriented research. Topics/descriptors that have terminologies related to library and information science activity such as information services, library technology, etc. are considered under library- oriented research while topics/descriptors such as scientific

Table 2—Prominent descriptors connected in journal articles indexed in LISA database (1990-June 2010)

Main Area	Descriptor 1	Fr	Descriptor 2	Fr	Descriptor 3	Fr	Descriptor 4	Fr	Descriptor 5	Fr
Bibliometrics	Periodicals	32	Articles	20	Research	16	Scholarly publications	15	Science and technology	10
Library Technology	Networks	25	Computers	15	Software	15	Surveys	9	Information technology	8
Libraries	User surveys	18	Use	14	Public libraries	12	Surveys	11	University libraries	10
Scientometrics	Scholarly publications	15	Science and technology	7	Scholarly publishing	6	Research	5	Scientists	5
Librarianship	Professional education	16	Cooperation	15	Curricula	8	History	5	Library consortia	5
Information Work	Agriculture	6	User needs	6	Environment	5	Patents	5	User surveys	5
Lib & Inf Sci	Professional education	27	Curricula	10	Research	10	Distance learning	5	Surveys	5
Library Materials	Periodicals	12	Bibliometrics	11	Electronic media	6	University libraries	5	Use	5
Citation Analysis	Periodicals	19	Articles	11	Theses	10	Scholarly publications	6	Agriculture	5
Public Libraries	Rural areas	6	History	2	Surveys	2	Automation	1	College libraries	1
Library Management	Finance	9	College libraries	7	Leadership	6	Surveys	6	University libraries	6
Information Technology	Communications technology	8	Libraries	6	Rural areas	4	Agriculture	2	Digital divide	2
Library Staff	Surveys	9	University libraries	9	College libraries	3	Job satisfaction	3	Manpower planning	3
Digital Libraries	Digitization	3	Institutional repositories	2	Technological university libraries	2	Universities	2	Academic libraries	1
Electronic Media	University libraries	7	Faculty	3	Institutional repositories	2	Internet	2	Library consortia	2
Information seeking behaviour	University libraries	4	Internet	3	Health professionals	2	Researchers	2	Rural areas	2
Electronic Periodicals	Library consortia	5	Scholarly publications	3	Scholarly publishing	2	Universities	2	Agriculture	1
Acquisitions	Periodicals	11	Prices	4	Foreign materials	3	University libraries	3	Medical libraries	2
Distance Learning	Information technology	3	Libraries	3	Competencies	2	Courseware	2	Digital Libraries	1
Knowledge Management	Information technology	4	Information communication	2	Communication	1	Community information services	1	Competition	1
Online Inf Retrieval	Internet	6	Electronic media	3	University libraries	3	Online databases	2	Research libraries	2

and professional communication under non-library oriented research. In this study, the research carried out by the Indian library professionals and researchers are structured round the following areas:

- Bibliometrics, Scientometrics, Informetrics, webometrics
- Libraries, Librarianship, Library management

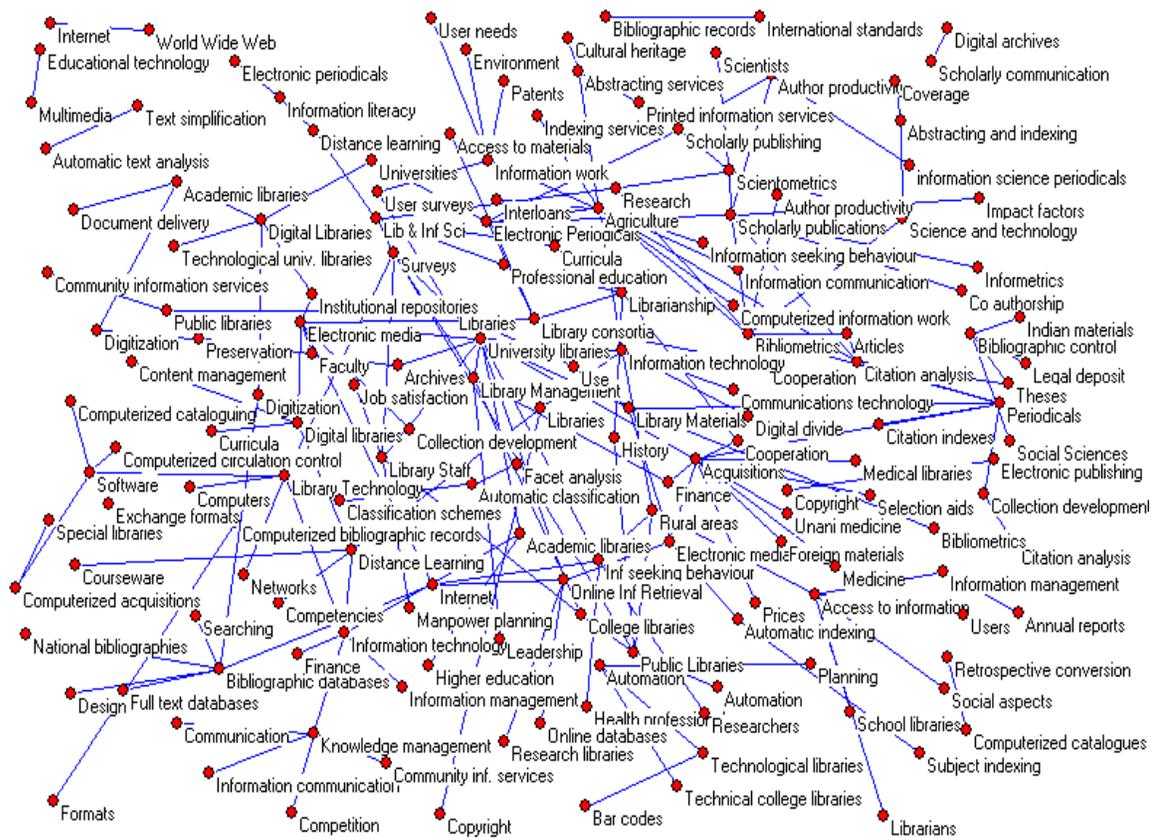


Fig. 1—Co-word network in journal articles indexed in LISA database (1990-June 2010)

- Library technology, Information technology
- Information work, Knowledge management
- Acquisition, collection development, technical services
- User, User services, user studies
- Others: Information literacy, Distance learning, copyright, educational technology, publishing, etc

The observation of the study is that a significant number of articles is related to library and information activities, which included acquisition, catalogues, circulation, collections, classification, information services, administration etc. There are also articles related to citation analysis, bibliometrics/scientometrics, distance learning, educational technology, information literacy, information seeking

behavior, etc. Bibliometrics/scientometrics is the most frequent topic for researchers in India. This can be attributed to easy availability of bibliographic databases to researchers. Other research topics are library technology, libraries and librarianship.

It was also found that many of the studies were based on data downloaded from bibliographic databases or were historical, conceptual or survey based. Research methods such as experimental or case or action, system/software analysis design are little used. Bibliometrics dominated the empirical research strategies followed by surveys, citation analysis and evaluation.

### Conclusion

The identification of the topics of high activity has important implications for strategic planning in research. The study demonstrates the application of

co-word analysis as a viable approach for identifying research trends. Co-word analysis visualizes the inter-relations of the keywords. The co-word analysis results have produced a great deal more than statistical artifact. The empirical results discussed in this study demonstrate the core areas of library and information science research in India.

The results of co-word analysis indicate that there is high interest in bibliometrics / scientometrics / informetrics, library system, university libraries. The results also suggest that there exist substantial activities in digitization, digital libraries and web 2.0. The study draws attention to areas of potential research in library and information science. It is hoped that the analytical approach presented in this work may provide an effective tool to research planners in assessing and monitoring development in research and identifying the gaps and weaknesses. More such studies based on other data sources are needed for uncovering characteristics of research activities in library and information science in India.

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