

Research trends in Library and information science

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Abstract : 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. the research productivity and impact of LIS teachers in Karnataka state through the citation analysis using Google Scholar. This study also analyzes the research productivity of schools and teachers of LIS to rank them. The study confined its scope to the present working LIS teachers in LIS schools of Karnataka state. In this paper, research productivity and impact of LIS teachers is carried out with number of articles published, number of citations received, h-index and i10 index. The data was collected from the Google Scholar database because it is a known fact that google scholar is a comprehensiveness database of scholarly literature. The collected data have been analysed and results are reported with appropriate inferences. 1199 research papers published by LIS teachers of Karnataka state. There are 11 research articles which have been cited 50 or more times each. Mysore University, Karnatak University and Karnataka State Women University occupy top three positions in the number of articles published. The study also examines the h-index raking of LIS teachers, Sampath Kumar B T occupy first position. Biradar B S, Kumbar B D and Biswanath Dutta occupy second position. The highest number of publications from LIS teachers is during 2014-2019(till July) is 38.20% and least is 4.34% during 1994-1998.

IndexTerms - Library and information science, LIS research, research trends, subject trends, topics trends.

I. INTRODUCTION

“Research is the only sure way to constantly expand the fund of human knowledge and solve the problems that face the mankind today”. Research in the field of applied sciences and professional disciplines has an added signification, since through research they develop better and advanced tools and techniques for their works which ultimately lead to improvement in service to and living condition of human being. Being a developing profession, the library and information science (LIS) does not have a very long and inspiring research tradition. The main objective of this study is to explore scholarly communication trends in the field of Library and Information Science Literature. A total of 28056 records from Web of Science database, Library and Information Science collected from 1989 to 2017, were analyzed. It examines based on its publication output in Library and Information Science during 1989-2017, based on several parameters, including the country annual average growth rate, global publication share, national publication output, etc. The study uses 29 years (1989-2017) publications data in Library and Information Science drawn from Web of Science Database. The analysis of trends of Ph.D level research work in library and information science(LIS) and related topics in Indian universities since the award of first Ph.D degree in 1950 showed that the years 1984 to 1988 were the period of Maximum growth in research. And the most popular subject had been academic libraries. The LIS department of Karnataka university is the most productive school in the field. Suggests some measures to prevent possible dilution of research work in this subject.

Data Collection Methods

“Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses and evaluate outcomes.”

The task of data collection begins after a research problem has been defined and research design/ plan chalked out. While deciding about the method of data collection, the researcher should keep in mind two types of data viz., primary and secondary.

Primary Data:

The primary data are those which are collected afresh and for the first time, and thus happen to be original in character. Primary data originally obtained through the direct efforts of the researcher through surveys, interviews and direct observation. Primary data is more costly to obtain than secondary data, but it is also more current and more relevant to the research project.

As for example, data collected by a student for his/her thesis or research project.

Secondary Data:

The secondary data are those which have already been collected by someone else and which have already been passed through the statistical process. Such data are cheaper and more quickly obtainable than the primary data.

As for example, Census data is being used to analyze the impact of education on career choice and earning.

Data collection methods:

The methods of collecting primary and secondary data differ since primary data are to be originally collected, while in case of secondary data the nature of data collection work is merely that of compilation. In below the different methods of data collection, with the pros and cons of each method.

Leveled equations, graphics, and tables are not prescribed, although the various table text styles are provided. The formatter will need to create these components, incorporating the applicable criteria that follow.

II. DATA ANALYSIS

For this study, data of 1754 PhDs awarded from 81 universities, located in 22 states of India was collected up to 2012. Quantitative analysis of the data has been presented under the following heads:

1. Distribution by decades
2. Distribution by universities
3. Distribution by states
4. Top ranking subjects
5. Emerging areas in LIS research
6. Distribution by supervisors
7. Distribution by languages, and
8. PhDs awarded from other than LIS departments.

1. Distribution by Decades

It is evident from Table 1 that during the first two decade of 1950-59 and 1960-69, just 2 PhDs were awarded in each decade. This growth was multiplied 8 times during 1972-79 when 16 PhDs were awarded in 8 years at the rate of 2 PhDs per year. Thereafter continuous growth was witnessed at the rate of 10.3 PhDs per year during 1980-89 and 38.5 PhDs per year during 1990-99. Growth during the next decade of 2000-09 crossed all the previous records as it was more than double (80.4 PhDs/year). However, last decade covering only three years form 2010-2012 superseded the growth rate of all the previous decades as 432 PhDs were awarded just within these 3 years at an average rate of 144 PhDs per year. Thus, it can be inferred that the number of PhDs awarded is continuously increasing at a good increasing average annual rate (Fig. 1).

Table 1. Decade-wise distribution of PhDs

Decades	PhDs (%)	Rank
1950-59	2 (0.11 %)	6
1960-69	2 (0.11 %)	6
1970-79	16 (0.91 %)	5
1980-89	103 (5.87 %)	4
1990-99	395 (22.52 %)	3
2000-09	804 (45.84 %)	2
2010-12*	432* (24.63 %)	1

*Data is for three years only

2. Distribution by Universities

During the total period of 63 years (1950 to 2012) of LIS research covered under this study, 1754 PhDs have been awarded by 81 universities (Annexure-I). Analysis of top ranking universities presented in Table 2, reveals that out of these 81 universities, 31 universities have awarded 1-9 PhDs; 16 universities 10-19 PhDs; 12 universities 20-29 PhDs; and 11 universities 30-44 PhDs. There are only 11 universities which have awarded 50 (cut off no.) or more PhDs (Table 2) and they together account for 41.33 % of total research output (725/1754 PhDs). This data has been presented university-wise in descending order. presents annual average growth of these universities, calculated on the basis of total number of PhDs awarded by each university, divided by the total span period of research of that university.

Usually it has been observed that older departments contribute more in the overall growth and development of a profession but data . reveals that the departments of Jiwaji and Annamalai Universities despite being the youngest departments, awarded highest number of PhDs. Among older university departments, Karnataka, Pune, and Madras could justify their research output although, award of first PhD in these departments took longer time which was 18 years for Karnataka, 28 years for Pune and 27 years for Madras. Among all LIS departments, although Andhra University's Department is the oldest which took 48 years to award its first PhD, still it could compete with Pune and Madras because of its annual average growth rate. On the contrary, Delhi University which was the first to award its first PhD, has fallen at the bottom because it awarded PhDs at the lowest average rate of 1.05 PhDs/year, yet it could find a place among 11 top ranking universities on account of its total research output.

3. Distribution by States

There are 81 universities in 22 states of India which are offering PhD programme and awarded 1 to 224 PhDs. Table 3 provides data of only 11 high performing states which have awarded minimum 62 PhDs (cut off no.). These 11 states account for 84.83 % (1488/1754 PhDs) of total research output. Data in Table 3 reveals that Karnataka is on the top with highest contribution of 12.77 % PhDs; followed by Maharashtra (11.35 %); Madhya Pradesh (10.83 %); Tamil Nadu (9.64 %); and Andhra Pradesh (8.55 %). These 5 states together contribute to 53.13 % of total output of 22 states. State-wise average growth of PhDs (calculated by dividing total number of PhDs awarded by each state with total period of research of that state) reveals change in rank order as compared with descending order adopted to present the total research output of each state. This change is there because of variation in number of universities offering PhD programme in each state and also state-wise variation in the total span period of research.

Table 2. Ranking and average growth in high performing states

S. No.	State	Ist PhD in state	Years up to 2012	No. of PhDs (%)	Avg. growth	Rank
1.	Karnataka	1980	32	224(12.77%)	7.00	2
2.	Maharashtra	1986	26	199(11.35%)	7.65	1
3.	Madhya Pradesh	1984	28	190(10.83%)	6.78	3
4.	Tamil Nadu	1986	26	169 (9.64 %)	6.50	4
5.	Andhra Pradesh	1983	29	150 (8.55 %)	5.17	5
6.	Uttar Pradesh	1982	30	127 (7.24 %)	4.23	6
7.	West Bengal	1950	62	120 (6.84 %)	1.93	9
8.	Punjab	1976	36	96 (5.47 %)	2.66	8
9.	Orissa	1985	27	89 (5.07 %)	3.29	7
10.	Delhi	1957	55	62 (3.53 %)	1.12	11
11.	Rajasthan	1978	34	62 (3.53 %)	1.82	10
Total share of PhDs				1488 (84.83 %)		

4. Distribution by Subjects

For subject analysis, all 1754 PhDs were grouped into 99 subject headings using controlled vocabulary developed for this study on the basis of Sears List of Subject Headings. Table 4 projects 13 top ranking subjects on which maximum number of PhDs (53.24 %) have been awarded. Of these, Bibliometrics/Scientometrics/Webometrics studies taken together have been found to be the most popular area of research with 171 (9.75 %) PhDs, followed by Library Personnel with 114 (6.5 %) PhDs; Information Seeking Behaviour with 94 (5.36 %) PhDs; and Information Services with 73 (4.16 %) PhDs. Total of these four subject areas account for 25.77 % of total research output.

5. Emerging Areas in LIS Research

In present day environment, information technology (IT) is playing a very crucial role not only in economic and social development of India but also in the field of Library and Information Science. It is visible from the growth of LIS literature in IT-related areas and its wider application in libraries for performing various library operations and providing wide range of services. It is also evident from the fact that during last one decade or so, there is a shift in thrust areas of LIS research from traditional librarianship to IT-related areas. As a result in recent decades, several PhDs have been awarded on IT-related areas. First three areas in Table 4 are of very popular nature on which maximum PhDs have been awarded, followed by other 17 areas that are slowly gaining attention in LIS research. Decade-wise analysis about the emergence of these areas in Table 5 reveals that out of total 20 subject areas, only 4 have emerged during 1980-1989 and 5 during 1990-1999. Remaining 11 have emerged after 1999 only.

Decade-wise growth of PhDs in these areas in Table 5 reveals a growing trend where 2000-2009 had been found to be quite productive (with 152 PhDs) but the highest growth at an average rate of 38.6 PhDs per annum has been attained just within 3 years during 2010-2012. This shows that research on IT-related areas was initiated during 1980s but it picked up from 1990s and now these areas are gaining due attention among scholars showing a shift of interest in research towards IT-related areas.

6. Distribution by Supervisors

According to this study, total 1754 PhDs have been awarded under the guidance of 348 single supervisors and 73 joint supervisors. Table 5 provides the listing of 16 top ranking supervisors (guided up to 16 PhDs) who account for guiding total 329 (18.76 %) PhDs. Among these 16 supervisors, Prof C.R. Karisiddappa and Prof P.S.G. Kumar have supervised highest number of scholars as single supervisors. However, 152 PhDs have been awarded under joint supervision also. In this list of 16 high performing supervisors, 4 supervisors in Table 6 (at S. No. 3, 5, 6, and 9) were also joint supervisors. On adding their number of joint guidance, their rank order has changed. Prof C.R. Karisiddappa maintains his first rank, even without having any PhD under joint supervision. Prof Raju3 has very aptly compared him with master blaster, Sachin Tendulkar, the epitome of cricket.

7. Distribution by Languages

In Library Science, majority of the PhDs are submitted and awarded in English language. However, some universities allow submission of PhDs in other languages also such as Hindi, Marathi and Bengali languages. Decade-wise data in Table 7 reveals that out of total 1754 PhDs, 77 PhDs were submitted in these four languages. Of these 77 PhDs, highest percentage of PhDs are in Hindi (64.93 %); followed by Bengali/Gujarati (12.98 % each), and Marathis (9.09 %).

8. PhDs from other than LIS Departments

Initially very limited number of LIS departments were offering PhD programme because at that time in majority of the LIS departments, neither adequate infrastructure facilities nor the research supervisors were available. At that time, many universities provided the opportunity to library professionals who were willing to do PhD in Library Science to register themselves in other departments of their university. First such PhD was awarded to Manindra Nath Basu in 1950 from University of Calcutta on a topic Museum Method and the Process of Cleaning and Preservation. About 18 such university departments falling under Social Sciences, Humanities, Commerce & Management, etc., registered and facilitated award of total 33 PhDs in Library Science-related areas from their university. Among these 33 PhDs, maximum PhDs (9) were awarded from History Department, for other departments, the number varied from 1-2

III. CURRENT USE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN DIFFERENT LIBRARIES IN INDIA

The Srivastava (1997) reports results of a questionnaire survey conducted in 22 R & D institutions in India to determine the extent of usage of IT components by library professionals and the coverage of IT in their graduate and post graduate library science programmes. The study reveals that regularly redesigning the syllabus of Library and Information Science course including advances in technology will only help in keeping at par with the market. Kannappanavar and Vijayakumar (2001) survey the use of hardware and software facilities in University of Agricultural science libraries in Karnataka. The results reveal that none of the university libraries at the time of study is having databases and full implementation of IT application in their libraries. Though the agricultural university libraries are having hardware and software facilities to some extent, the results are not reaching the clientele. It recommends that the library professionals should approach the authorities of the university to train library personnel on IT application and approach funding agencies like INFLIBNET and ICAR for their library automation and provide IT based information services to their clientele. Jeevan and Saji (2004) present the results of a survey conducted among the best libraries in Thiruvanthapuram, Kerala to assess the adoption of Information Technology in these libraries. A survey was conducted using questionnaire and interview for getting information about the different IT components useful for better library organization and comprehensive as well as instant information services. Eighteen scientific, technical and research libraries both under central and state governments based in Thiruvanthapuram participated in the survey. All the libraries participated were of the opinion that IT had a positive impact on the daily routine work of the library and that IT played a positive role in enhancing services, user satisfaction, meeting users' demands, and overall library image. Some of the problems faced in the adoption of IT were shortage of IT skilled manpower, difficulties in periodic up gradation of infrastructural facilities, frequent change and advancement of technology, insufficient training of professionals and absence of hands-on training. Cholin (2005) provides an overview of information technology implementation in different university libraries in India that provides effective access to resources available within universities and elsewhere. This study was an attempt to understand the use of information technology in university libraries by studying the status of information technology application in Indian university libraries at various levels. The study was conducted among 66 university libraries which is approximately 25% of the total number of universities during the period of study and the responses were received from 54 (81.8%) of the total libraries covered. The factors studied include manpower in the universities, user population, budget, IT infrastructure- hardware, software, network tools, database development etc. The study reveals that the university libraries in India are at various stages of development in the application of information technology tools in their day-to-day activities. Suku and Pillai (2005) present the results of a survey to assess the status of automation in the university libraries of Kerala. A structured questionnaire was used to elicit data from the librarian/librarian in charge of the central libraries of six universities. The study clearly mirrors out that library automation has been slow in Kerala due to various reasons like absence of University librarian in most of the libraries and lack of adequate qualified professional staff. 50% of university libraries in Kerala introduced comprehensive automation of housekeeping activities. Walmiki and Ramakrishnegowda (2009) in a survey of university libraries in Karnataka outline the status of ICT infrastructure of selected six university libraries. A structured questionnaire was used to obtain data from the university librarians. The data collected include details of hardware infrastructure like availability of servers, PC's, laptops, printers, scanners etc. Software facilities for automation of housekeeping operations, digital library activities are included in the survey. The survey reveals that most of the libraries lack sufficient hardware and software facilities and internet with required bandwidth. The university libraries have to plan implement and develop ICT infrastructure to exploit the benefits of digital information environment. Singh, Sharma and Negi (2009) report a study of the current state of the art use and applications of ICT in library and Information centres in Noida. The study is based on 25 LICs of public, government, corporate, public and private enterprises in Noida, the data of which was collected through a structured questionnaire through mail/email among the librarians of the selected institutions. The result highlights that lack of awareness, interest and initiation of library professionals towards ICT application in the library were the major barriers of ICT application in the LICs even though the attitude of the librarians towards ICT application/use in the LICs were very positive. The majority of LICs in Noida has good hardware, software facilities to some extent but ICT based services and products were not reaching to the users to the extent expected mainly due to the problems of trained library professionals leaving available ICT infrastructure underutilized. Therefore it is essential that ICT resources should be improved and the more ICT skilled staff should be increased or trained in using and handling ICT. Sampath Kumar and Biradar (2010) observe the use of information and communication technology (ICT) in 31 college libraries in Karnataka, India by analyzing the ICT infrastructure, status of library automation, barriers to implementation of library automation and librarians' attitudes towards the use of ICT. Lack of manpower, lack of skilled staff and lack of training were the major constraints for not automating library activities. Majority expressed the need for appropriate training to make use of ICT tools.

IV. PRESENT STATUS OF LIBRARY AND INFORMATION SCIENCE EDUCATION IN INDIA

India would rank among the first five countries, imparting Library and Information Science (LIS), education, in the world today. Currently, LIS education is imparted by a variety of institutions which include, universities, (traditional/deemed), affiliated colleges, polytechnics, professional associations and documentation centre's. Presently, there are about 120 universities, in India offering LIS education at various levels, and 63 universities offering doctoral degree in LIS (Rameesha and Babu, 2007). There are ninety two (92) universities institutions imparting master's degree programme in library and information science of which 70 are offering one year M. L. I.Sc. programme, 15 offer two year M. L. I. Sc., 2 universities offer two year MSc in information science programme, and one deemed university offers two year Master of Information Science (MISc) and 2 deemed universities offer Associateship in Information Science (AISc) and one university is offering two (2)year MIM (Master of Information Management) programme under fully self-finance scheme. Of the 70 universities offering one year M. L. I. Sc. programme, forty four (44) are regular universities, six (6) distance education institution/ universities, eight (8) self-finance courses for a period of two (2) years, and four (4) are self-finance courses of year duration, seven (7) are degree colleges and one (1) is deemed university. (Walia, 2008).

ANALYSIS OF DATA The data gathered through questionnaire from 8 university LIS departments professionals of Karnataka state and has been tabulated, analysed and discussed. LIS Education in Karnataka The levels of LIS education in Karnataka state universities offering the following categories:

- Bachelor of Library and Information Science (B.L.I.Sc.)

- Master of and Information Science (M.L.I.Sc.)
- Master of Philosophy (M.Phil.)
- Doctor of Philosophy (Ph.D.)

The Table 1 show that the courses offered by the universities in Karnataka state.

Table 1: Universities Offering Type of Courses

Sl. No.	Name of the University	Location	Establish. Year	Type of Courses
1	Bangalore University	Bangalore	1974	MLISc/MPhil/Ph.D
2	Gulbarga University	Gulbarga	1980	MLISc/MPhil/Ph.D
3	Karnatak University	Dharwad	1962	MLISc/MPhil/Ph.D
4	Karnataka State Women's University	Bijapur	2007	MLISc/MPhil/Ph.D
5	Kuvempu University	Shimoga	1993	MLISc/MPhil/Ph.D
6	Mangalore University	Mangalore	1982	MLISc/MPhil/Ph.D
7	University of Mysore	Mysore	1965	MLISc/MPhil/Ph.D
8	Tumkur University	Tumkur	2005	MLISc/MPhil/Ph.D

V. 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 cooccurrence 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 coword 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

VI. CONCLUSIONS

The present study reveals that research in LIS was at low ebb up to late 1970s, but after that the number of PhDs has been continuously increasing decade by decade. Present decade has crossed all previous records as just within three years from 2010-2012, the number of PhDs has increased at the highest average rate of 144 PhDs/ year. Probably this increase is happening because majority of the departments are now having qualified research guides and are paying due attention on developing adequate infrastructure for research. Moreover, UGC has also laid down the condition of PhD as an essential qualification for higher positions both in libraries as well as in LIS departments. While it is appreciable to note that more and more young professionals are pursuing research, but there is an evident need to ensure that quality of research is not compromised. Moreover, while selecting the topic for research, due attention must be paid on interdisciplinary areas, having universal significance and potential to expand the boundaries of knowledge. Another important point which all scholars as well as supervisors must keep in mind is that the topics chosen for research must be of high standard as value of research lies in quality not in quantity. Perhaps there is a dire need to control this mushrooming growth in LIS research. For this, there must be some national body devoted to monitor and ensure the adherence to research standards. The Indian Institute of Library and Information Science as proposed by National Knowledge Commission (India) must take the responsibility to control, direct and prescribe standards for conduct and award of PhD degree but unfortunately till date neither this Institute has come up nor has the proposal been implemented.

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