Annals of Library and Information Studies
Vol. 53, December 2006, pp. 219-223

Library and information science research in India: A bibliometric study

Swapan Kumar Patra[a] and Prakash Chand[b]

[a]Department of Biochemical Engineering & Biotechnology, Indian Institute of Technology Delhi, New Delhi-110016; Email: skpatra@gmail.com

[b]National Institute of Science Communication and Information Resources, 14- Satsang Vihar Marg New Delhi-110067; Email: prakashc@niscair.res.in

The paper presents a bibliometric study of library and information science research literature emanating from India based on the data abstracted in Library and Information Science Abstracts (LISA). Standard bibliometric techniques are employed to analyse the collected data and accordingly get indicators. Bradford's law of scattering is used to identify core journals of library and information science wherein Indian authors publish their research output. To understand the productivity pattern of authors, Lotka's Law has been applied. The identified core journals are mostly published from India. Indian authors' contribution in' international journals is very low. A list of authors who have published 10 and more papers during 1967-2004 is drawn and presented. Such authors are 37 (1.35%) in number and authors with single publication have major share (74.63%). The author's productivity pattern is in conformity to Lotka's law.

Introduction

India is one of the oldest civilizations of the world with a glorious past of higher learning institutions and libraries. In ancient times, libraries were part of the royal houses and monasteries and later they descended to public domain as a part of higher learning system. Modern day library and information science research in India is more than a century old; which has developed around universities and R&D institutions. In independent India, library schools developed significantly with pioneering efforts of Dr. S.R. Ranganathan which made him 'the father of Library Science in India'. His efforts introduced formal education and research in library and information science at the University of Madras, Bombay, Banaras, Delhi etc. Delhi University was the first university in India which offered facilities for research in the area of library and information science, leading to PhD degree, under the supervision of Dr. S. R. Ranganathan[1]. Thereafter, other universities in the country introduced facilities for research in library science. At present about 49 universities offer full time and 3 universities part time Ph. D. programme, 89 universities have Master's degree programme and 87 universities/ colleges offer Bachelor degree programme[2].

Outside the conventional university system, two institutes of national importance offer research and education in the field of LIS, namely, Documentation Research and Training Centre (DRTC), Bangalore, and erstwhile Indian National Scientific Documentation Centre (INSDOC) presently National Institute of Science Communication and Information Resources (NISCAIR), New Delhi. So, the past of library and information science in India has been rich and regarded as an important discipline and now seems fully developed[3].

Despite the rise in the number of institutions imparting LIS education and research and India's well known capabilities in ICT and its application in libraries and information centres, only an analysis of India's LIS research contributions will enable to understand its strengths and capabilities. A bibliometric study of research contributions is an appropriate way to carry out the analysis.

Bibliometrics is the term used by Pritchard[4] and it is defined as "the application of mathematical and statistical methods to measure quantitative and qualitative changes in different media". Quantitative analysis can measure the growth, scattering of articles in different journals or to measure the obsolescence of literature in different disciplines. Many authors have done bibliometric analysis of different Indian science disciplines but no comprehensive study on Indian LIS research has been done. A study of LIS research and

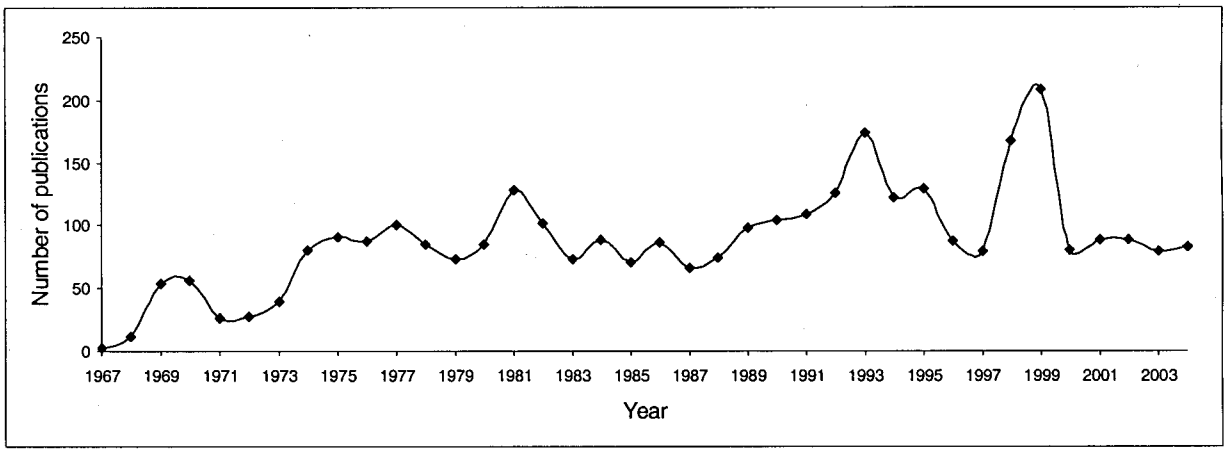

Fig. 1 - Growth of LIS literature in India

development trend shows that 1992 is the most productive year for doctoral research output[5]. The present study finds 1999 as the most productive year. Additionally, a comparative study of LIS research in Eastern European countries and developing countries has observed that articles from developing countries including India are decreasing[6]. Whereas, the present study reflects growth in literature, authorship pattern, core journals and research areas.

Scope

The data for study has been collected from Library and Information Science Abstracts (LISA) for a period of 1967 to 2004. LISA is an international abstracting and indexing service in the field of library and information science. It covers about 440 periodicals emanating from more than 68 countries in 20 different languages. The database is updated every two weeks. It covers all aspects of library and information science. The collected data might have missed some of the contributions of Indian authors due to limitations of indexing system followed by LISA.

Methodology

The data was downloaded from the online version of LISA, published by Cambridge Scientific Abstracts (CSA) giving "INDIA" as a search term occurring anywhere in a record. A database of such retrieved output is developed using the software "Endnote" a product of ISI (Institute for Scientific Information), Philadelphia, USA. The software has a strong web interface to download online data with equally strong subject bibliographic tool to index different fields. Each record of downloaded data contains author, year, title, journal information, key words, abstract and note. Author's addresses are not listed in the database and therefore; author affiliation analysis has not been done.

A total of 3,446 records were downloaded for a period of 1967 to 2004. After manual checking of records, a few records were deleted, as these were not of Indian authors. Finally, the database containing 3,396 records was retained for the study. The database includes 444 (13.07 %) conference papers, 87 (2.56%) book reviews and 2,865 (84.36%) journal articles. The data has been analysed using Microsoft Excel 2003 and MATLAB 6 for bibliometric indicators.

Results and Discussion

A total of 3,396 records have been analysed to find out the growth of literature, authors' productivity pattern and core journals in library and information science discipline. Three thousand three hundred and twenty records (97.76%) out of 3, 396 are in English language, and rest 76 (2.23%) are in different languages including Indian languages. This is obvious because English is the predominant language of Indian publications. The identified core journals are mainly of Indian origin and authors' productivity pattern conforms to Lotka's law.

Growth of literature

Figure 1, depicts the growth of literature in LIS field but the growth does not show any definite pattern. During the total period 1967 to 2004, exponential growth of

literature has been observed in two phases, first in early seventies i.e., 1972 to 1975 and then in late seventies i.e., 1979 to 1981. Second phase is seen in early nineties i.e., 1987 to 1993 and then in late nineties i.e., 1997 to 1999. First phase exponential growth of literature may be due to the formative age of the subject as a new discipline. The second phase of growth may have been due to the advancement of computer and communication technologies, particularly the web technology. This has revolutionised the entire scenario of information generation, organisation, delivery and management. The highest number of articles (208) was published in the year 1999 and thereafter, a gradual decline is seen. However, in last few years, the growth of literature is static with 80 articles per year which appears to be insignificant in terms of world LIS literature.

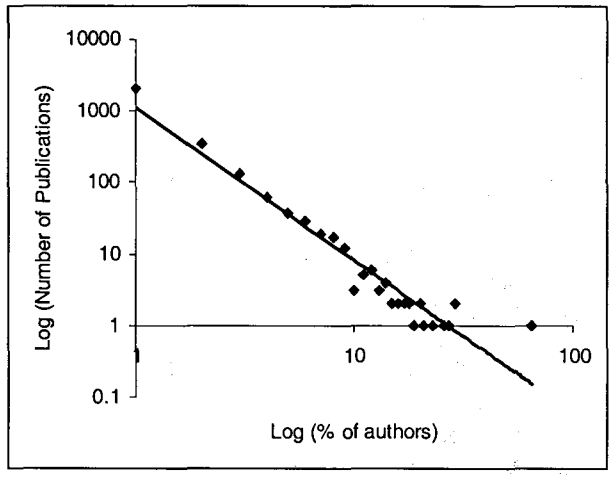

Fig. 2 - Log plot of author and their publication

Authorship Pattern

From 1967 to 2004, 2,732 authors have published 3,396 articles, about 1.24 articles per author. This indicates that single authorship is more prevalent in LIS area. It also indicates lack of collaborative and team research. A list of 37 authors who have published 10 or more articles are given in Table 1.

Lotka's Law[7] describes the frequency of publications by authors in a given field. It states that "the number of authors making n contributions is about $1/n^2$ of those making one; and the proportion of all contributors, that make a single contribution, is about 60 percent". This means that in a given subject out of all authors, about 60 percent will have just one publication and 15 percent will have two publications, 7 percent of authors will have three publications and so on. According to Lotka's Law of scientific productivity, only six percent of the authors in a field will produce more than 10 articles.

The general form of Lotka's law can be expressed as:

$$y = \frac{c}{x^n} \quad \text{.....(1)}$$

Where y is the percentage of authors, x is the number of articles published by an author, c is the constant and n is the slope of the log-log plot (Fig. 2). In Indian LIS literature about 74 % authors have single publications. About 12 % authors have two publications and 4 % have three publications.

The value of n (exponent of Lotka's formula) is -2.12 and the value of C is 0.64. In order to verify the observed distribution of author's productivity with the theoretical distribution, Kolmogrov-Smirnov test[8] was done. It was found that the literature data follows Lotka's original distribution.

Core journals

Bradford's Law[9, 10] is used to determine the number of core journals in any given field. It states that "journals in a single field can be divided into three parts, each containing the same number of articles, firstly a core of journals on the subject, that produces approximately one-third of the total the articles, next a second zone, containing the same number of articles as the first, but a greater number of journals, and finally a third zone, containing the same number of articles, but a still greater number of journals". The mathematical relationship of the number of journals in the core to the first zone is a constant n and to the second zone the relationship is n^2. Bradford expressed this relationship as 1: n: n^2.

As shown in Figure 3, the journals are ranked according to the decreasing order of relevance, and plotted their publication with that of the rank, the graph is a typical "S" shaped curve, which shows that the subject is mature[11].

The study reveals the 3,996 articles of Indian authors are published in 281 journals. Out of this, 131 journals publish only one article, 50 journals publish two articles, 18 journals publish 3 articles and 6 journals publish 1,225 articles (1/3 of 3996 is 1132). These 6 journals can be considered as the "core journals" of LIS field. These journals are, *Herald of Library Science* (354 articles),

Table 1 - List of authors who have published 10 or more papers

Name of the author	Number	Name of the author	Number
1. Kaula, P. N.	65	20. Guha, B.	14
2. Ranganathan. S.R.	29	21. Rao, S. S.	13
3. Mangla, P. B.	29	22. Vyas, S. D.	13
4. Gupta, B. M.	27	23. Karisiddappa, C. R	13
5. Maheswarappa, B. S.	26	24. Kumar, Krishan	12
6. Satija, M. P.	23	25. Kumar, R. P.	12
7. Gopinath, M. A.	21	26. Trehan, G. L.	12
8. Neelameghan, A.	20	27. Kaul, H. K.	12
9. Deshpande, K. S.	20	28. Raju, A. A. N.	12
10. Kumar, S.	26	29. Malhan, I. V.	12
11. Garg, K. C.	17	30. Rajan, T. N.	11
12. Mittal, R. L.	17	31. Anand, A. K.	11
13. Sridhar, M. S.	16	32. Kannappanavar, B. U.	11
14. Agrawal, S. P.	16	33. Ramaiah, L. S.	11
15. Jeevan, V. K. J.	15	34. Haravu, L. J.	11
16. Bavakutty, M.	15	35. Panda, K. C.	10
17. Kumar, P. S. G.	14	36. Umapathy, K. Setty	10
18. Vashishth, C. P.	14	37. Chopra, H. R.	10
19. Kalia, D. R.	14		

Table 2 – Top 13 journals that publish about 50% of the total articles.

Name of the journal	No of publications	% of total
1. *Herald of Library Science*	354	10.42
2. *Annals of Library and Information Studies**	242	6.03
3. *Journal of Library and Information Science (India)*	221	6.50
4. *IASLIC Bulletin*	202	5.94
5. *SRELS Journal of Information Management*	131	3.85
6. *Lucknow Librarian*	122	3.59
7. *Indian Library Association Bulletin*	121	3.56
8. *Scientometrics*	75	2.20
9. *International Library Review****	69	2.03
10. *Library Herald*	65	1.91
11. *Information Studies****	63	1.85
12. *DESIDOC Bulletin of Information Technology*	63	1.85
Total	1738	50.02

*Previously known as *Annals of Library Science and Documentation*
** Previously known as *Library Science with a Slant to Documentation*
*** Continued as *The International Information and Library Review*

Journal of Library and Information Science (India) (221 articles), *Annals of Library Science and Documentation* (205 articles), *IASLIC Bulletin* (202 articles), *Lucknow Librarian* (122 articles), and *Indian Library Association Bulletin* (121 articles). Fifty percent of the total articles published are in thirteen journals as shown in Table 2. These 13 journals may be regarded as the important journals for Indian LIS research. It is also interesting to note that among the 13 journals, only two are international journals namely, *Scientometrics* and *International Library Review* which are covered by Science Citation Index (SCI)[12].

Conclusion

India has the infrastructure and facilities for education and research in LIS, but LIS literature from India is rather low as reflected by the LISA database. LIS is an essential and important component of education system and particularly for higher education and R&D system. Its growth and advancement is equally important as of other disciplines in the universe of knowledge. The study shows that the LIS research output of India is mostly published in Indian journals. To have global presence and visibility, research output of this area needs to be published in SCI covered international journals. Further, works of some well known Indian LIS professionals do not seem to be adequately reflected in LISA. The reasons could be due to the indexing and coverage limitations of LISA. To understand Indian LIS research output's strength and weakness, a comparative study of LIS research output with respect to other Asian majors like China, Japan and Korea needs to be explored further.

References

1. Mangla P B and Ranganathan S R. Research in library & information science and the contribution of Ranganathan, *Education for Information* 2 (4) (1984) 267-282
2. Handbook on Library and Information Science, New Delhi: Association of Indian Universities, 2004.
3. Singh M P, Library and information education in India: Issues and trends, *Malaysian Journal of Library and Information Science,* 8 (2) (2003) 1-17.
4. Pritchard A, Statistical bibliography or bibliometrics?, *Journal of Documentation,* 25 (4) (1969) 348-349.
5. Kannappanavar B U, Vijayakumar M, 50 years of LIS research in India: trends & development, *SERLS Journal of Information Management,* 33 (4) (2000) 267-300.
6. Uzun A, Library & information science research in developing countries and eastern european Countries: a brief bibliometric prospective, *International Information & Library Review,* 34 (1) (2002) 21-33.
7. Lotka A J, The frequency distribution of scientific productivity, *Journal of the Washington Academy of Science,* 16 (1926) 317-323.
8. Pao M L, Lotka's Law: A testing procedure, *Information Processing & Management,* 21 (4) (1985) 305-320.
9. Bradford S C, Sources of information on specific subjects, *Engineering: An illustrated weekly* 37 (3550) (1934) 85-86
10. Brooks B C, The derivation and application of the Bradford-Zif distribution, *Journal of Documentation,* 24 (1968) 247-265.
11. Tsay M Y, Jou S J and Ma S S, A bibliometric study of semiconductor literature, 1978-1997, *Scientometrics,* 49 (3) (2000) 491-509.
12. Sharma R N, Development of library and information science periodicals in Asia, with emphasis on South Asia: problems and solutions, 65th IFLA Council and General Conference, Bangkok, Thailand, August 20 - August 28, 1999 available at http://www.ifla.org/IV/ifla65/papers/006-118e.htm