Chapter-2

REVIEW OF LITERATURE

2.1 INTRODUCTION

A review of the literature is an essential part of academic research. It's part of introduction not a separable part of any research activity. The review is a careful examination of a body of literature pointing towards the answer to our research question. It brings out the latest and existing knowledge of a research area and enables a researcher to perceive clearly what has already been done and what still remains to be done.

The process of reading, analyzing, evaluating, and summarizing scholarly materials about a specific topic is called review of literature. The results of a literature review may be compiled in a report or they may serve as part of a research article, thesis, or grant proposal.

According to Harrod (1987) Glossary literature review is “a survey of progress in a particular aspect of science over a given period (e.g. one, five, or ten years); it may range from a bibliographical index or mere list of references, to a general critical review of original publications on the subjects covered”. Busha and Harter (1980) defined it as “Critical summary of different facets of the research problem as reported in existing sources”. Thus literature review assists a researcher

1. to enlighten and enrich to research scholar on his/her conceived area of research;
2. to ascertain about the completed research or ongoing research on the particular area and proceed further avoiding duplication of research;
3. provides its knowledge of the particular area i.e. ideas, theories, explanation and hypotheses for formulating the problem and suggests the methods of research to solve the problem;
4. it provides updated information to generate new knowledge and also helps comparative analysis with the present study.

‘Bibliometric study’ is a focus point of the present research as it is an important area of research in the field of library and information science. Many studies have already
been conducted on bibliometrics. In this review, only select and relevant published documents on bibliometrics have been reviewed. These studies have been presented under the different facets.

2.2 Application of Bibliometric Laws

Bibliometric is a flexible and growing research methodology which has taken the field of library and information science also in its fold. The idea of studying journal articles to perform a citation analysis and using this information to gain ideas about a journal, author, or topic was a natural progression from earlier types of research in the field. Several studies have been completed using different laws in bibliometrics e.g. Brooks (1990), Bandyopadhyaya (1999), Rousseau and Rousseau (2000), Zbikowska-Migon (2001), Peritz and Bar-Llan (2002), Welsh (2004), Suresh Kumar (2003) etc.

Epstein (2005) considered the utility of bibliometrics for raising new questions and its limitations for guiding decision-making. Librarians and other researchers are still learning how to use the information garnered from bibliometric study, but its implications are positive, and more and more experts are acknowledging its place in research, and are using bibliometrics in their own fields.

Mehta (2005) recently undertook case study of a scientific institute to judge scientific productivity through bibliometric techniques and opined that bibliometrics utilizes quantitative analysis and statistics to describe patterns of publication within a given field of a body of literature. One of the main areas of bibliometric research concentrates on the application of bibliometric laws. The most commonly used laws are Lotka's law of scientific productivity and Zipf's law of rank size statistics.

Prathap (2005) assessed an international bibliographic database through the application of bibliometric laws and stated the main lesson from this exercise is that science assessment is too important a study to be left to scientometricians who try to straight-jacket the data to simple formulate like Lotka's law and Zipf's law. Although the field of scientometrics now offers well-tested procedures for some measure of
quantitative assessment of research performance, these are largely left unused in our country when we attempt exercise to assess the performance of individuals or institutions.

Butter et al. (2006) provided the concepts of combining maps and bibliometric maps. Bibliometrics maps of science are well-established research subject. But their adoption as a science policy support tool is lacking. Authors' claimed they developed a tool that interfaces between a qualitative map and a bibliometric map which lets the users create a correspondence between the distinct vocabularies of the maps.

Zainab, Anyi and Anuar (2009) in their bibliometric study on Malaysian Journal of Computer Science evaluated the article productivity of the journal from 1985 to 2007 using Lotka's Law. The study further revealed authorship, co-authorship pattern by the degree of authors' collaboration that ranged from 0.25 to 0.95.

Chiang et al. (2010) examined the publishing trends of e-learning literature catalogued in a SSCI database during 1967-2009. According to them, the findings indicate that (1) the quantity of recent research on e-learning is expanding remarkably; (2) the frequency indexes of authors productivity do not appear to abide by Lotka's Law; (3) most research papers on e-learning are generated by multiple authorship; and (4) applications of e-learning have most found in research areas such as Education and Educational Research, Information Science and Library Science, and Computer Science/Interdisciplinary Applications.

Gupta and Khare (2013) in the study covers 255 periodicals with 2953 citations collected from 35 doctoral theses till the year 2010. The time span 1986-1995 was the most productive years of cited periodicals. Contributions of journals were from USA, and the most cited journal was IASLIC Bulletin. Bradford Law of distribution was applied to find out the core journals in the field of Library and Information Science. The journal distribution pattern of the LIS doctoral theses did not fit the graphical Bradford's distribution pattern. The distribution of journals was in three zones and the number of references in each zone calculated as 3: 26: 226.
2.3 Different Mathematical/Statistical Models and methods used in Bibliometrics

Van Raan (2003) an overview of advanced bibliometric methods for (1) objective and transparent assessment of strengths and weaknesses in research performance, and demonstrate that advanced bibliometric methods are, particularly at the level of research groups, university departments and institutes, an indispensable element next to peer review in research evaluation procedures. (2) Monitoring interdisciplinary scientific developments, recent advances in bibliometric mapping techniques are promising. They are unique instruments to discover patterns in the structure of scientific fields, to identify processes of knowledge dissemination, and to visualize the dynamics of scientific developments.

Schildt and Mattison (2006) proposed an alternative algorithm using a data set from the field of family business research and compare it to two alternative methods, multidimensional scaling and clustering and introduced a new software tool, sitkis that implements the algorithm and other common bibliometric methods.

Levitt (2007) presented his research study aims to develop and apply a metric for estimating trends in database of articles. The motivation of estimating trends in this database is that these trends are possibly of interest to science policy.

Nkiko and Adetoro (2007) evaluate the citation analysis of Covenant University's Pioneer Bachelor Degree Students' Research Projects and found that books were the most frequently cited type of media (53.3%) while journal citations were far behind (25.16%). They stated that the "the gap between book and journal citations reflects the fact that the library's book collection is current and that students of this level do not yet appreciate the usefulness of journals for research".

Chandrashekara, Mulla, and Harinarayana (2010) descriptive bibliometric analysis of digital libraries available in the Emerald databases from April 1991 to March 2009. The Electronic Library stands first rank among the published literature on digital library. Periodicals are sensitive indicators of the emerging new ideas in any discipline. A careful evaluation of periodical literature may indicate a complete picture of the discipline. It serves as a key to identify the research trends in the field. This study helps the librarian
recognizing the core journals in the field by depicting the journals prepared by the authors for publication of their research results immediately.

Serenko et al. (2010) conducted a bibliometric analysis of a body of literature contained in 11 major knowledge management and intellectual capital, peer-reviewed journals and revealed the institutional and individual productivity, co-operation patterns, publication frequency, and other related parameters.

Swain (2013) evaluates the pattern of publications of Internet Research (IR) from 2008 to 2012 and reveal the research influence of this journal from the citing and cited references of the papers through appropriate bibliometric measures. Citations for each of the published articles are explored through Google Scholar for assessing average impact of individual papers. A citation record for measurement of impact factor and immediacy index was extracted from Scopus.

2.4 Bibliometric Study on Different Subjects

Over the years, a number of reviews and bibliographies of the bibliometrics, informetrics and scientometrics literature has been published; some are general in their scope whereas others cover specific sub-topics like, Estabrooks, Winther and Katz (2002) study on Literature on Nursing; Nwagwu, Williams (2006) Nigeria's Biomedical literature; Mitha and Leach (2006) study on Literature on HIV/AIDS; Thanuskodi and Venkatalakshmi (2010) study on Research on Ecology; Chiang et al. (2010) an E-learning literature on SSCI database; Ghouse, Modin N. Mamdapur, Govanakoppa, Rajalaxmi A. and Rajgoli, Iqbalahmad U. (2011) on Baltic Astronomy etc.

In an article by Pelzer and Wiese (2003), "Bibliometric Study of Grey Literature in Core Veterinary Medical Journals," bibliographic citations from twelve core veterinary journals published in 2000 were analyzed to determine the proportion of citations from grey literature. Results indicate that out of total citations analysed, 6.38% were considered to be grey literature. Nearly 90% of the grey literature appeared at conferences, government publications, and corporate organization literature.

Shokeen and Kaushik (2004) in their study of Indian Journal of Plant Physiology, revealed that journal articles are predominant with more than two thirds of total citations.
Patra and Chand (2005) studied on the chronological growth of Indian Biotechnology. Applicability of Lotka’s law has been examined for the authorship pattern. Productivity of authors have analysed and found a list of 35 authors that published more than 10 publications. Bradford’s law of scattering has been used to identify the core journals, which cover most of the research and development output of Indian Biotechnology. The study shows the active authors, institutions and state wise distributions of Indian Biotechnology research output.

Mitha and Leach (2006) determined the geographic distribution of literature related to HIV/AIDS in South Africa. The authors were interested in, where much of the research originated. Mitha and Leach chose two pertinent databases and limited their searches to a specific time period. The data retrieved showed evidence that most of the literature on HIV/AIDS in South Africa originated from within the country itself.

Kretschmer and Kretschmer (2007) highlighted new centrality measure for social network analysis applicable to bibliometric and webometric data. A fairly large number of publications in sociology, in computer science or in information sciences, as well as in studies of collaboration in science describing the studies of social networks with unweighted ties because measures involving unweighted ties are easier to calculate. There are few studies on networks with weighted ties since they only need more complex formulas, but need a process of quantifying especially when quantitative empirical data are not directly available. However quantitative empirical data are directly available under the condition of using bibliometric or webometric data. In conclusion new complex measures of the degree centrality are introduced including weighted ties possible for use of the analysis of co-authorship or citation networks. Both co-authorship relations and citations are well quantified data.

Thanuskodi and Venkatalakshmi (2010) analysed the research output performance of scientists on Ecology. In academic and scientific work, publication is the chief means of communicating research, a primary means of recognition and reward, and hence a central social process in any academic as well as Research Institutions. The study attempts to analyze the performance of scientists working in various institutions in terms of growth rate, areas of research concentration, author productivity and authorship pattern.
Matthew (2010) conducted a bibliometric study of the Journal of Humanistic Psychology (JHP). This study is to quantify the dimensions of articles published during the period 1961 to 2010 and also included the geographic origin of articles, number of authors per article, author gender, number of pages per article, a number of references per article, a number of articles per issue, type of article, and a citation analysis of the most frequently cited authors and documents. The distinct bibliometric profile of the JHP can be attributed to the philosophical conceptualization of science that accepts subjective reports as evidence in humanistic psychology.

Khode and Thakkar (2012) this study was based on the bibliometric analysis of publications on open source appeared in Emerald journals from April 1998 to May 2010. The bibliographical details of each publication on open source were downloaded from the Emerald website and recorded onto a spread sheet with pre-designed columns. It has undertaken total 63 publications published on open source, which were appeared in Emerald journals. Maximum number of articles contributed by single author 40 (63.49%). Library Hi Tech and Program electronic library and information systems have first rank among the published literature on open source software respectively.

Swain and Panda (2012) conducted a bibliometric study on Journal of Intellectual Property Rights, 2002 to 2010 and found that due to the absolute domination of solo contributions, the visibility of collaborative contribution was found remarkably less. The study further revealed that about one third of the total publications received citations, more than half of the cited articles carried just one citation, one fourth got 2 citations, and the rest received citations between 3 to 9 times.

2.5 Citation Analysis/Impact Factor

Citation analysis is one of the aspects of the bibliometric study. Large number of literature has been published on the citation pattern, analysis etc. by Gupta and Kumar (2001), Dutta and Sen (2000), Ullah, Kanwar and Kumar (2004), Sinnarkar (2003) etc. Among them few recent studies are given below:

Ramesh and Nagaraju (2000) analyzed the citations provided in the articles of the Indian journal of Information, Library and Society. 138 citing articles have cited 901 citations i.e. On an average 7 citations were cited per article. About 67.5% of the articles
had 1-20 citations. More citations were from the books and periodicals than the other type of materials.

Similar type of study was performed by Koley and Sen (2003) covering 457 citations appended to 26 research articles published in the four issues of the quarterly Indian Journal of Physiology and Allied Sciences. Of the citations, 76.81% relate to journal articles, 18.59% to monographs, and the rest of conference papers, theses, etc.

Roth (2005) described the emergence of competitors in the Science Citation Index and the Web of science. Eugene Garfield’s recognition that the concept of citation searching, from the legal literature, should be applied to the sciences has been amply rewarded. Citation searching has surely seen a dramatic progression from the cumbersome print volumes of SCI. Recent developments in hypertext linking and web browsers have led to the Web of science, which results in the relationship between citing and cited documents. Recent developments of competitors to the WOS while interesting and useful for quick links to some of citing references are clearly not a substitute for a comprehensive citation search.

Singh and Dominic (2006) analysed of a citation pattern of Allelopathy journal. The study covers 687 citations appended to the 30 research articles published in four issues of Allelopathy Journal. The study reveals that 30.57% of the total citation are author self-citation and 16.16% are journal self citation. The highest percentage of year wise journal citation index was found to be 33.18% in the period of 1981-1990.

Verma et al. (2007) analysed of contributions in ‘Annals of Library and Information Studies (ALIS)’. The study was undertaken on 131 research articles published in ALIS during 1999-2005 to examine yearwise, institutionwise, statewise distribution of contributions, authorship pattern, citation analysis, length of contributions etc. The study shows that most of the contributions of this journal are contributed by a single author and statewise distribution shows that most of the contributions are contributed from New Delhi. Citation analysis of 1456 citations includes finding out the average number of citations per contribution, types of publications cited and preparing of rank list of cited journals in contribution of the journal.

Thanuskodi (2011) analyzes a bibliometric study of 974 articles which were published during the period 2005 to 2009 in the Indian Journal of Chemistry. The paper
covers the bibliometric analysis of a number of contributions, authorship pattern, geographical distribution, length of articles and finds out the number of cited documents and the average number of references per article.

Tsay (2011) Employing a citation analysis, the study explored and compared the bibliometric characteristics and the subject relationship with other disciplines and among the three leading information science journals, Journal of the American Society for Information Science and Technology (JASIST), Information Processing and Management and Journal of Documentation. The citation data were drawn from references of each article of the three journals during 1998 and 2008. The Ulrich’s Periodical Directory, Library of Congress Subject Heading, retrieved from the WorldCat, and the LISA database was used to identify the main class, subclass and subject of cited journals and books.

The results of the study revealed that journal articles are the most cited documents, followed by books and book chapters, electronic resources, and conference proceedings, respectively.

Das (2012) carried out a bibliometric analysis of 210 papers and 2999 citations published in the journal Nelumbo published by the of Botanical Survey of India for the period 2004 to 2011. Yearwise distribution of contributions in their different volumes, authorship pattern, degree of collaboration, length of papers, citation pattern, average citation per contribution per volume, type of documents and their citations, subjectwise distribution of papers, rank list of cited journals, ranking of contributors have been studied. The Joint authorship pattern comes 74.76%, which is higher than the single authorship pattern. Out of 2999 citations maximum 52.59% are from journals.

Rana (2012) presents the analysis of 83,439 papers that were published in different ISI-listed periodicals between 2000 and 2009. The study covers year-wise scientific output where Singapore produced an average of more than 8,000 scientific papers per year. Alone in 2008, Singapore produced 10,870 papers, the largest year-wise output during the period reviewed.

Regolini and Janne's (2013) have performed a bibliometric analysis based on citations to its papers which gives clear indication about the influence of this journal among institutions, countries, and researchers. This study also provides an overview of
knowledge dissemination in various disciplines. Moreover, a citation study may be a barometer of the evolution of a transdiscipline.

2.6 Bibliometric Studies on Journals in Library and Information Science

One type of bibliometric research is the analysis of the historical development of a specific body of literature, especially its authorship, publication, and use. According to Smith, in the 1981 article "Citation Analysis," 'literature of' studies may include types, age, highly cited authors and journals, languages and/or countries of origin, and subject distribution.

Lancaster (1991) delivered a lecture during the 3rd International Conference on 'Informetrics' held in Bangalore in 1991 and later published as a booklet by the Sarada Ranganathan Endowment for Library Science. This lecture on 'bibliometric methods' in assessing productivity and impact of research by Lancaster enumerated the bibliometric criteria for assessing research productivity include (a) No. of publications produced (b) No. of publications produced on what types (c) Quality of sources (e.g., journals) in which they appear (d) No. of work of an individual, group or organization is cited (e) Quality of citation (f) No. of publication are produced per individual, per man-hour expended, per $ expended (g) No. of citation per individual, per man-hour expended, per $ expended etc. He further stated about the bibliometric methods applications in the management of research like (i) Evaluation of the productivity of a particular researcher. perhaps for appointment or promotion ; (ii) Evaluation of the impact of the work of an institution or research group ; (iii) Identification of possible new research areas on the basis of interdisciplinary citation linkage ; (iv) Identification of institutional linkage ; (v) Assisting in the establishment of research policies or priorities in resource allocation. He also gave detail with bibliometric measures of the productivity and impact of research as applied to individuals, research groups, institutions, and countries and discussed the problems and limitations of bibliometric data.

Tague-Sutcliffe (1991) discussed different theories that providing insights into the kinds of measures which are possible-ordinal, and additive and the problems of measuring informativeness within the framework of an information service.
Shapiro (1992) informed on the legal precedents of bibliometrics, a topic that has been otherwise neglected by information science historians. The use of citation indexes has been demonstrated as far back as 1743 and publication counts have also been located in legal writings since at least 1817.

Joglekar and Sen (2000) identified 15 information science e-journals and presented some bibliometric data on them. According to their definition, an e-journal contains original work, which is subject to a peer review process, and is published only on the Web at no cost.

Uzun (2002) compared twenty-one core LIS journals published between 1980 and 1999 to ascertain the research contribution of developing countries and Eastern European countries. He found that the number of articles from China, Saudi Arabia, Turkey, Botswana, Ghana, Kuwait, and Taiwan has increased considerably while those in India, Nigeria, Pakistan, Brazil, and Poland have declined.

Schaffer's (2004) bibliometric study focused on the research needs of psychology faculty, and quantified the availability throughout the library of articles cited recently by the faculty. More than social sciences faculty generally, the psychology faculty reported relying on the journal literature rather than on the monographic literature. Less than one-third of the articles cited were available online and 89% of these were found in Ebsco databases, Science Direct, JSTOR, or society publications with deep backfiles.

Anwar's (2006) bibliometric study researched the core authorship, literature patterns, and geographic origins of literature with the date palm as its topic. By identifying several large libraries that contain extensive collections of electronic resources with articles on the subject, the author hoped to access a complete and accurate picture of the literature. By including only full text articles and excluding duplicates and records with incomplete information, the author was able to better determine core authorship and literature. The author's data indicated a rise in the publication which peaked in 1989, and leveled off in later years. In addition, single authorship of articles on this subject was rare, indicating an increase in interest of a larger group of people during the time period of this study.

Bharvi et al. (2007) analyzed 1,317 papers published in the first fifty volumes from 1978 to 2001 of the international journal Scientometrics and found that the US share of
the papers is constantly on the decline, while that of the Netherlands, India, France and Japan is on the rise and that the scientometric output is dominated by the single-authored papers.

Shafi et al. (2007) completed a bibliometric study on ‘D-Lib Magazine’ for authorship trend, contribution of teachers and professionals, country-wise contribution, degree of collaboration and productivity within different facets of digital / electronic libraries. It was found that collaborative research gives priority over solo research. The degree of collaboration was founded 0.66. The study further reveals more contribution from teaching community compared to professionals. Country wise distribution reveals that most of the contribution comes from the USA and Germany while the facet wise distribution of articles depicts that most of the articles cover digital libraries and preservation followed by metadata / cataloguing.

Naseer's and Muhammad (2009) study on Library and Information Science (LIS) literature mirrors the development of the LIS profession, which needs to be analyzed for growth of the profession and to overcome its weaknesses. Bibliometric methods have been widely used in LIS research for analysis of literature. The study concludes that bibliometrics has been found to be very useful in solving diverse issues. However, its application to LIS literature is not very common in Pakistan and this area of research needs attention. It recommends provision of better access to literature, comprehensive bibliographical control and sharing of best practices to enhance the use of bibliometrics in LIS research.

Cathy Lin (2012) determined how Library and Information Science (LIS) research in Taiwan has changed between 2001 and 2010. Bibliometric and content analysis methods were conducted to analyze 2,494 journal articles, 983 theses, and 191 research projects between 2001 and 2010. The results show LIS and Technology to be the most popular topics in journal articles. The most well-received thesis topics are LIS and Technology and User Services, accounting for more than 50 % of graduate theses. The same is true for research projects, with the subjects of LIS and Technology, LIS Theory and Foundation, and User Services have a ratio of more than 70 %. In government-sponsored research projects, the average amount of funding obtained had no significant differences or tendencies for various subjects over time. In authorship of journal articles,
individual researchers conducted 66.11% of articles in key LIS scholarly journals in Taiwan between 2001 and 2010. The major research questions address the research status of LIS in Taiwan, how the Taiwanese government supports the field, and the collaborative authorship of LIS journal articles in Taiwan.

Mulla's (2012) study is based on the analysis of bibliographic details of documents in the field of Information Science and Scientometrics (ISS) published as various journal articles, thesis reports, patents and standards. The data were obtained from the Indian Science Abstract (ISA) for the period of 2005 to 2009 was collected from the website of NISCAIR's online ISA Journal. The bibliographic fields were analyzed by normal count procedure and it covers the following items of information like names, year wise distribution of articles, types of document, the length of the papers, institution wise distribution of articles, country wise distribution of contributions, state wise distribution of contributions, journal wise distribution of articles, etc.

Parveen Kumar (2013) - The study was carried out to identify the number of articles published in the Journal of Indian Library Association from the year 2007 to 2011. The study covered the number of papers published, the number of references made, the authorship patterns and average length of paper published etc. The analysis showed that only 2(2.81%) research papers were contributed by more than four authors. It also revealed that out of 71 research papers only 3(4.22%) research papers have no citation.

Qadri (2013) analysed the productivity of Indian LIS Researchers for the period of Pre 1990's & post 1990's. The data related to Library and Information Science literature have been collected from National Journal i.e. IASLIC Bulletin & International Journal i.e. Program: Electronic library and Information System. On the basis of collected data, the study attempted to examine frequency of the subject area covered, authorship pattern, prolific authors, profession wise contribution, institution wise contribution and most productive journals. Results of the study showed that there are marked differences in subject areas covered from traditional to modern, patterns of authorship increases to single authorship, prolific authorship and productivity of journals also changes. It also revealed that there is steady growth in Indian LIS literature in the year 2010 as compared to 1985.
2.7 Bibliometric Studies on Individual Electronic Journals

Koehler et al. (2000) compared some of the bibliometric characteristics of three information science e-journals and a leading print journal, Journal of the American Society for Information Science (JASIS). They found that JASIS articles have more citations, and its articles were typically longer than e-journal articles. They also observed that JASIS and Information Research (IR) seem to be perceived by the authors as archival journals, while the other two e-journals they studied tended to publish reports of work in process. In addition, they reported that JASIS authors were mostly from North America, and IR authors, originally mainly of UK origin, have become more geographically dispersed.

Jacsó (2001) studied the coverage of e-journals in databases covering library and information science. His definition of an e-journal is similar to that of Joglekar and Sen. Jacsó chooses 10 information science e-journals and reported on their coverage in six online databases.

Patra, Bhattacharya, and Verma (2006) study of bibliometric literature used the time frame of 1969 to 2005 to accomplish this goal. The authors chose to search Library and Information Science Abstracts database, for which 1969 to 2005 is the full range of coverage. Specific keyword searches were used, and the researchers then noted information that could help indicate the growth (or non-growth) of literature, as well as the core journals, authorship patterns, and language distribution. The results of this study point to a steady growth of literature in recent years, attributed by the author to an increase of interest and participation in the field of bibliometrics.

Singh, Mittal and Ahmad (2007) studied over 1,000 articles for the period 1998-2004. Data were collected from LISA Plus and were analyzed to study authorship patterns, authors' productivity and prominent contributors, language-wise and year-wise distribution of articles, country-wise distribution of journals, core journals in the subject area, and indexing term frequency. Some of the important findings are that most articles (61%) are single-authored; author productivity is not in agreement with Lotka's Law, except in one case where the number of articles is three; the maximum number of articles were published in 2003 with English being the most productive language; maximum
articles were published in the journal D-lib Magazine; distribution of articles nearly follows Bradford's Law; and USA ranked first for maximum number of journals.

Davarpanah and Asle Kia (2008) presents a quantitative study of productivity, characteristics and various aspects of global publication in the field of library and information science (LIS). A total of 894 contributions published in 56 LIS journals indexed in SSCI during the years of 2000–2004 were analyzed. A total of 1361 authors had contributed publications during the five years. The overwhelming majority (89.93%) of them wrote one paper. The average number of authors per paper is 1.52. All the studied papers were published in English. The sum of research output of the author's from USA and UK reaches 70% of the total productivity. Most papers received few citations. Each article received on an average 1.6 citations and the LIS researchers cite mostly latest articles. About 48% of citing authors had a tendency of self-citation. The productive authors, their contribution and authorship position are listed to indicate their productivity and degree of involvement in their research publications.

Chaurasia (2008) explained the bibliometric analysis of the journal Annals of Library and Information Studies (2002-2006) showed a trend of growth in contributions and average number of contributions was 21.4 per volume. The majority of the library and information scientists prefer to do collaborative research and contribute their papers jointly. Most of the contributions were on Bibliometrics (36.45%). IT and Digital Technologies in Libraries had also got sufficient papers. The institutional and geographic distribution of contributions was calculated. Most of the contributions were with citations. The majority of the library and information scientists had cited journals in large number (50.15%) while books came in second with 273 (19.96%) citations. ‘Annals of Library and Information Studies’ occupied the 1st rank and ‘Scientometrics’ was the 2nd rank in the ranked list of cited journals.

In a bibliometric study carried out on the Ghana Library Journal over a 7-year period, Sam (2008) reported that 43 journal articles were published and that 618 citations were made, averaging 14.4 citations per journal article. Journals accounted for the most frequently-cited type of media at 44.5%, followed by books (32.5%), and reports (9.4%). According to Sam, in the current sources of information, about 62.9% of the journals and
48.8% of the books appearing in the reference lists were published in 1990 or later. The study also revealed that the subject area most researched was academic libraries and that most of the authors were from universities (75%) while 12.5% of the authors were from research institutions.

Tsay (2008) explored the relationship between Journal of the American Society for Information Science and Technology (JASIST), and other disciplines by citation analysis. The citation data were drawn from references of each article of JASIST in 1980, 1985, 1990, 1995, 2000 and 2004. The Ulrich’s Periodical Directory, Library of Congress Subject Heading, retrieved from the WorldCat and LISA database were used to identify the main class, subclass and subject of cited journals and books. The results of this study revealed that the production rate of JASIST literature doubles and the average number of references cited per paper is also increased 2 to 3 times in a period of about 25 years. Beginning in 1995, there has been a significant increase in the number of electronic resources and constitutes 5% of all document types in 2004. JASIST itself is the most highly cited, and is followed by four library and information science (LIS) journals, namely Information Processing and Management, Journal of Documentation, Annual Review of Information Science and Technology and Journal of Information Science. The number of countries publishing the cited journal increases from 9 to 26 within 25 years. The three main classes of journals that were cited by JASIST most are library science (50%), science (22.7%) and social sciences (6.3%). The three subclasses of LIS encompass general bibliography, machine methods of information and retrieval and mechanized bibliographic control and library and information science. The top five most cited books of JASIST are Smart Retrieval System—Experiments in Automatic Document Processing, Introduction to Modern Information Retrieval, Information Retrieval, Little Science and Big Science, Information Seeking in Electronic Environments, Information Retrieval: Data Structure and Algorithms. The most cited books of JASIST are quite dispersive and science is the most cited class followed by LIS, social sciences, philosophy/psychology/religion, and the most cited subject is computerized information retrieval and mechanized bibliographic control.
Park (2010) revealed a new thing in her study "D-Lib Magazine: Its first 13 years" that the source journal is dominated by male authors with 74% of all contributions, and 77% of authors made a single contribution to the DLib magazine during this study.

Ross (2010) investigated trends in publication from 1993 to 2003 of the Library Quarterly in volumes 63 through 73. It investigates trends in subject focus and author productivity, such as, developing trends in the content of the articles published, authorship pattern, and author affiliation.

Thanuskodi (2010) in his Bibliometric Analysis of the Journal of Library Philosophy and Practice from the year 2005 to 2009, noted that a total of 249 articles was published during the period under reference with 82 serving as the maximum number of articles published in 2009 and 10 serving as the minimum in 2005. The study also revealed that out of the 249 published articles, 78 were contributed by single authors (31.32%), while the rest (171 articles or 68.68%) was contributed by joint authors.

Hussain and Fatima (2011) conducted a bibliometric analysis of the "Chinese Librarianship: an International Electronic Journal" for the period of 2006-2010. The study demonstrates and elaborates on the various aspects of the Journal, such as its distribution of articles by year, authorship patterns, distribution of contributions by institution, subject distributions, citation patterns, length of article, a rank of cited authors, and geographical distributions of authors.

Hussain, Fatima and Devendra Kumar (2011) analyzed a bibliometric study of 578 articles published during the period January 1, 2000 to December 31, 2010 in the Electronic Library journal. The paper covers the bibliometric analyses of year-wise distribution of articles, category-wise classification of papers, subject-wise distribution of articles, authorship patterns, and institutions-wise distribution of contributions. Special issues of the Electronic Library brought out during 2000-2010, and prolific authors during 2000 to 2010 have been analyzed.

Khaparde (2011) stated in his study “Bibliometric Study of Electronic Journal of Academic and Special Librarianship.” That single author contributions has dominated the
journal with 47.95% of contributions, and in geographical based distribution of articles India have occupied the top position with 28.41% publications. The study also made an attempt to examine the year-wise distribution of citations, type of information sources used, authorship pattern, geographical distribution and core journals in the field of Electronic Journal of Academic and special librarianship.

Singh, Jain and Babbar (2011) analyzed the trends and the publication patterns in DESIDOC Bulletin of Information Technology over a ten-year period from 1992–2002. The data collected from the 10 volumes is summarized in ten tables: volume wise distribution of contributors, authorship pattern of contributors, geographical distribution of contributors, institution wise, etc. This study reveals that total 145 articles were published in the 60 issues of the journal. Out of the 145 publications, 97 (66.90%) articles published by a single author. The study also reveals that 128 items (88.28%) were contributed from India and rest 17 items (11.72%) were contributed from the rest of the country.

Swain (2011) conducted a bibliometric study of Library Philosophy and Practice from 2004 to 2009 and revealed the partial compliance of the authorship productivity pattern of LPP with Lotka’s Law at a slightly greater n value. The study further revealed that the degree of collaboration in LPP ranged from 0.222 to 0.52 and the highest numbers of contributors hailed from Nigeria, followed by USA, India, and Iran.

Thanuskodi (2011) presented a bibliometric analysis of the journal titled “Library Herald” for the period between 2006 to 2010. The analysis cover mainly the number of articles, authorship pattern, subject wise distribution of articles, average number of references per articles, forms of documents cited, year wise distribution of cited journals etc. All the studies point towards the merits and weakness of the journal which will be helpful for its further development. The result showed that out of 138 articles single author contributed 72 (52.17%) articles while the rest 66 (47.83%) articles were contributed by joint authors. The study reveals that most of the contributions are from India with 89.85 % and the rest 10.15% only from foreign sources.

Tsay (2011) the study revealed that journal articles are the most cited documents, followed by books and book chapters, electronic resources, and conference proceedings,
respectively. The three main classes of cited journals in JIS papers are “library science,” “social sciences” and “science.” The three subclasses of non-LIS journals that were highly cited in JIS papers are “industries, land use, labor”, “mathematics, computer science,” and “science.” The three highly cited subjects of library and information science journals encompass “searching,” “information work,” and “World Wide Web.” The highly cited main classes of books in JIS papers are “Social sciences,” followed by “library and information science,” “science,” “philosophy, psychology, religion.”

Tsay and Shu (2011) revealed that journal articles are the most cited documents, followed by books and book chapters, electronic resources, and conference proceedings, respectively. The three main classes of cited journals in Journal of Documentation (JOD) papers are library science, science, and social sciences. The three subclasses of non-LIS journals that were highly cited in JOD papers are Science, “Mathematics, Computer Science”, and “Industries, Land use, Labor”. The three highly cited subjects of library and information science journals encompass searching, information work, and online information retrieval. The most cited main class of books in JOD papers is library and information science, followed by social sciences, science, “Philosophy, Psychology, Religion.” The three highly cited subclasses of books in JOD papers are “Books (General), Writing, Paleography, Book industries and trade, Libraries, Bibliography,” “Philology and Linguistics,” and Science, and the most cited subject of books was on information storage and retrieval systems.

Warraich and Ahmad (2011) revealed an interesting thing in his study "Pakistani Journal of Library and Information Science: A bibliometric analysis" that about 53.15% of the articles are research oriented, whereas 39.64% of the articles were having no references.

Isiakpona (2012) analysed a bibliometric study of the LIBRES, Library and Information Science Research Electronic Journal between 2004 and 2010. Literature, both past and present, have established that bibliometric analysis plays a very important role in the field of Library and Information Science, especially in the areas of research evaluation and quality adjustment of published articles.
Bibliographic analysis was used to analyze the collected data. The results of the study revealed that a total of 61 articles was published in the 7-year period with 12 articles as the highest number in 2008. Most of the articles were within the general subject area of Library and Information Science and were written by a single author. Hence, the degree of collaboration was 0.279, and the majority of the publications was contributed by authors in universities.

Jena, Swain and Sahoo's (2012) study on nine volumes (Vol 49 to 57) containing 36 issues of "Annals of Library and Information Studies" published during the year 2002 to 2010 were taken up for evaluation. The details with regard to each published article such as number of articles in each issue of the journal, number of authors, name of authors, place for authors, number of references and their forms, number of pages, etc., were recorded and analyzed.

Ratha, Naidu and Gawde (2012) described the bibliometric Analysis of the Information Research: an International Electronic Journal (IRIEJ), which has included the study of form of documents, authorship pattern, ranking of authors, year wise distribution of references and articles, ranking of cited journals, cited publishers and research contributors.

Swain, Jena and Mahapatra (2012) evaluate journal of Interlending and Document Supply (ILDS) from 2001 to 2010 using different bibliometric indicators and to find out various dimensions of publication trends of this journal. Analyzing 315 scholarly articles published in ILDS for a period of 10 years, ranging from 2001 to 2010, the study reveals that the highest numbers of articles are found to be single authored contributions, followed by two-authored contributions. The authorship productivity pattern partially complies with Lotka's Law. In regard to country productivity, UK leads the table, followed by the USA, and France. Moreover, ILDS authors are found to have fairly cited recent literature in their papers which is evident from the half life period of documents. Furthermore, the study concludes that ILDS can enrich its standard if it can fine tune its editorial policy.
Yang and Lee (2012) assessed research patterns and trends of library and information science (LIS) in Korea by applying bibliometric analysis to 159 Korean LIS professors’ 2,401 peer-reviewed publications published between 2001 and 2010. Bibliometric analysis of publication data found an increasing trend for collaboration, robust publication patterns, increasing number of international publications, and internationalization of LIS in Korea. The maturation and internalization of LIS research was evidenced in increased number of publications in high impact journals (e.g., SSI, SSCI), growing participation in leading international conferences (e.g., ASIST, TREC), increasing proportion of Korean LIS faculty with international degrees, and high publication rates by professors with international degrees.

Das (2013) critically analysed 239 scholarly communications published in the inaugural five volumes of Journal of Informetrics (JOI) to examine growth of literature, types of communications, authorship pattern, collaboration trend, predominant research domains, etc. Subsequent analysis focuses on prolific contributors, degree of collaboration, and time-lag trend. Findings reveal that publication output doubles over the study period as article publications increase considerably; though single-authored contributions were significant (30%), the majority of contributions were collaborated with two-authors (36%), while average authorship accounts for 2.28 per communications. Degree of collaboration (DC) was impressive (0.699) but not overwhelming as research collaborations has emanated from 199 higher learning institutions of 32 countries across the globe. The results also show the upward trend of keyword usage with an average of 4.55 per items, of which h-index, citation analysis, bibliometrics, g-index, etc., expectedly predominates. Scholarly nature of source journal has been further ascertained from increasing citations and reference usage trend. Moreover, growing hardness of the field had been attributed to JOI due to the increasing usage of tables and figures. The study also showed that the journal takes an average of about four month time to publish a manuscript.
Har Singh (2013) analysed the various bibliometric components of the articles published in the Chinese Librarianship: an International Electronic Journal between 2009 and 2012. Various quality aspects of the 55 articles published in the period were studied. Also revealed are the quantitative growth of articles by number and year, distribution of citations by number and year, range of citations per article, authorship patterns, authorship productivity, most prolific authors, and authors by country.

Panda et al. (2013) stated in the study The Journal of Information Literacy: A bibliometric study that almost all the papers (94.65%) are from academic institutions. The citations in the journal demonstrate that individual research is higher than collaborative research. Both faculty members and professionals have equally contributed to the journal.

Roy and Basak (2013) Bibliometrics is the discipline where quantitative methods were employed to probe the scientific communication process by measuring and analyzing various aspects of written documents. It helps to monitor growth of literature and patterns of research. This paper examines the articles published in the Journal of Documentation for authorship pattern, degree of collaboration, geographical distribution of papers and citation analysis. The studies carried out in this paper found that the majority of papers are multi-authored. The degree of collaboration is found to be 0.51. The geographical distribution reveals that the contribution by the United Kingdom is the highest. The average citations per paper are 43.

Srimurugan and Nattar (2013) in the study carried out that collaborative research was given priority over solo research. The degree of collaboration was found to be 0.625. It further revealed that more contribution comes from the USA and Germany, while facet-wise distribution of articles depicts that most of the articles cover digital libraries and preservation followed by metadata/cataloguing. It also found the authorship trends, contribution of teaching and professional, country-wise contribution, degree of collaboration and productivity within different facets of digital/electronic libraries.
2.8 Bibliometric Studies on Multiple Electronic Journals

Senapati and Jagtar Singh (2006) analysed bibliometric data of two web-based journals entitled 'South African Journal of Information Management' (SAJIM) and 'Information Science' (IS) on the basis of year-wise distribution of papers, authorship pattern, institution wise distribution of papers, countrywise distribution of papers, and subjectwise. It has been found that both the journals have no uniform policy in respect of the number of papers to be published in a volume. Single authors have made the maximum contribution in both the journals. The majority of papers has been contributed by authors from academic institutions in both the journals. IS is international in character as compared to SAJIM as contributors of IS have been distributed throughout the world. SAJIM has covered maximum number of papers on Information System Management whereas IS on Information System. A good number of papers have covered in Knowledge Management have been covered in both the journals.

Gunasekera (2008) presented a bibliometric study of two LIS journals, namely Journal of University Librarian's Association (JULA) and the Sri Lanka Library Review from 1997 to 2007 were analyzed to examine the type of LIS research, areas of LIS research and research strategies and data collection methods used by the LIS researchers in Sri Lanka. This bibliometric study is an analysis of the authorship pattern, author productivity and prominent contributors, citation pattern, length of papers, language wise and year wise distribution of articles, growth and direction of LIS research papers over a period of ten years. Sri Lanka LIS research output seems to concentrate in the area of "LIS Activities" and "Information Seeking". Most of the articles (94%) are single authored and author productivity is not in agreement with the Lotka's Law. There is no definite growth pattern or positive growth in the area of LIS research in the country. Average citation per article was 9 while the average length of an article was 12.

Bhat and Sampath Kumar (2008) described a citation analysis of research articles from scholarly electronic journals published in 2000-2006. The analysis focused on the extent to which scholars are using web-based sources in scholarly electronic journals.
The results of the study show that 81.49% of articles published in selected 9 electronic journals during 2000-2006 have web references. Out of 25,730 references 56.54 % of references are printed journal references and 43.52% of them are web references.

Mukherjee (2009) described 17 fully open access electronic journals published uninterruptedly during 2000–2004 in the field of Library and Information Science Open Access e-journals’ literature by analysing articles, authors, institutions, countries, subjects, and references. Quantitative content analysis was carried out on the data, the data were analysed in order to project literature growth, authorship pattern, gender pattern, cited reference pattern and related bibliometric phenomena. The analysis indicates that there were as many as 1636 articles published during 2000–2004 with an average increment of 23.75 articles per year. The authorship pattern indicates that team research has not been very common in LIS OA publishing and male authors were keener than female authors. Authors from academic institutions were paid more interest in OA publishing and most of them were from developing nations. The subject coverage of these OA e-journals were very vast and almost all facets of information and library science were covered in these articles. There were 90.10% of the articles of these e-journals contained references and on an average an article contained 24 references. Of these, 38.53% of the references were hyperlinked and 87.35% of hyperlinked references were live during the investigation. The analysis of data clearly indicates that OA e-journals in LIS are rapidly establishing themselves as a most viable media for scholarly communication.

Joanna Sin (2011) analysed 7,489 papers published in six leading publications (ARIST, IPandM, JAMIA, JASIST, MISQ, and Scientometrics) to identify the co-authorship trends within Library and Information Science (LIS). Logistic regression tested the relationships between citations received and seven factors: authorship type, author's subregion, country income level, publication year, number of authors, document type, and journal title. The main authorship type since 1995 was national collaboration. It was also the dominant type of all publications studied except ARIST, and for all regions
except Africa. For citation counts, the logistic regression analysis found all seven factors were significant. Papers that included international collaboration, Northern European authors, and authors in high-income nations had higher odds of being cited more. Papers from East Asia, Southeast Asia, and Southern Europe had lower odds than North American papers. As discussed in the bibliometric literature, Merton's Matthew Effect sheds light on the differential citation counts based on the authors' subregion.


Parveen Kumar (2013) deals with open access journals accessible from Directory of Open Access Journals (DOAJ) in the subject of library science. Analyzed based on country, keywords, frequency, etc. The analysis indicates that there was only one open access journal i.e. Bulletin of the Medical Library Association available before 1990 in the field of library and information science (LIS). Only 19.04% journals have their EISSN. Almost one fourth journals was publishing on half yearly basis.

Jamdade and Jamdade (2013) Authors made an effort to study the total 137 free full text with 5 online journals was accessed through DOAJ and analyzed based on subject headings, languages, country their accessibility of archives of online journals in Library and Information Science.

The review shows that there are several areas in which bibliometric research on electronic journals is needed.
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