## Chapter 2: Literature Review

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Chapter 2: Literature Review

2.1 Introduction:-

Literature review is an objective analysis of contributions made by authors, researchers, experts including technical specialists on a particular subject area or research topic. It is a chronological presentation of growth and development of literature in a particular field over a period of time. The very purpose of a literature review is to understand the experimented methods, techniques and skills of a phenomenon and its procedural presentation. This is believed to guide the researcher to formulate and identify the objectives, hypothesis, methods for collection and analysis of data. Literature review enables the researcher to restructure, reorganize and recast the presentation in light of work done at various levels. Therefore, a literature review is considered as an integral part of research studies (Dahibhate, 2011). The review covers research articles, theses and dissertations, projects, reports etc.

The present review is grouped in following facets:

2.1.1. Library and Information Science: Education
2.1.2. Library and Information Science: Research
2.1.3. Bibliometrics and bibliometric analysis
2.1.4. Bibliometrics Law
2.1.5. Citation analysis studies
2.1.6. Citation analysis studies in LIS
2.1.7. Web resource citation studies
2.1.8. Webometrics and scientometrics studies
2.1.9. Citation analysis study in other subject

2.1.1. Library and Information Science: Education:-

Asundi and Karisiddappa (2007) in their publication "Library and information science education in India: International perspectives with special reference to developing countries" made a detailed analysis of development and progress of LIS education in India and its features. The authors narrated the different levels of education system and also suggested the future trends in education. Rath (2010) and Higgins (2007) pointed out in their communication that education is one of the largest activities in the world and library supplements to fulfill educational goals and serve as a gateway for academic world. Authors emphasized the need of proper LIS education to provide better services to users from the
library. Singh (2003) in his article “LIS education in India Issues and Trends,” revealed the status of LIS education in India and narrated the historical developments in LIS education since independence. He also explained different levels of LIS education offered by different universities in India. Author emphasized on the need for having a national level accreditation body to maintain uniformity and standards in LIS education. The study concluded with discussions on the problems in LIS education and suggested ways to solve these problems and the approaches to prepare the LIS professionals to face the growing challenges in the job market. Jain (2007) in his paper on “Library and Information Science (LIS) education and LIS professionals in India” indicated that currently both the traditional libraries and the digital libraries coexist in India. LIS education in India has not become receptive to the new emerging situation. The library schools have failed to develop the required knowledge and skills relating to the use of information technology among students. The paper discusses the challenges in LIS education in the Indian context. It deals with the preparing LIS graduates for leadership and support to management roles to and also to support national and economic development in India, collaboration and resource sharing among LIS schools. It also discusses the recent emphasis given on e-learning in LIS education in India.

LIS education has completed hundred years in 2011 and on this occasion Department of Library and Information Science, The University of Bardawan, Golapbag, Bardawan, West Bengal organized a seminar on the theme "A century of LIS Education in India: Past, Present and Future" during 2-4 February 2012. The main theme of the seminar was LIS education and in which sub themes covered were historical development of LIS education in India, changing practices in LIS education and trends, reshaping LIS courses, New components in LIS education, choice and credit based LIS education system, Accreditation issues, continuing education, Digital Library and Virtual Library based educational applications in syllabi, applications of ICT and web tools, international cooperation and collaboration. This seminar reflects the need of revamping LIS education tuned to present and future requirements. Similarly a conference was also organized by IATLIS in 2009 on the same theme and many scholars contributed their opinions in respect to LIS education. Karisiddappa and Asundi, Satija, Konnur and Dahibhate, discussed on the theme of LIS education. Kalra, Tripathi, Gadhvi, discussed on the LIS curriculum reorganization. Jagtar Singh and Malhan (2010) in their paper "Trends and issues in LIS education" identified the emerging trends and lingering issues in Library and Information Science (LIS) education in India, and suggested to align LIS education programs with job-market and end-user expectations. Ravi
and Mohan (2005) in their communication explored that the e-learning mechanism is required to provide for quality of Library and Information Science education at university level through the distance learning. The paper highlights LIS education in distance mode, developments of E-learning and LIS education in India, and universities are forced to face major challenges to adopt e-learning mechanisms, which are to design LIS programmes to fit into the e-learning environment, to provide quality education. The teachers as well as students are to be trained in the information technology advancement, to enhance LIS education e-learning consortium, collaboration, quality assurance with accreditation and cost effective were discussed in details to strengthening the LIS education.

Garg et al. (2009), in his study reported that the craze for PhD in library science is also growing rapidly in India, and main reason is that today most of the universities are demanding for a doctoral degree in library and information science for faculties as well as for senior professionals in university and other higher educational and research libraries. This led to an increased research activity at various library schools in India.

**Summary:-** The above literature review highlighted major challenges in LIS education. LIS education in India is progressing and growing at an alarming speed (Asundi and Karisiddappa 2007). There are different levels of LIS education system and conduct courses at bachelors, masters and research programs i.e. M Phil and PhD (Rath 2010 and Higgins 2007). LIS education is a basic need for better management and providing library services to users. Authors have also suggested need of a national level accreditation body to maintain uniformity in LIS education system and curriculum needs to be updated regularly to face new emerging technologies (Jain 2007). Use of ICT is necessary to support and manage the emerging trends in LIS. Different skills have to be acquired by the LIS professionals to face the future trends. Distance learning and e-learning practices in LIS are implementing in nearer future and libraries have to look in to this aspect in terms of improving education system

**2.1.2. Library and Information Science: Research:-**

Wikinson (1983) rightly indicated in his paper "If librarianship aspires to become a profession, it should depend upon research to develop its knowledge base and its theoretical framework". This statement explains the need of research in LIS. Mahapatra and Sahoo (2004) indicated that there are many problems that libraries and librarianship faces due to
constant changes in the profession, and to solve these problems only research activities could be a useful measure. Further to enhance the human knowledge base and to develop better advanced tools and technique in LIS research helps in attaining such activities. Research is vital as it is a scientific method of enquiry, finding out something, creating new knowledge, going beyond experience and solves the issues. Chandrasekharan and Ramasesh (2009) in their research paper clearly projected the output of research in India and development of doctoral research in India with relevant statistical analysis. Attempt in the study depicted quantity of research output in the form doctoral theses grouped according to state, university, subject and supervisor / guide etc. The study concluded with indicating areas of research activity in LIS with ranking of universities and states which have contributed research in India. Satija (1999), Gupta (2010), also made similar studies and discussed the trends in LIS research in India. Patra and Chand (2006) in their communication LIS research in India conducted a bibliometric study of LIS research and concluded suggesting LIS research output from India needs to be flashed at international level instead contributing in Indian journals. Kannappanavar and Vijayakumar (2000) conducted a study on the occasion of completing fifty years of LIS research in India and illustrated the trends in research. Authors in their study reported traces and the trends and developments of LIS research in India for the past 50 years. According to the year 1992 is the most productive year for research output. Planning and management is the most favoured area for research by LIS researchers followed by user studies and bibliometrics. Karnataka University and its research guides are the most productive university and research guides in the field. Satija (1999) in his article presents a state-of-the-art overview of library and information science (LIS) education and research in India as a background to reviewing the doctoral research in the field. Author traces the origin and growth of PhD programmes in LIS in India and highlights the initiatives and efforts of Dr S. R. Ranganathan (1892–1972) in research. The article provides annual data on the quantitative output of LIS PhD theses and ranks major Indian universities by their output. It includes lists of the major areas of research and identifies some arid areas. Wagh (2011) reviewed research performed in Library and Information Science In India during the period 2004-08 and recorded research programs of PhD in LIS carried out in different universities in India .The data was analyzed and found out the areas of research receiving more attention or less attention, growth pattern, productivity of the universities and supervisors etc. Kumar (1998) reviewed the progress of research in India and analyzed the PhD research conducted during 1950 to 1997. The results deduced from the study reports subject wise analysis, guide wise analysis, state wise analysis, chronological analysis, university productivity analysis etc.
This study was very useful to the researchers in this field. Garg (2009) conducted a detailed study in the area of LIS research using a bibliometric study of citations. He covered the LIS research output during the period 1963-2008. His study identified various patterns like Chronological, guide wise, state wise, subject wise, university wise, language wise, etc. Kumar (1998), in his paper studied the research activity in Indian universities and his conclusion leads to findings that increased research activity at various library schools in India is reported. His paper provides statistics of doctoral research in India. The data of the doctoral research in India has been analyzed chronologically, subject-wise, guide-wise, and university-wise.

**Summary: -** The above papers reviewed the efforts of research activity carried out in India and authors opined that constant changes in library profession are visualized and research activity helps in solving the problems in various areas of LIS. Research activity helps in creating new knowledge and finding out solutions. In India research activity is growing fast and many efforts are made to analyze the progress stated by Chandrasekhara, Satija, Gupta, Patra, Chand and Kannappanwar. All these authors analyzed the research activities based on chronological growth, subject wise growth, university wise growth, state wise growth and guide wise growth etc. Though research activity started in 1957 but real growth was observed since 1992 in India. Prominent universities in India are conducting PhD programs and contributing in research activity.

### 2.1.3. Bibliometrics and Bibliometric analysis:

Sen (1990), Sengupta (1988) have clearly expressed their views in respect of bibliometrics and stated that bibliometric analysis is used as a research technique and used to study the literature used in performing research by scholars in various subjects. Sengupta (1988) is of the opinion that the literature has grown tremendously and author felt that a survey is necessary to find out the trends of use of literature in biomedicine and find research trends. His article presents a review of different studies which includes themes like explosion of literature, identification of core journals, subject dispersion and geographical dispersion of literature. Sen and Chatterjee (1990), Sen (1989), Sengupta (1988) and Ravichandra Rao (1983) have already conducted bibliometric studies and presented an exhaustive review of
the trends in Indian bibliometric research. At the international level also such type of reviews were reflected and surveys made by Hejreppe (1986 & 1980) and Rousseau (1988) are the examples.

Kabir (1994), studied the authorship pattern and the extent of research collaboration in the field of LIS, based on data collected and analyzed from "LISA" an abstracting journal, for the period 1964-1990. The purpose of the study was to identify authorship trends and solo research using bibliometric studies. The study revealed that solo research is more favourable than the collaborative research. This indicates that in LIS solo research trend is visible.

Diluvio (1989) in his dissertation, tried to find out contribution of Philippine scientists in periodical literature, and the sources cited by these scientists in their articles. A major source of data analyzed was from Science Citation Index for the period 1975-1985. All papers were published by Philippine scientists in English and appeared in international journals. The publication pattern was 39% appeared in US journals. The 53% of papers published by the international agencies in Philippines. Local Philippine scientist affiliated with these agencies contributes only 14% of papers. One third of papers from the international agencies published were co-authored by Philippine and Non-Philippine scientists. Citation analysis techniques were used to compare the extent of published Philippine literature. The study concluded with pointing Philippine scientists published papers in journals emanating from a wide range of countries but they contribute very little to the high impact journals as measured by citation.

Scholman (1990), in his study tried to examine issues related education which is separate field and with the help of patterns of information transfer in health education research using bibliometric methods author focused on core journals in the field of health science, comparison of health education research with research from other disciplines and analysis of citations and researchers in health education.

Nweke (1989), identifies 260 journal titles cited 750 times in the Zoological theses submitted to the Ibadan University, Nigeria during 1970 and 1975. Author used Bradford’s law for solving citation relation in 23 core journals. Noguchi (1988), attempted a bibliometric study in management. Unlike most contemporary sciences in Japan the subject of “Japanese style management” is special and it evolved out of Japanese standard management practice and was reorganized and praised outside Japan. This study apply bibliometric method and examined the characteristics of the literature on “Japanese style Management” in western languages and investigates Japanese contribution to the development of this subject. It was found that the literature is a little more scattered than Bradford’s law predicts and that the
transfer of information about “Japanese style management” is carried out more by Japanese authors writing in Western languages than by publications used in Japan.

Nuria and Sabate (2008) conducted bibliometric study using citations in chemistry field. The citations from PhD dissertations were ascertained to find types of documents used, document most frequently used in the research process, the most frequently consulted journals and obsolescence rate of the journals etc. The analysis covered 46 doctoral theses submitted to Institute Químic de Sarriá (IQS) from 1995 to 2003. The results obtained from the analysis of 4,203 citations revealed that the most frequently used documents were scientific papers, which accounted for 79% of the total; 33 journals met 50% of the informational needs; and the age of 50% of the citations was not older than 9 years. Finally, the results can be used as a tool for the collection management of the library. Tonta and Umut (2006), analyzed the bibliometric features of 100 theses and dissertations approved by Department of Librarianship, Hacettepe University, during 1974 and 2002. The research coverage of 24% thesis was on university libraries, followed by public libraries (9%). Doctoral dissertations appeared twice as long as master’s theses and contained 2.5 times more citations. Recently completed research work theses and dissertations contained more citations to electronic publications. Fourteen (3.2%) journal titles received almost half (48.9%) citations. Cited journal titles in master’s and doctoral theses and dissertations overlapped significantly. The mean half-life of all cited sources was 9 years. Single authorship was the norm in cited resources. The findings of the present study is used to identify the core journal titles in librarianship as well as to evaluate the existing library collections to decide which journal titles to keep, discard, or relegate to off-site storage areas.

Chaurasia (2008), in his article “Bibliometric Analysis of Annals of Library and Information Studies (2002-2006)” highlighted the fact that Bibliometrics is an emerging thrust area in research and has now become a well established part of information research and a quantitative approach to the description of documents. Bibliometrics has grown out of the realization that literature is growing and changing out of a rate with which no librarian equipped with traditional bibliographic skills and methods could keep abreast. In his study author shows that journals are most cited form of communication amongst the library and information scientists and the source journal is the most cited publication. The bibliometric analysis study of the journal “Annals of Library and Information Studies (2002-2006)” indicated trend of growth in contributions and on an average number of contributions of articles are 21.4 per volume. Majority of the library and information scientists prefer
collaborative research and contribute their papers jointly. Most of the contributions are on bibliometrics (36.45%). ICT and digital technologies in libraries and have also received sufficient papers. Author has also conducted institutional and geographical distribution of contributions library and information scientists have cited journals in large number (50.15%) while books at second level with 273 (19.96%) citations. ‘Annals of Library & Information Studies’ occupies the 1st rank, and ‘Sciento)m{etrics’ occupies 2nd rank in the ranked list of cited journals. Pillai and Kumar (2010), present study to determine the bibliometric characteristics of the biochemistry research conducted at University of Kerala, and presented subject wise break-up, bibliographic forms of cited documents, most cited journals, collaboration in authorship, etc. in the study. For this study and to find research trends in biochemistry at the University of Kerala, 168 doctoral dissertations awarded between 1966 and 2007 at the Department of Biochemistry of University of Kerala were used as a source for analysis.

Vallmitjana and Sabate (2008), conducted bibliometric study using citations from PhD dissertations of chemistry to ascertain types of documents most frequently used in the research process, and most frequently consulted journals and obsolescence rate of the journals etc. The analysis covered 46 doctoral theses presented at the Institute Químic de Sarriá (IQS) from 1995 to 2003. The results obtained from 4,203 citations revealed that the most frequently used documents were scientific papers, which accounted for 79% and 33 journals met 50% of the informational needs, The age of 50% citations was not older than 9 years.

**Summary:** - Bibliometric studies and citation analysis is used as a research technique for finding out trends in the subject and use of literature by the researcher as well as gaps in research hence laws of bibliometrics, citation analysis play the very prominent role in deciding different patterns. In LIS, citation studies are also proved beneficial for finding core journals and formulating collection development policy.

**2.1.4. Bibliometrics law:-**

Askew (2008), in his study used Lotka’s law of scientific publication productivity using the methodology outlined by Pao (1985), in the field of Library and Information Studies (LIS). A data set of 1,856 citations was collected using *ISI Web of Knowledge* databases. In the study values of \( n \) and \( c \) were calculated i.e. 2.1 and 0.6418 (64.18%) respectively. This study finds
the amount of literature in the field of library and information studies and conforms to Lotka’s law with reliable results. Lotka’s law can be used in LIS as a standardized means of measuring author publication productivity. Pillai (2009), used bibliometric techniques and laws especially Bradford’s Law of Scattering and a reviewed scholarly contributions. A study of five-year data from journals (2004-2008) cited by the physicists at the Indian Institute of Science (IISc), Bangalore was carried out to examine the applicability of Bradford’s Law of Scattering, which include 690 periodicals containing 11,319 references collected from 79 doctoral theses during the period 2004-08. In the results presented ranked list of journals and four Physical Review-B with 9.53% citation, followed by Physical Review-A with 7.69% and Astrophysical Journal with 5.47% citations were the most preferred journals. Applicability of Bradford’s Law in various methods was tested. Zabed Ahmed and Rahman (2009), in their paper examined the validity of Lotka’s law to authorship distribution in the field of nutrition research of Bangladesh. A list of periodical articles on different aspects of nutrition research published during 1972-2006 was compiled for analysis. Using “full productivity” of authorship, a total of 998 personal author names were identified. Lotka’s law was tested using both generalized and modified forms, The results suggest that author productivity distribution predicted in Lotka’s generalized inverse square law is not applicable to nutrition research of Bangladesh. Using least-squares excluding high productive authors and maximum likelihood methods, Lotka’s law is found to be applicable to nutrition research in Bangladesh.

Summary: - Bibliometric laws like Bradford, Lotka are very popular and used to find different patterns including half-life literature in every subject area.

2.1.5. Citation Analysis Studies:-

Janakiramaiah and Doraswamy (2011), in their study examined the conference papers published, in the convention on automation of libraries in education and research institution (CALIBER) in the year 2005 and 2006. The analysis of paper cover different bibliographic forms used, average number of citations per paper, authorship pattern, different websites used, types of conference proceedings, geographical distribution and ranked list of cited journals. Das and Sen (2001) analyzed 1049 citations from 34 research articles of Journal of Biosciences; 2000. It their study it was found that out of the total citations, journal articles comprises 85.89% and monographs 10.1%. Ramesh and Nagaraju (2000) analyzed the citations from articles of Indian journal of Information, Library and Society. From 138 citing articles total citations were 901 i.e. on an average 7 citations were cited per article. About
67.5% of articles had 1-20 citations. More citations were from the books and periodicals than the other type of materials. Similar type of study was also performed by Koley and Sen (2003) covering 457 citations appended to 26 research articles published in four issues of the quarterly journal "Indian Journal of Physiology and Allied Sciences". From the total citation study it was noticed that about, 76.81% citations relate to journal articles, and 18.59% to monographs, and the rest to conference papers, theses, etc. Rethlefsen (2007) analyzed citation of journal articles authored by Minnesota Department of Health staff. Information on each cited reference was recorded, including reference type, relative age of citation, and journal name etc. The outcome of the study was that journals were the most heavily cited resource by the researchers (63%). Bhat & Sampath Kumar (2008) studied a citation analysis of research articles from scholarly electronic journals published in 2000-2006. The analysis focused on the extent to find which scholars are using web-based sources in scholarly electronic journals. Results of the study shows that 81.49% of articles published in selected 9 electronic journals during 2000-2006 had web references. Out of 25,730 references 56.54 % of references were for print journal and 43.52% of them were for web references. 437 citations from 32 research articles from two issues of the “Rawal Medical Journal” were collected by Javed and Shah (2008). The study revealed that 49.52 % citations pertained to journal articles and rest to other resource types. All the above studies except the last one reveals that journals are heavily cited and preferred source of information. In the above studies citations of journal articles were analyzed.

Slutz (1997) in his citation analysis study of 16 master's theses, analyzed the data based on gender of authors; documents used (book, article within book, journal article, thesis, dissertation); and place of publications etc. The research findings indicated that more male authored citations were appeared and most of information sources used were books, articles within books, and journal articles. Gooden (2001) performed a citation analysis study of dissertations, and from 30 dissertations collected 3,704 citations. Author found that journal articles were cited more frequently than monographs and 85.8% of the citations were for journal articles and 8.4% citations were for the monographs. 4,012 citations in 70 postgraduate dissertations in education were studied by Okiy (2003) and he found that most students in education stream use more textbooks literature (60.3 per cent), than other forms of library materials. Megnigbeto (2006) studied the citations of dissertations of library and information science (undergraduate students) and found that the number of citations to internet resources was initiated but use is very low.
Dalia (1987), Analyzed funding policies in a more systematic method and scientific manner. The need of analysis is due to exponential growth of the scientific literature and obviously the population of scientists producing it. The search for such advice has been resulted in the development of a combined method of statistical analysis of the literature in the given field. The techniques employed were mainly citation analysis and epidemiological analysis. The high correlation between quality and citations by review articles justified the use of citation analysis technique. Pulla and Sharma (1988) in their research paper analyzed distribution of publications according to chronology. The analysis is based on number of authors contributed on various systems, classes of agents, forms of literature and finally by institutions. The publications of Environmental Mutagen Society provided a data of 491 publications. Collaborative authorship has been dominant pattern of contribution. Drugs and higher plants appear to be most preferred areas of interests in the subject fields. Seven periodicals have been identified as core by bibliometric study trends. Arvinda and Reddy (1990), analyzed around 3807 citations appended in review articles published in “Annual review of Anthropology” during the year 1980-1982. They found that 57.53% of the Sociocultural Anthropology literature is published in the form of books. The single author citations are more (87.21%) as compared to two, three and more than three author citations. Rank list of cited journals presented in the study indicated scattering of literature of socio culture anthropology in 270 periodicals. His study is useful to Anthropology area. Sharada and Devaki (1990), in their study analyzed the articles abstracted in “Linguistics and Language Behaviour Abstracts (LLBA)” vol. 11-21, 1977-87 were identified to find the authorship pattern, topics covered in linguistics and related fields. She found geographical distribution of authors, chronological distribution, most preferred periodicals of linguists, etc and presented in the paper. This study brings to the light the research output of the linguists in Indian. Articles published in journals at the international level during the past 10 year’s period and highlighted both the areas of interest and the neglected areas in linguistics.

Kannappanavvar et al. (1991) studied the characteristics of literature in clinical psychology and tracked half-life and rate of obsolescence, using citation analysis techniques. The major findings of the study were obsolescence for books and journals which is reported as 16.13% and 14.29% respectively. The Annual Aging Factor (AAF) of cited journal literature in clinical psychology is 0.9425% and while that of books is 0.9475%. The utility factor for journal literature and books was found to be 14.29% and 20.00% respectively. Lal (1993), analyzed 6273 references from four volumes (Vol. 33-36; 195-88) “Indian Society of Soil
Science”. Based on citation analysis a ranked list of 50 most important journals representing 83.42% citations out of the 376 titles cited. The study revealed that 58.43% journal citations relate to only 6 journals out of 50 most cited journals. With regard to the ranked list of journals a comparison is also made with three previous lists. It gives a country-wise distribution of journals in the ranked list and chronological distribution of all references. Use of different kinds of documents as well as Indian and foreign have been shown with the help of tables and diagrams.

Karisiddappa et.al. (1990), studied the authorship pattern and collaborative research in psychology. The data collected from “Psychological Abstracts” for the year 1988 was selected for the study. The contribution of single author papers published were 39.43% indicating the trend towards multiple authorship (60%). The pattern of authorship varies from subject fields. The degree of collaboration in research is 0.6% in Psychology and ranged between 0.29% to 0.89% among the various subject fields. Beena (1996), analyzed the trends from the books published in Malayalam language. She analyzed subject wise and year wise distribution of Malayalam books in science, social science and humanities. The analysis indicated that there is an unbalanced growth of books in different discipline published in Malayalam language.

Chikate and Patil (2008), indicated in their research paper citation analysis is a worthwhile area of research. According to them citation analysis is useful for understanding subject relationships, author effectiveness, publication trends, and so on. The first recorded citation analysis was Gross and Gross (1927) who looked at citation patterns to determine the journals to be subscribed to and back volumes to be acquired for the library of Pomona College. They studied the citation frequency in the references given in the Journal of the American Chemical Society (Amudhavalli 1997). With citation analysis one can evaluate and interpret citations received by articles, authors, institutions, and other indications of scientific activity (Ravichandra Rao 1993).

Jadhav et al (2011), in their study using citation analysis analyzed all the journal articles published in ‘University News’ from January 2004 to December 2008. The citations gathered for the study were 5968. The study related that the maximum number of citations were referred publications 2007 to 2008 published from that is 2950 (50.6%), books are most cited type of document 1549 (26.39%), and maximum number of citations were from India i.e. 3675 (62.61%). In authorship pattern single author citations are dominant than others (3011
Swanepoel (2010), used citation analysis technique to analyze the reference listed in 480 Master’s and Doctoral (M & D) theses and dissertations submitted at the TUT between 2004 and 2007. The purpose of this study was to determine types of information sources used by Master’s and Doctoral students at TUT, different patterns of uses across the 7 faculties of the university, and access to the journals that are mostly used by Master’s and Doctoral students. More than 37,000 citations were analyzed in this study over the 4-year period. The study found several similarities but also some distinct differences in the use of information sources across the 7 faculties of TUT. It also identified more than 60 different information sources used by Master’s and Doctoral students. With regard to journal use, the study found that out of 3,641 different journals cited, most journals were only cited once over a period of 4 years. Denick (2010), used citation analysis for the information literacy standards and assessment in higher education. This study explores the assessment of first-year engineering design students’ information literacy skills in order to refine existing methods and library instructional strategies. A citation analysis is representing references cited in first-year engineering design reports from “Drexel University’s Introduction to Engineering Design” program during the 2008-2009. Citation style was evaluated and identified as per resource type, and currency of each citation reported. From a sample of 234 citations, 38% of references were classified as websites, 28% of references were journal articles and 12% of references were books. The results of this study were compared to previous assessment efforts and aligned to the ALA/ACRL/STS Task Force on Information Literacy for Science and Technology’s Information Literacy Standards for Science and Engineering/Technology. The methods and findings of this study demonstrate an evidence-based approach, focusing on standards-based assessment of engineering information literacy, specifically in how best to serve students, new to engineering research, design and communication.

Haddow and Genoni (2010), conducted a study of social science journals using citation analyses, for Australian journals to determine the differences between data collected from Web of Science and Scopus. The data was compared with the tier rankings assigned by disciplinary groups to the journals for the purposes of a new research assessment model, Excellence in Research for Australia (ERA). In addition to citation-based indicators analysis include an extended journal impact factor, the h-index, and a modified journal diffusion factor, to assess whether subsequent analyses influence over the ranking of journals. The study concluded with findings that the Scopus database provides higher number of citations for the journals. However, there appears to be very little association between the assigned tier...
ranking of journals and their rank derived from citations data. Duzyol et al (2010), studied the mapping of co-citations in open access which is one of the major research trends and hottest topic in electronic publishing. Authors maps the intellectual structure of open access based on 281 articles that appeared in professional literature on the topic between 2000 and 2010. Using bibliometric and co-citation analyses, co-citation patterns of papers presented co-citation maps. Cite Space software was used to analyze and visualize co-citation maps. Maps show major areas of research, prominent articles, major knowledge producers and journals in the field of open access. From the study most frequently cited journals by the authors are listed. The most recent research topics appear to be institutional repositories, open access publishing/open access journals and scientific communication. The preliminary findings show that open access is an emerging research field, and this study is used to identify landmark papers along with their impact in terms of providing different perspectives and engendering new research areas.

Podlubny (2004), studied impact of citation distributions in different fields of science for the years 1992, 1994, 1996, 1997, 1999, and 2001. He found that the ratio of the total number of citations of any two broad fields of science remains close to constant over the analyzed years. Based on this observation, normalization of total numbers of citations with respect to the number of citations in mathematics is suggested as a tool for comparing scientific impact expressed by the number of citations in different fields of science. Biglu (2005), in his research study analyzed a total number of 432 German journals in 2000 and 427 journals in 2005 listed in the Science edition of the Journal Citation Reports (JCR). The study showed that the proportion of German journals added in JCR data bank in 2005 counted 4%. (From a total number of 6,088 journals in the JCR, 427 (7%) were published in Germany). The 6,088 journals in the JCR published 847,114 articles out of there 50,276 (6%) appeared in the German journals. They have 22,353,992 citations in 2005 out of these 861,190 (4%) came from German journals. Gooden (2001), made a citation analysis study of dissertations accepted in the Department of Chemistry at Ohio State University between 1996-2000 to determine information use. He studied 30 dissertations and analyzed 3,704 citations. His study analysed types of resources cited, currency of literature, and dissertation topics. The current results compared with past research by other authors and concluded that Journal articles were cited more frequently than monographs, (85.8% of the citations were journal articles and 8.4% of the citations were monographs). Das and Sen (2001), conducted a study based on 1049 citations listed in 34 research articles from “Journal of Biosciences, Vol. 20(2-
4) 2000”. In their study they found the authorship pattern indicating 18.68% per cent papers are single-authored, 52.71 per cent are double- and triple-authored, and the remaining 28.61 per cent are joint contributions of four or more authors. They have pointed out that in medicine; the author team is more than those in the fields of chemistry and physics. Sometimes mega-authorship (i.e. contributions by ten or more authors) has been traced in studies, and one of them was having 22 authors. From the citations analysis of various types of information resources, journal articles comprised 85.89% and monographs 10.1% and Indian contributions reported 5.53%. From the citing articles 30 are by Indian authors, 3 by foreign authors, and 1 (2.94%) jointly by Indian and foreign authors. 10.87% are self citations in which 0.57% are journal self citations.

Martens (2001), in his article suggested that the citations can be viewed not only as a "concept symbol" but also as a "boundary object". The scientific, legal, and patent citation systems in America are examined at the micro, meso, and macro levels in order to understand how they function as co modified theories of truth in contemporary knowledge representation. This approach also offers a meta-theoretical overview of existing citation research efforts in science, law, and technology that may be of interdisciplinary interest.

Meho and Sonnenwald (2000) conducted a study to analyze the relationship between citation ranking and peer evaluation of performance of faculty. The study was based on sources of peer evaluation data, citation content analysis and book review content analysis, to find citation ranking and correlate with data from citation content analysis, book reviews, and peer ranking. The authors would like to assess whenever citation ranking is a valid evaluative indicator of research performance of senior faculty members. Analysis shows that normalized citation ranking and citation content analysis data yield identical ranking results. Analysis also shows that normalized citation ranking and citation content analysis, book reviews, and peer ranking perform similarly. Citation analysis contains data to indicate some specific and important insights into the quality of research. The study shows that citation ranking can provide a valid indicator for comparative evaluation of senior faculty research performance.

Kayongo (2011), in his study focused on determining the extent to which collections of the Hesburgh Libraries of Notre Dame met the needs of graduate students. His study covers the data from 2005-2007 and using citation analysis of 248 dissertations focused on the different aspects. The data analysis showed that over 90% of the 39,106 citations were for books and journals. The Libraries owned 67% of the items graduate students cited in their dissertations.
The Libraries owned 83% of the Arts and Humanities, 90% of the Engineering, 92% of the Science, and 75% of the Social Sciences sources in the top 1000 most cited titles, indicating a need for funding for further development of Social Sciences collections in the Hesburgh Libraries. Kumar and Kumar (2011), in their paper analyzed 8093 citations appended in the Journal of Oilseed Research (JOR) published during 1993 to 2004. Out of 8093 citations 5642 are given in main articles and 2551 in short communications in JOR. They also analyzed types of documents cited and identified core journals in the area. They analyzed authorship patterns, and Geographical distribution of cited references. The study concluded indicating that only 20 core periodicals cover more than 50% references and also indicated that collaborative research is a new trend in oil seeds research.

Datta and Sen (2000), studied the 743 citations appended to 41 research articles published in the January to April 2000 issues of “Indian Journal of Pure and Applied Physics” the articles being contributed by 124 authors (117 Indian and 7 Foreign). Their study results show that solo research in physics is still quite sustainable (25%) in Indian team. Research is of course the most prevalent form of research where the team size is rather small ranging usually from two to four researchers. Journal articles account for 83% of the total citations and the ratio of Indian to Foreign citations is found to be almost 1:8. The percentage of author self citation is found to be slightly more than 17% and that of journal self citation just 3.6%. The ratio of Indian affiliated citing authors to foreign affiliated citing author is 6:3:1 of the citing articles, 3 are single authors, 17 are two authors and 10 are three authors, 6 are four authors and four are five authors in the case of 27 articles no inter institutional collaboration was involved for the remaining 14 articles.

Bill (1996), identified Seven faculty members from statistics department and their contribution in published research in 1993 and the first half of 1994 was collected and a citation analysis was conducted at the university library, where distinct discipline based collection development policies are now being formulated. Two citation patterns were identified by author, bibliographic and non-bibliographic citations. Bibliographic citations (from the bibliography) numbered 394 from 122 titles. Journals and monographs were the two formats most frequently cited, 46.7% and 36.9%, respectively. The average age of a citation was 12.3 years. The two most frequently cited journal titles were, Journal of Time Series Analysis and Stochastic Processes and Their Applications. Non-bibliographic citations (not found in the bibliography) were used to identify the more important research topics to this population of faculty.
Tilak et al (2010) analyzed the impact of library holdings in terms of physical and online access of doctoral studies in Tezpur University based on citations appended to the PhD dissertations in four subjects covered under the School of Science & Technology. Two latest dissertations (degree awarded) from each subjects were selected and studied. Category wise distribution of the cited items viz. journals, books & monographs, conference proceedings, electronic sources, web citations and others have been studied. Category wise percentile distribution and availability of cited items in the parent library have been calculated for journals and books followed by preparation of rank list of journals for each four subjects studied. Using statistical and bibliometric parameters. The findings were useful to re-engineering of collection development policy of the university libraries.

Dervos et al (2006) have proposed new citation indexing paradigm i.e. the Cascading Citation Indexing Framework (c2IF). It improves the way research publications are assessed for their impact in promoting science and technology. In this analysis given a collection of articles and their citation graph, citations are considered at the (article, author) level. Each article is uniquely identified by means of the Digital Object Identifier (DOI, http://www.doi.org). To identify each author uniquely, a Universal Author Identifier (UAI) scheme is established. Citations (article, author) pairs, citation paths that target each citing article are also considered. The granularity of the paradigm is further increased by introducing the concept of the chord, whereby a citation path of length one co-exists with paths of length two or higher, involving the same source- and target- articles. Reed (1995), in his article stated that promotion or tenure of faculty members are increasingly judged more by quality than on the quantity of their scholarly publications. As a result, author wants help from librarians in locating all citations to their published works for documentation in their curriculum vitae. Citation analysis using Science Citation Index and Social Science Citation Index provides a logical starting point in measuring quality, but the limitations of these sources leave a void in coverage of citations to an author's work. This article discusses alternatives and additional methods of locating citations to published works.

Brennen (1978), studied citations, indexed in “Tropical Diseases Bulletin” for a forty-eight month period (1972 1975) were analyzed according to the journal in which they were published and the language in which they appeared. The results of the study conformed to Bradford's law of bibliographic distribution. The reference scattering coefficient was determined to be 0.504, which indicated a high concentration of articles in relatively few journal titles. A rank order list of sixty-one journals was given as an appendix. The study
noted that English is the most important language in all the literature in terms of productivity. The results of the study may be used as acquisition tool for developing journal collection in tropical medicine.

**Summary:** - Many authors used citation analysis method to find the productivity in different subjects. All the studies pointed out that Journal articles are more used followed by books and other literature. The study reflected less use of e-publication but its use is increasing slowly since past few years (Jan Rosy, 2009). The authors also tracked geographical, chronological and authorship pattern in different subject areas. Citation analysis study is also useful for judging by scholarly publication published based on the citation analysis technique science, citation index, Scopus, Web of Science are generated, now a days for a article or patent pre and post citations are also made available in the databases.

### 2.1.6. Citation analysis studies in LIS:

Mahapatra (1995), Chang-Ping Hu et.al (2011), in their paper revealed the relationship and structure of library and information science (LIS) journals in China. For this purpose 24 core LIS journals in China were selected and the relevant data of journal co-citation retrieved from Chinese Journal full-text database constructed by China National Knowledge Infrastructure during the period of 1999–2009. Using cluster analyzing multidimensional scaling analysis and factor analysis, they analyzed the data of journal co-citation.

Vaishnav and Dharmapurikar (1990), surveyed and analyzed literature published in “Herald of Library Science” for 10 years (1977-1986) and selected 202 articles having 1370 citations. The study aimed at reviewing the citation patterns. They found that 89% of citations and covered from books and periodicals. Indian documents were preferred more in which 70% citations were self cited; 80% journal citations were found from library science journals. The main purpose of study was to find, citations per article, types of document cited, geographical distribution of journals cited, obsolesce of library literature, chronological distribution of citations, ranking of authors cited, language cited, self citations, bibliographic coupling, co-citations, frequency of periodicals used and ranking of journals etc. The study concluded with findings and suggestions. Mahapatra (1992), analyzed the influence of Ranganathan’s work published in the form of literature in the field Indian LIS. Author selected the articles published in journals, “Annals of Library Science and Documentation” “Herald of Library
Science‖ “IASLIC Bulletin‖, “ILA Bulletin‖ and “Library Science with a Slant to Documentation‖ published during 1975 to 1985. The study reported that books written by Ranganathan were cited more often than articles. Similarly Mahapatra (1995) conducted another study to analyse three top ranking Indian journals i.e. “Annals of Library Science and Documentation‖, “Library Science with a Slant to Documentation‖ and “Herald of Library Science‖ to analyze the factors for ranking at top position. Author studied different features like citing and non-citing articles, rate of citations per article, self citation behaviour, author’s collaboration, type of document cited and regency of cited document etc. He is of the opinion that these features may be included in the ranking of journals rather than simply counting of citations. O’Conner (1979), in her doctoral dissertation she assessed the dissertations submitted to library science. A study covers 1206 library science dissertations submitted between 1925 and 1975 in social sciences citation index (SSCI). The study reports that 789 citations from 312 dissertations of LIS serials cover 43.3% of the total citations, 69.6% citations indicated the use of dissertations in their contents which formed a considerable part of the total contribution of source material. Vij (2001), in his article provides a brief sketch of the library and information science abstract database for period. 1969-2000 covering 550 journals with over 206091 abstracts. Author highlights the advantages of LISA database and reported results, which pointed out that LISA includes 550 library and information science journals in its database. Its coverage of journals is from the developing countries are relatively poor, only 24 Indian journals are covered and this figure varies from year to year. The coverage of Indian periodicals and papers is only 4.55% of the total journals and 1.67% of the number of records respectively in this bibliometric study. LISA database was analyzed to investigate year wise distribution of records, subject areas covered. Evolving and decaying subjects, language wise distribution of records country wise distribution of records, authorship pattern, ranked list of Indian and foreign journals, time lag in the coverage of Indian journals and shortcomings of LISA CD-ROM database. His study concludes indicating that there is a still room for coverage of Indian journals in LISA database.

Schneider and Borland (2004), in their paper used bibliometric technique to the research area of knowledge organization more precisely in relation to construction and maintenance of thesauri. This paper reviews related work that has been a inspiration for the assembly of semi automatic bibliometric based approach for construction and maintenance. Similarly the paper discusses the methodical consideration behind the approach. Eventually the semi automatic approach is used to verify the applicability of bibliometric methods as a supplement to
construction and maintenance of thesauri. In the context of knowledge organization the paper outlines two fundamental approaches to knowledge organization, that is the manual intellectual approach and the automatic algorithmic approach. Bibliometric methods belong to the automatic algorithmic approach though bibliometrics do have special characteristics that are substantially different from other methods within this approach.

Nishavathi (2007), identified research trends in LIS in India based on subject or area analysis. She identified major subjects like management, information seeking behaviour, information storage and retrieval, LIS education, LIS legislations and movement etc. Among every subject she identified subthemes in which she had listed few elements like, economics, LIS system, personal and financial management, planning of library information centres, information use, information management, information seeking behaviour, information sciences retrieval, classification, cataloguing, indexing, library and information services, collection development, User education, reference service, automation, networks for resource sharing and citations. According to Nishavathi (2007), trends in filling PhD thesis in India during 1950-2004 are

<table>
<thead>
<tr>
<th>Year</th>
<th>PhD theses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950-1979</td>
<td>12</td>
</tr>
<tr>
<td>1980-1989</td>
<td>76</td>
</tr>
<tr>
<td>1990-1999</td>
<td>144</td>
</tr>
<tr>
<td>2000-2004</td>
<td>97</td>
</tr>
<tr>
<td>Total</td>
<td>229</td>
</tr>
</tbody>
</table>

*Table 2.1: PhD theses in India during 1950-2004*

From her study she pointed out that growth of LIS research is reported since 1990’s. She has pointed out that major research was carried out in academic (70%) library activities followed by special libraries 16% and then universities libraries 14%. This data indicate that research in academic libraries are more, where as more research is required in management, including webometrics and scientometrics, ICT, information literacy and digital libraries based research as well as.

Shi-Jian Gao et al (2009) in his case study which is based on citation analysis of 56 PhD theses submitted in 2005 at Wuhan University (www.whu.edu.cn) in China. The authors
analyzed 10,222 citations from theses in library and information science, biology, Photogrammetry, remote sensing, and stomatology, and also compared the characteristics of the literature cited in the four disciplines. The results revealed that in the area biology and stomatology mainly English language publications were cited more whereas in the field of LIS, the cited literature came primarily from Chinese sources. In photogrammetry and remote sensing, citations were almost evenly split between English and Chinese sources. The results of study are useful for library collection development policies and other technical services.

Rekha and Parameswaran (2002), analyzed the issues of “Journal of Knowledge of Organization”, an international, journal the study covers 12 volumes published from 1988-2000. The study covered year wise and subject wise distribution of contribution, authorship pattern, author productivity, institutional affiliation and geographic distribution of contributors, prolific contributors to the journals etc. The outcome of the study indicated that in the field of knowledge organization from the total citations 167 out of 214 contributions are by single authors. It is found that the major topics included in the journal are classified on knowledge organization, information retrieval system, linguistic and terminology, subject cataloguing, indexing thesaurus, categorization, natural language processing and artificial intelligence. Ghosh (2000), analyzed 1374 citations from 117 contributions published in “Library Science with a Slant to Documentation and Information Studies” Vol. 32-36, shows that the contributing authors are mainly working librarians or library professionals than that of the teaching faculty. Eugene Garfield is most productive author as the trend of contributing articles were mainly on bibliometrics or citation analysis during 1965 to 1997. “Library Science with a Slant to Documentation and Information Studies” is the most cited journals followed by the ‘current content’. Co-citation and bibliographic coupling strength has been counted by authors to observe the interdependence of the cited documents. He highlighted that the contributors most frequently refer and cite to the journals in which they write. Saxena et al (1999) presented in their paper the software developed at DESIDOC for ranking of performance. Indian scientists and technologies are ranked based on the citations to their publications covered in science citation index (SCI). The software developed by DESIDOC provides facilities like generating reports based on highly cited authors, highly cited journals, highly productive institutions weight age of authorship etc quickly. This measure could be one of the important parameters for rating the performance of scientists for giving awards, promotions or other career incentives and for making appointments to important positions. Thus it is found that not only citation analysis is valuable but development of software for
ranking and making the task easier also shows important of citation analysis is various studies.

Deshpande and Rajyalakshmi (1997), conducted a study of 65 dissertations in library and information science submitted to Nagpur University during the period 1990-94 which reveals that majority of the works are in the field of literature survey and trends in various aspects of library and information science. Citation analysis has been carried out to find the types of cited sources materials authorship pattern and chronological distributions of cited references. The ranked list of cited references and journals indicates the annals of library science and documentation is the most cited journals by the researcher. Akiko (1976), in his study of citation analysis of thesis in LIS collected citations from 113 graduation theses submitted to Keio University School of Library and Information Science (SLIS) in 1973-74. After detailed study he has reported some findings like 62.2% of all citations (3,996) were to journals; more than 50% literature cited was within 4 years, citations to foreign literature was 23.1%; 9 titles accounted for more than 50% of citations to domestic journals, and 8 titles gave corresponding coverage of foreign journals. The Keio University Libraries and information centres (holding 80.8% of cited material) were shown to be important information sources for students.

Kubota (1976), analyzed the citations from 113 graduation theses submitted to Keio University School of Library and Information Science (SLIS) in 1973-74. Some of his findings were 62.2% citations (3,996) were to journals; more than 50% literature cited was 4 years old; citations to foreign literature comprised 23.1%; 9 titles accounted for more than 50% of citations to domestic journals, and 8 titles gave corresponding coverage of foreign journals. The Keio University LICs (holding 80.8% of cited material) have shown while conducting research important information sources have to be used by students. Sellen (1984), while conducting citation analysis of articles appeared in College and Research Libraries (C&RL) and Journal of Academic Librarianship (JAL) issues in 1981 revealed that academic librarians use more periodical articles than monographs in research and majority of references in periodical and monographs were appeared post 1975.

Ramesh and Nagaraju (2000), in his article analyzed the citations for article appeared in Indian Journal of Information, Library and Society (IJILIS), during 1995-1999. This journal has received about 7 citations per article, and 67.5 % of articles had 1-20 citations. More citations were from the books and periodicals than the other type of materials. Tendency of
authors seems to cite indigenous work more as compared to the documents published in other countries. Out of 138 citing articles, 37 articles have no references. Dr. S.R. Ranganathan was first in the rank of authors whose valuable books have been utilized by several researchers more frequently and has 32 citations. Second Ranked author was Kalyane having 25 citations followed by Shukla (12 citations), Kaula (11 citations), Venkatappaiah (8 citations), Grogan (7 citations), Lancaster (5 citations), Guha, Gupta and Krishna Kumar (4 citations each), Mittal (3 citations); and Neelameghan (2 citations). English language was dominating amongst the cited articles, and it is sent percent. Only 14% citing authors had tendency of self citation, co-citation cases are 110, and only a couple of cases being repeated. More than 90% citations were from library and information science journals. Each Journal received on an average of 7 citations.

Taylor and Dillon (2008), in their paper examines the impact of key authors in “Information Systems Research” from 1986 to 2005 and analyzed changes in influence and research interests over this period. The author set was based on publication counts in top information systems journals, supplemented on a reputational basis with authors recognized for their contribution to their field. Citation analysis was used to identify the most influential authors and to examine changes in influence over five-years. The results to their study show that certain key authors have exerted strong influence throughout the twenty-years, but for a new set of authors influence has begun to emerge in the last five years.

Keat and Kiran Kaur (2008), in their study applies citation analysis method to examine the use of information resources by students of the Master in Library and Information Science (MLIS) at the University of Malaya while preparing their dissertation. References from 40 MLIS thesis submitted during 2000-2005 were examined. The analysis was reported for author, source title, bibliographic format, language, subject category, and place of publication etc. Core journal titles listed and also compared with Journal Citation Report (JCR). The study pointed out that journals and books are the most used sources and there is a steady increase in the use of electronic media by LIS researchers. Authorship pattern indicates preference for single authored works. This study serves as a baseline indicator for resources used by LIS researchers. This study is utilized by librarians to focus on collection development to support research needs. Chia (2007), used citation analysis method and applied to reveal the information behaviour, network among scholars and identify the research trends to enhance the information services. In his study, the author examined the PhD dissertations of students from Life Science from National Chung-Hsing University in
Taiwan and the references cited in those dissertations analyzed approach to reveal the trends of student’s research environment.

Tim and Halperin,(1976), studied characteristics of literature cited and used in library science doctoral dissertations, Data is tabulated for United States and foreign publications, age of cited work, number and frequency of citations, library science subjects, and subjects in other disciplines etc. Jan Rosy (2009), studied citation analysis of all the journal articles published in the “Library Trends” from 1994-2007, 593 articles were published in this journal during 14 years span. Highest numbers (52) of articles are published in 2004. The Journal contained 15662 references in which 13783 are p-citations and 1879 are e-citations. Every issue published about. 11 articles and each article have an average of 23.2 p-references and 3.1 e-citations. It was found that 44.51 % print books are consulted by the authors and 0% e-books are accessed. Authors have consulted 44.04% p-journals as against 11.82% e-journals. Figures shows that 88.14% other web references are used in the articles reference. Author found in his study gender contributions and pointed out that female contribution are (52.34%) where as male contribution was 47.66%. Philipp and Walther (2007), In their study analyzed 3.889 records which were indexed in the LISA database. They pointed out the core journals in the field using Bradford’s Law of Scattering (pure quantitative calculation), Egghe’s Journal of Infometrics (JOI) first issue to appear in 2007, comes most probable at the right time.

Summary:- Many citation analysis studies are also conducted in LIS to asses productivity in the area to find use of literature by the researchers, as a tool for preparing selection and collection development policy, qualitative resource collection, providing new services etc. citation analysis in LIS is applied to find out different patterns like geographical, chronological, authorship pattern, rank list etc.

2.1.7. Web Resource Citation Studies:-

Casserly and Bird (2003), in their study “Web citation availability: Analysis and implications for the scholarship” analyzed five hundred citations for internet resources from articles published in library and information science journals published in 1999 and 2000. The bibliographic information is not properly reported and most of URLs are pointed to the content pages of “edu” and “org” domains and did not include a title. More than half citations (56.4%) were permanent. 81.4% were available on the web and searching the internet archive
increased the availability rate to 89.2%. Zandian (2009), in his survey (electronic/print) cited papers appeared in LIS thesis of MA degree, found a unique and comprehensive pattern of resources used by students in 5 universities, (Iran University of Medical Sciences, Tehran University, Tarbiat Modares University, Azade Shomal University and Azade Olome Tahghight). A citation analysis approach was used for analysis. 259 MA theses of LIS in the five universities were selected as population of survey. The outcome of study was, English print and electronic papers are highly cited in the period of the study with exception of Iran and Olome Tahghight universities. Alireza (2005) studied the web usage in her study and reported that the Web is a growing organism and one of the most important characteristics of the Web is that, a web page has ability to link to other web pages through hyperlinks. Since 1996, hyperlinks have been studied extensively by applying existing bibliometric techniques to the Web (Larson, 1996, Ingwersen, 1998). The Web affords rich opportunities to apply and adapt bibliometric techniques to new contexts and content.

Kousha and Thelwall (2007), in their paper introduced a new data gathering method “Web/URL Citation” and used it for Google Scholar as a basis to compare traditional and Web-based citation patterns across multiple disciplines. For this purpose authors prepared a sample of 1,650 articles from 108 Open Access (OA) Journals published in 2001, from four scientific areas and four social science disciplines. They recorded the number of citations from sample articles selected from ISI Web of Science, Google Scholar and the Google search engine (Web/URL citations). For each discipline, they found significant correlations between ISI citations and both Google Scholar and Google Web/URL citations; with similar results when using total or average citations. Google Scholar citations were more than ISI citations in four social science disciplines as well as in computer science, suggesting that Google Scholar is a more comprehensive tool for citation tracking in the social sciences and perhaps also in fast-moving fields where conference papers are highly valued and published online. The results for Web/URL citations suggested that counting a maximum of one hit per site produces a better measure for assessing the impact of OA journals or articles, because replicated web citations are very common within individual sites. Yang and Meho (2006), in his study covered citations from researchers and evaluated faculty members. Author indicated that faculty members are trying to identify as many citations to their published works as possible to provide a comprehensive assessment of their publication impact on the scholarly and professional communities. The Institute for Scientific Information’s (ISI) citation databases, which is widely used as a starting point if not the only source for locating citations,
they presents a case study comparing citations found in Scopus and Google Scholar with those found in Web of Science, for items published by two Library and Information Science full-time faculty members.

Ruimin et al (2009), studied author co-citation analysis (ACA) which is an important method for discovering the intellectual structure of a given scientific field. Since traditional ACA was confined to ISI Web of Knowledge (WoK), the co-citation counts of pairs of authors mainly depended on the data indexed in WoK. Fortunately, Google Scholar has integrated different academic databases from different publishers, providing an opportunity of conducting ACA in wider a range. In their paper, they conducted ACA study in information science in China with the Chinese Google Scholar. 31 most important authors of information science in China were selected as research objects. In the part of empirical study, factor analysis is used to find the main research directions of information science in China. Pajek, a powerful tool in social network analysis, is employed to visualize the author co-citation matrix as well.

Sandra (2008), assessed the impact of online journals on citation patterns by examining whether researchers were more likely to limit the resources they cited to those journals available online rather than those only in print. The outcome of study pointed out that number of journals cited each year continued to increase. On the large urban campus, researchers were not more likely to cite journals available online or less likely to cite journals only in print. At the regional location, at which the number of print-only journals was minimal, use of print-only journals significantly decreased. The study concluded indicating that journals available in electronic format were cited more frequently in publications from the campus whose library had a small print collection, and the citation of journals available in both print and electronic formats generally increased over the years studied.

2.1.8. Webometrics and Scientometrics Studies:-

Moradi et al (2006), compared role of web 1.0 and web 2.0. Authors studied the activities of Iranian librarianship weblogs using webometrics methods. The results of study indicated that only 28 weblogs are active out of 46 Iranian librarianship blogs which are updating day in and day out. This study also indicates that there are only three cooperated weblogs and almost all of them use Iranian hosts, mostly Blogfa. There is only one weblog which is hosted by Blog sky. The language assessment of the survey shows 25 Farsi weblogs, two English weblog and only one bilingual (English and Farsi) among those 28 active blogs. The survey
ranked aforementioned weblogs using total links, self-link, inlinks and web impact factor (WIF).

Meho and Rogers (2008), in their study authors examines the differences between Scopus and Web of Science and analyzed citation counting, citation ranking, and h-index of 22 top human-computer interaction (HCI) researchers from EQUATOR (a large British Interdisciplinary Research Collaboration project). Results indicated that Scopus gave more coverage to HCI literature than Web of Science. No significant differences were found between the two databases when citations in journals are only compared. The study concludes that Scopus can be used as a sole data source for citation-based research and evaluation in HCI, especially when citations in conference proceedings are sought. Meho and Yang (2006), in another study examines the effects of using Scopus and Google Scholar (GS) on the citation counts and rankings of scholars as measured by World of Science (WoS). The paper discussed the strengths and weaknesses of WoS, Scopus, and GS, and brought out their overlap and uniqueness, quality and language of the citations, and the implications of the findings for citation analysis. The study involved citation searching for approximately 1,100 scholarly works published in about 200 articles. More than 10,000 citing documents were examined in the study.

Boell (2007), used scientometrics method of analysis scientifically from academic disciplines, journals plays an important role in disseminating findings of research among the disciplinary community members. In this study he analyzed six databases focusing on LIS literature: INFODATA, Current Contents, Library and Information Science Abstracts, Library Information Science Technology Abstracts, Information Science and Technology Abstracts, and Library Literature and Information Science, and listed the core journals in areas of LIS. Journals were also ranked by the number of occurrences in multiple databases in order to identify 'core' publications. The number of journals overlapping among databases is estimated and a matrix giving the overlap is visualized using multi dimensional scaling. In his study he prepared a comprehensive master list of 1,205 journals publishing articles of relevance to LIS. About 968 active journals were published in English, in which one third of the journals and published from the US and another one third from the UK and Germany. Nearly 16% of all journals are open access, 11% have a ISIJIF, and 42% are peer reviewed. Fifteen core journals are identified and a list of the top fourteen journals published in Germany was reported. The aim of compiling a comprehensive list of LIS journal was achieved by author.
Summary: - From this search literature is observed that along with citation analysis, bibliometric studies now webometrics and scientometrics studies are being conducted to analyses, the trends (WOS and GS are playing major role).

2.1.9. Citation Analysis Studies in Other Subject:-

Meadows (2004), examined the citation characteristics of papers in the monthly notices of the Royal Astronomical society (especially for the years 1963-1965) as means of studying the usage of astronomical literature in UK. The decrease of usage which has been investigated and the half life determined. Particular attention has been given to the immediacy effect and to its possible variations in different sub fields of astronomy. The citations have also been separated according to journal of origin. As a result of this study a quantitative estimate has been made of the titles and back runs that are required to satisfy a given percentage of the demand for astronomical research literature in this country. Suryanarayana (2000), conducted studies using citation analysis in subject areas of their institutions i.e. Tobacco for evaluating the utility of journals, monographs, conference proceeding and other literature by the users. “Tobacco Research Journal” published by Indian Society of Tobacco Science, is analyzed. Rajahmundry from 1987-1997 which covers 69% main articles and 31% sort communications. The analysis related that the journal received more articles from CTRI and it is observed that there was no specific ratio of publishing of main articles and short communications in the journal. In general the average citations to main article is 9.2% (ranging from 7.4% to 12.9%) and for the short communications is 5.9% (ranging from 4.1% to 7.1%) single author contributions were less i.e. 6.2% and two and more than three author contributions were more than 32.1% each. 74.4% of citations are mostly from periodicals and Tobacco Research Journal was cited 382 times in there citations. Only one paper from India was cited 10 times and one paper from foreign journal was cited 24 times. The study concludes that periodicals citations are mane and in which TRJ is more cited . Bill (2000), performed a study in the area of environmental science using citation analysis of local faculty from the Texas Tech University Library (TTU). The purpose of his study was to characterize the citation patterns of the interdisciplinary field of environmental and human health as compared with other disciplines and to apply the results to collection development. Twenty-four articles were selected from 1996 and 1997 with over 1600 citations to more than 950 listed references. The average age of citations was 10.5 years for journals and 9.4 years for books. On average, journals were cited 67% of the time while books were cited 17% of the
time. Proceedings, theses, and technical reports were also cited but that data was not applied to collection development. The impact on collection development has been to identify a small number of specific books which were frequently cited but were not in the collection and to identify important subject terms with which to guide the selection of related books. Finally, 12 new frequently cited journals reviewed to determine their suitability as additions to the collection.

Soehner and et. al. (1992), while assessing collection he suggested that citation method is a new collection assessment method based on the citations for articles. The citation record is developed by identifying sources which cite the landmark article. Citation extracted from the articles and used for the purpose of assessment of the collection. This method was used to assess the biotechnology collection of the National Library of Medicine. The information gained from this study, in addition to demonstrating the technique, also provided insight into the evolution of the biotechnology literature. Chen (1977), conducted a systematic study in 1976 covering all the articles published in “Bulletin of the Medical Library Association”. The preliminary results were presented at the poster session at the Seventy-fifth Annual Meeting of the Medical Library Association in Minneapolis, and the detailed results and discussion of methodology had been presented as Part I of the author's recent sourcebook on Health Sciences Librarianship, published by Scarecrow Press.

Fang (1989), while ranking journals using citation analysis in his study to identify ranking of journals in health sciences and ascertain the faculty status. Author pointed out that guideline could indicate a journal's value for promotion and tenure consideration. For this purpose author lists recent research articles (1982-1986) published in health science librarianship, and articles written by health sciences librarians, and there were compiled by searching social SCISEARCH and MEDLINE. Results of study shows BMLA as the most prominent journal in the field. Therefore, citations from articles in BMLA from 1982 to 1986 were chosen as a sample for citation analysis. Citation analysis was employed to identify most frequently cited journals. Some characteristics of the citations in BMLA are also discussed. The ranking of journals based on citation frequency, as a result, was also identified.

Mulla (2011), in his citation study which is based on 1808 citations from 101 research articles published in 7 volumes (14 issues) of “International Journal of Information Science and Management (IJISM)” published during 2003 to 2009, indicated that 190 authors have contributed in 101 articles. majority of the articles were published in 2007, and 32 (16.84%)
authors had contributed 14 articles, (49.47%) authors contributed with two-authored papers and authors’ collaboration was found to be 0.80. The average number of authors per volume was 27.14. IJISM contained 1808 references out of which 1573 are print-citations and 235 are electronic-citations from 101 articles. Every issue has approximately 14.43 articles and each article had an average 12.43% print references and 1.86% electronic citations. It was noted that authors had preferred print information services and journals were the most preferred sources among the print and electronic references as compared to books, proceedings, theses and other sources. The country wise distributions of articles covered 17 countries. Out of total 190 authors, highest numbers i.e., 157 have been contributed from Iran, and stands in the first rank among the contributors. UK and Germany stand in the second and third place respectively, followed by India, Nigeria, China, Bangladesh and Malaysia these are in the fourth place with a contribution of two articles each. Similarly, 9 countries together in the fifth rank with a contribution of one article each.

Hadagali et al (2009), in their paper attempted to identify the attributes of subject literature in Physics theses submitted to Karnataka University, Dharwad during 1992–2006. Their study is based on 10, 057 citations (references) reflected in the 37 theses. Subject distribution, form wise distribution, authorship pattern, chronological distribution of journals and books, half-life period of journals are examined. Journal of Chemical Physics ranked first among 548 journals. Tiew (2000), Analyzed the use of self-citation and author self-citation in the research articles and short communications published in “Natural Rubber Research” during 1988 to 1997. Results showed that 53% of articles contained self-citations; the rate of journal self-citations per article ranges between 1 to 12; a high percentage of authors (61.4%) contributing articles to the journal cited themselves is a tendency noticed for authors affiliated to the institution publishing the journal to cite the journal; the highest self-citing author is A. D. Roberts in this study.

LaBonte (2005), in his citation analysis used literature from Science-Engineering Library at the University of California, Santa Barbara and find out meeting the needs of an interdisciplinary group of 60 faculty members at California Nano Systems Institute. The latest three publications of each faculty member (published within the last two years) were analyzed in two ways using the Science Citation Index to find articles they published in journals and the journals cited in articles. The results indicate that the library subscribes to 98 percent of the journals in which faculty members are published or are citing frequently. This information is useful to map the citation patterns of a new interdisciplinary field and can be
used for future collection management decisions. Zafrunnisha and Reddy (2011), this paper studied the citation analysis from PhD theses of Psychology subject and theses were submitted to Sri Venkateswara University, Tirupati, and Andhra Pradesh, India during the period 1963 – 2003. Out of 9275 citations from 56 PhD theses, from Journals contribute the highest number of citations accounting for 63.7%, multi authored papers account for 63.32%. Journal of Applied Psychology’ occupies the first rank with 4.26% citations, USA ranked first by citing 34.92% journals. Most of the cited journals of Psychology (94.6%) are in English language and maximum citations (47.62%) are from Psychology only.

Griscom (1983), made an effort to measure in-house use of music periodicals using citation study based on bibliographies in theses and dissertations studying was conducted at the Indiana University Music Library. A total of 256 titles were cited, but only 30% were cited more than once. While the periodical literature cited by musicologists has a low rate of obsolescence, the periodicals cited by theorists and educators becomes obsolete at a rapid rate, making the rate of obsolescence for the field as a whole, fairly high, unlike other subject areas in the humanities.

Nabe and Imre (2008), analyzed citation analysis of PhD dissertations in plant biology and zoology at Southern Illinois University Carbondale, and tested the common assumption that scientists favour of current research to such an extent that journal backfiles can be de-emphasized in academic library collections. The study is reproducible for any institution, and helpful to evaluate to find the value of electronic journal backfiles and the need to maintain print backfiles. Miller (2011), conducted a study on content analysis from literature published during 2000-2010, that focused on university biology students, faculty, Scholarly articles were divided into the library research domains. The largest number of papers published was from the Education domain, followed closely by Collections. Only two papers were categorized as Reference/Enquiries, and no papers were found in Management and Professional Issues. This study helps to science librarians to better understand what has already been written about biology subjects in a university setting. Gaps in the research can help other librarians who are interested in pursuing more research with biology subjects. Wu Jun (2009), In their paper, the citation data (2006—2007) from Journal Of Fishery Sciences Of China (JFSC) is analyzed according to the information provided by Chinese St Journal Citation Reports 2006—2007. The results showed that the number of citing journals to JFSC were 141 and 166 in 2006 and 2007, respectively. The total cited frequency of 2006 and 2007 was 2133 times, which was more than that of 2004 and 2005 by 991 times. The highest citing
frequency to a single paper was 22 times, and among the top 10 highest cited papers, those about fish disease, immunology and genetics dominated. The conclusion is that the citation analysis provides a direction for the editors to organize the articles for their journals according to the change of hot-topic research from the cited data and researchers also could get some suggestions from the results. Wole and Olayinka (2009), analyzed citations from master’s degree dissertations submitted to the Department of Animal science, University of Ibadan, Nigeria during the period 2000-2007, for finding possible relationships between citing, cited articles and authors. Frequency and percentage distributions (presented in charts, tables, and graphs) and measures of central tendency were used to analyse data. Findings showed that journals were the most utilized reference materials in the dissertations. The areas like poultry nutrition works had the highest number of dissertations followed by agricultural biochemistry and nutrition. The lowest number of dissertations was from forage production and management and monogastric nutrition with just two dissertations each. The findings from this study could serve as a user study with implications for both collection development and user services design in libraries. Future studies could focus on ascertaining the implications of collection of reference materials to project and article referencing, instruction in classes and outreach.

Haddow (2010), in their study citation analyses from Australian social science journals to determine the differences between data drawn from Web of Science and Scopus. In addition, citation-based indicators including an extended journal impact factor, the h-index, and a modified journal diffusion factor, were calculated to assess whether subsequent analyses influence the ranking of journals. The findings suggests that the Scopus database provides higher number of citations for journals. However, there appears to be very little association between the assigned tier ranking of journals and their rank derived from citations data.

Anil Kumar and Dora (2011), in their study analyzed the citations of the 49 doctoral dissertations submitted to Indian Institute of Management, Ahemadabad, during the period 2004 to 2009. The study revealed that journals are the most cited sources, and based on the pattern of citations, a local ranking list of journals has been developed. Author also applied Bradford's law to identify the groups of journals differentiated by their use. Results indicated that the top 48 journals that were ranked among the 30 most used journals contributed to more than 55% of the journal citations.
Hadagali et. al. (2009), In their paper made an attempt to identify the attributes of subject literature in Physics as reflected in theses submitted to Karnataka University, Dharwad during 1992-2006. The study is based on the 10, 057 citations given in the references in the 37 theses. Subject wise distribution, form wise distribution, authorship pattern, chronological distribution of journals and books, half life period of journals are also examined. Journal of Chemical Physics ranked first among 548 journals. It is found from the study that Half life period of journals is 33 years. Pali and Moore (2008), in their article reports the findings of a study conducted to examine the types of information used by graduate students in the fields of biological and agricultural sciences at Iowa State University (ISU). The citations of doctoral dissertations submitted in nine agriculture and biological science subject fields at ISU from 1997–2006 were analyzed. The article discusses the types and ages of resources cited in the different subject fields studied. The most cited journals in each discipline were identified, and the journal title dispersion was examined. Neshaneh (2009), In his research study examined the sources of "sciences and petroleum engineering" between the years of 1980 and 1986 for finding core journals and analyzing the writer's citation behaviours according to the types, languages of the recourses used. In his study analyzed 115 essays in 17 quarterlies. The research shows that, the most number of citations is related to journals. Represents 491 cases of the total number of 1154 resources, which is equal to 42.5%. From the total number of citations to journals, 95.9% was related to Latin journals and 4.1% related to Persian ones. Books have 453 cases and 37.5% of the whole citations are categorized at second level. From the citations to the books 91% books and 8.3% for Persian ones. Citations to reports, standards, patents and conferences with 14.7% are at third level.

Eckel (2009), studied the citation patterns in 96 Master's theses and 24 PhD dissertations completed at Western Michigan University's College of Engineering and Applied Sciences between 2002 and 2006. The hypothesis of this study was that an increase in graduate student research competence between the master's and doctoral levels could be seen in their use of scholarly sources such as journal articles and conference papers. From each thesis and dissertation, bibliographic information. The data analysis indicated that doctoral engineering students use a significantly greater number of scholarly journal articles (44.3% to 29.3%) and conference papers (21.9% to 12.5%) than master's students. Also, master's students depend more heavily upon literature available on the web. These results gave tentative support to the hypothesis. This study shows that there is a significant difference in the proportions of scholarly and other research sources used by master's and doctoral engineering students.
Javed and Shah (2008), analyzed the citation pattern adopted by researchers for publishing in Rawal Medical Journal (RMJ) in 2006. Author collected citations of articles published in the RMJ and analyzed manually in the study. From 437 citations in 32 research articles. The authorship pattern of the citations indicated that more than 23 % contributions were from single author and 77 % were the result of team work. The ratio of the coordinated work among the citations, 49.52 % pertained to journal articles. From the cited articles, 23 articles were contributed by the Pakistani authors, 8 by foreign authors and 1 jointly by Pakistani with foreign author. (Rawal Med J 2008; 33:254-257).

Sahu et. al. (2011), while studying citation pattern reported in his study, publication growth, its characteristics, research impact, quality, citation value, category of journals, core research areas, characteristics of productive authors with reference to the National Metallurgical Laboratory, an R&D organization under CSIR, India after analyzing data. Based on data collected from Science Citation Index, it was found that the highest number of 120 papers were published by the laboratory in the year 2010, out of which 28 papers received 62 citations during the same year for the papers published by the laboratory whereas the highest citation received were 738 from 88 out of 107 papers published in 2006. The average number of publications per year was 88.1 for the period under consideration and the average citation per paper was 5.02. The analysis shows that the majority of the authors of this laboratory published their research work in joint authorship (96.48%). The authors mostly prefer to publish their research findings in reputed international journals rather than Indian journals. 72.95 percent citing authors are from foreign countries and only 27.05 percent are Indians. Therefore, the R&D contributions made by scientists of CSIR-NML had a global impact in the field of metallurgy and materials science. High citations received were in the areas of materials science, metallurgical engineering, Nano science & Nano technology and environmental engineering over the last decades as observed during the period 2001-2010. The h-index of the last decade was 25.

**Summary:** - The purpose of this research study was to analyze the current information needs, trends in research and use of literature by LIS Researchers.

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