CHAPTER 2

REVIEW OF THE LITERATURE

2.0 Introduction

2.1 Review of literature on bibliometric study

2.2 Review of literature on citation analysis
2.0 Introduction: A literature review is a body of text that aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contributions to a particular topic. Most often associated with academic-oriented literature, such as theses, a literature review usually precedes a research proposal and results section. It is literally that: a "re" view or "look again" at what has already been written about the topic. It is not a literary review, which usually is a review of a literary work such as a play, novel, book of poems or a review that has some artistic merit. In writing the literature review, the purpose is:

- to convey to the reader what knowledge and ideas have been established on a topic.
- what their strengths and weaknesses might be.

Citation pattern of doctoral dissertations are the products of research activity which form an important source of information because normally the first chapter provides the state-of-the-art list of references of previous work. Such type of analysis have been attempted in different subjects in natural sciences but paucity of such works is found in social sciences. However, some significant studies have been conducted in some areas of social sciences, like, Library & information Sciences, Psychology, Economics, Education, etc. Here the studies which have been done earlier are presented in two categories – Bibliometric study and Citation analysis.

2.1 Review of literature on bibliometric study:

2.1.1 Deo, Mohal & Survey (1995) jointly carried out a bibliometric study containing analysis of 4066 citations collected from 26 doctoral dissertations on English language and literature accepted by Dr. Babasaheb Ambedkar Marathwada University and this work determined the use pattern of literature by researchers in English. Here,
with various sub-disciplinary analysis on bibliometric study, it was shown that the data under study did not exactly fit into the Bradford’s Law of Scattering.

2.1.2 The study conducted by Biradar & Premalatha (1993), identifies the forms, authorship pattern, language-wise periodical and periodical articles, obsolescence of literature and the core journals. The study attempts on the pattern of information use by researcher in the field psychiatry (Alcoholism). It is based on the references appended to M.D. Psychiatry dissertation accepted by the Department of Psychiatry Nimhans, a deemed University, Bangalore during 1947-1995.

2.1.3 Bandyopadhyaya (1999) in his Ph D thesis, analysing the citations appended to the doctoral dissertations of five disciplines (Mathematics, Physics, Mechanical Engineering, Political Science and Philosophy) of the University of Burdwan during 1981-1990, presented a comparative analysis of trend of information flow among these subjects. 11,228 references used in these theses are taken as the main subject of study. Copy of published articles annexed to these theses, if any, and the references appended to them are also considered. Citation indexes are used to identify, if anybody has cited those articles published by the scholars.

The main objective of this study are:

- To develop a set of computer programmes for citation analysis and related bibliographic study.
- To study the research outputs in some selective disciplines of science, engineering, social science and humanities to find the differences in types of documents used, scatter of literature within different journals, applicability of Bradford’s Law, choice of journals for publication of articles, age of references, multiple authorship trend, compactness of thesis titles, compactness of writing, reference intensity from one subject to another.
• To prepare general and normalized ranked lists of journals in different subjects

2.1.4 A study covering 1006 doctoral dissertations and 16 patents produced in Mahatma Gandhi University in different disciplines during 1983-2008 is made by James, Sreekumar & Nair (2008). The bibliometric study reveals that during the period MGU has made monumental contribution to generation of knowledge. Distribution and frequencies of these of the faculties of science in the university during the period shows a steady growth. The study also reveals that a few guides supervised research in sub-disciplines of very specific areas and the research by them as well as by their students forms the highly cited works worldwide like in polymer.

2.1.5 Sevukan & Sharma (2008) presented a detailed analysis of research performance of biotechnology faculties in central Universities of India from 1997-2006. Various bibliometric techniques had been employed to analyse data collected from PubMed, NCBI, ISI Web of Science database and SCI Expanded. The results indicated the growth of literature in biotechnology, authorship pattern and applicability of Lotka’s Law and Bradford’s Law.

2.1.6 A paper made by Kaur & Aggarwal (2010) brings out the result of a bibliometric study of research publications of department of chemistry, Guru Nanak Dev University, Amritsar for the period 2002-2006. It analyses all the 269 research publications from 84 journals. It examines yearwise distribution of papers, collaboration within the university and with foreign institutes, authorship pattern, journals in which authors publish, impact factor of journals etc.

2.1.7 On the basis of 9254 citations of Ph D theses in Botany submitted to Vikram University, Shukla, Goswami & Sharma (2010) presents a bibliometric analysis. The study period is sixteen years (1991-2006) and the paper covers 50 Ph D theses. Factors considered for the analysis are illustrations, bibliographical form and ranking
of journals, along with the analysis of authorship pattern. The main objective of this study are: to find out the major subject areas of research, to find out the most used reference pattern of different types of documents, to find out the core journals and to know the quantitative growth of Ph D theses in Botany. The study reveals that the books are the most preferred form of references by researchers in botany while journals are considered as the primary source of information and that are less used by the researchers.

2.2 Review of literature on citation analysis:

2.2.1 Gopinath(1985) presented an analysis of references given at the end of technical papers in *Journal of Physiology, Experimental Cell Research, Journal of Comparative Neurology* and *Journal of Molecular Biology*. Sample articles were chosen for subject coterminous with each other for three decades – 1950, 1960 and 1970. The analysis resulted in ranking of journals, increase or frequently cited source of information. It was also found that older decrease of reference articles, variety of documents cited and age of references. It was found that journals have greater self-citations and journals were the most documents have fairly good impact values in the field of Biochemistry. The data elements in the bibliographic citations remain same over the period 1950’s – 1970’s. The secondary information services have been identified as important sources for finding references and verifying them.

2.2.2 Lal (1985), by the method of citation analysis attempted to identify the main sources of citations and prepared a list of most important journals in various branches of agricultural science. In addition to this, a list of 59 most cited primary journals in order of their merit has been prepared. His analysis also includes the geographical and chronological scattering of citations. It is hoped in his paper that the information
inferred may be of help to Agricultural University Libraries to arrive at a need-based consideration in the selection and acquisition of journals within the limited resources.

2.2.3 Bohannon and Gibson (1986) said that citation analysis has been used to identify journals that are relevant to various professions. They have analyzed the frequency with which different journals were cited in physical therapy over a four-year period and have compiled a list of journals that were cited 10 or more times. This list may be useful to individuals who are interested in an approximation of the journals that may be most relevant to physical therapy.

2.2.4 Various citation measures are utilized by Pichappan (1990) to find how information is transmitted in formal communication. His study was conducted to determine the ranks of various Indian Agricultural Science journals by citation frequency, impact factor and discipline influence score.

2.2.5 A case study of citation analysis of Ph D thesis by NEERI scientists in the field of environmental science and engineering during 1977-1991 had been carried out by Madkey & Rajyalakshmi (1994). The rate of submission, subject-wise distribution of thesis, ranking of source materials, authorship pattern, chronological distribution of journal and book citations and geographical distribution of most cited journals have been determined in this paper. Based on the analysed data half life and obsolescence of literature have been calculated and conclusions are drawn.

2.2.6 Verma (1994) has done a citation analysis of 2599 journal citations from 1986-1990 of three Indian journals in economics. It was shown that Indian economists gave equal importance to journal and non-journal materials for their research work and depended upon non-current research materials. The ranking list indicated that Indian scholars in economics use more foreign literature and most of the journals subscribed by the university library did not find place in the ranked list.
2.2.7 Bandyopadhyay (1996) studied 27 doctoral dissertations in mathematics submitted at the Burdwan University (West Bengal) from 1981 to 1990 and also of the references in the published articles cited in those theses. Using a database management software package (dBase III+) he analysed the bibliographic forms of literature used, ranked list of journals in pure mathematics, applied mathematics and statistics, normalized ranking of journals with corrected citation number according to Sengupta’s formula and correlation study between two lists. In his study he showed that the result of citation study based on these references differs from that based on journal article’s references. References given in the theses represent more exhaustive picture of scholars’ journal requirements.

2.2.8 On the other hand, the study by Huanwen (1996) analysed formally published journal articles in library & information science in China from 1985 to 1994. This analysis revealed the LIS research in China, their coherence, changes and neglected areas and similarities & difference between research in China and abroad. Here it was concluded that the research in library & information science in China trended towards theoretical research but in the world towards applied research.

2.2.9 Kademani and Kalyane (1996) analyse 164 papers by R. Chidambaram, a nuclear physicist from India, published during 1958-93, and identifies highly cited papers as per Science Citation Index. His self evaluated 'most significant publications' were also considered and it is found that the self assessment by a scientist about the significance of his papers may not always tally with the world’s opinion. The citation data were subjected to domain-wise and category-wise classification, and used to study time lag for receiving first citation to each paper, synchronous and diachronous self-citations, core journals in which his publications were published, publication density, publication concentration, journals in which his publications were cited, and
influence of channels of communications and authorships on citedness. The important finding of the study is that out of thirteen papers considered by the scientist as most significant; four are outstandingly cited, four are remarkably cited, one is fairly cited and one which was published in 1990 received two citations till 1992 and two papers did not receive any citation. The citation analysis of papers published in 1993 was not carried out. The outstandingly cited papers of the scientist did not find any place in the aforementioned list of thirteen. This finding hints towards a possibility that self assessment by a scientist, about the significance of his papers may not always tally with the world opinion.

2.2.10 Citations of 22 doctoral dissertations in chemistry submitted to Mangalore University during 1980-1993 were analysed to study the information use pattern of researchers. Out of 418 journals, referred to by the researchers, 60 core journals were identified. Mubeen(1996), in this study showed that researchers mainly depended on journal sources for their research. It is evident from her study that an overwhelming majority use English as primary for their research. This study confirmed that the journal use pattern of chemistry researchers fitted well with the Bradford’s Law of Scattering.

2.2.11 According to Ghosh(2000) the contributing authors are mainly working librarians or professionals than that of the teaching faculty. He came to this conclusion on the basis of citation analysis of 1374 citations from 117 contributions published in “Library Science with a slant to Documentation and Information Studies”, vol. 32-36. Citation pattern of source document indicates that the journal citations have been quoted more which shows, periodicals are in fact the best medium of scholarly communication. It shows that the contributions of this journal cited the source journal in most cases, apart from current contents. The study reveals that the
journal published more contributions on bibliometrics. Current trend of using information technology in the library and information science field is being reflected in the journal from the year 1999. The subject treatment of this journal is diverse in nature because it covers the contributions in all the fields of Library and Information Science.

2.2.12 Das & Sen (2001) made a study based on 781 citations appended to 43 research articles pertaining to January to June 2000 issues of volume 109 of Indian Journal of Medical Research. They analysed authorship pattern of citations, sources of citations, Percentage of Indian citations, distribution of authors of citing articles, author self-citation and journal self-citation.

2.2.13 Dutta & Sen (2001) conduct a study covering 427 citations appended to 30 articles appeared in January to March 2000 issues (Nos 1-3) of Indian Journal of Pure and Applied Mathematics. In all 622 authors are figuring in the citations. On average there are 14 citations per article and 1.46 authors per citation. The authorship pattern shows that single-authored citations amount to 51.40 per cent of total citations. The high percentage of single-authored citations clearly indicates the dominance of individual research in mathematics unlike physics, chemistry, biosciences and medicine where single-authored contributions cover around 20 percent of total citations. The articles involved in this study have been contributed by 59 authors including 28 foreign authors.

2.2.14 Gooden (2001) has made a citation analysis of dissertations accepted in the Department of Chemistry at the Ohio State University between 1996-2000 as a way to determine material use. The 30 dissertations studied generated a total of 3,704 citations and types of materials cited, currency of literature and dissertation topics were analysed. It was shown that the current results corroborate past research by
other authors and journal articles were cited more frequently than monographs. At last it was hoped that the result of that study may be used to assist in chemistry collection development of different universities.

2.2.15 Srivastava (2002) in his paper, “Information use pattern of researchers in chemistry : a citation study” analysed 18,364 citations of 74 doctoral dissertations submitted in Benares Hindu University during the period 1980-1994. This study revealed that researchers under study had primarily depended on periodicals of chemistry and its allied branches for their sources of information. It is evident from this study that the researchers used the literature published in periodicals during the last three decades from the time of research and also that the percentage of books and periodicals used within 10-15 years of their publication is more than those published within 5 years of their use. This study confirmed that the researchers under study have depended on only few countries, mainly the USA and the UK for original information. It is appeared from this study that most of the researchers have used English as the primary language for their research.

2.2.16 The paper entitled “Analysis of contributions of IASLIC Bulletin” by Verma (2004) analyses the 209 contributions of 10 volumes of IASLIC Bulletin (vol. 36-45) and it gives information about average number of contributions in each volume, studies authorship pattern, statewise & institutionwise distribution of contributions. The paper analyses the contributions of this journal in various fields of the subject and analyses 1437 citations appeared in 10 volumes of this journal. It gives information about average number of contribution and type of publications cited with their quantitative data.

2.2.17 Dhawan & Gupta (2005) evaluates citations performance of 1101 Indian Physics research papers published in 29 high impact physics journals in 1997. The
evaluation is based on citations won by these papers within six years of publication. The purpose is to verify to what extent research evaluation based on journal impact factor can be considered objective and fair. The study finds that journal impact factor is not a surrogate to citations. Nearly 12% of papers in high impact journals did win even a single citation within six years of their publication. Secondary papers winning high range of citations per paper were published in a wide range of impact factor journals. In conclusion it is said that although impact factor is not a guarantee to citations but publication in high impact journals does improve the probability of winning citations. The higher the impact factor the greater their citations probability. The nationally and internationally collaborated papers have greater chances of winning high citations than the non-collaborative ones.

2.2.18 In the paper entitled “Citation analysis : a method for collection development for a rapidly developing field” LaBonte (2005) has shown that the Sciences-Engineering Library at University of California Santa Barbara is already adequately meeting the needs of the new California Nano Systems Institute. The latest three publications of 60 faculty members (published in the last two years) were analysed in two ways using the Science Citation Index : the journals they were published in and the journals where cited articles were published. The results indicate that the library subscribes to 98 percent of the journals in which faculty members are published or are citing frequently. It is hoped that this information is useful to map the citation patterns of a new interdisciplinary field and can be used for future collection management decisions.

2.2.19 Patra, Bhattacharya, & Verma (2006) in their paper analyses growth pattern, core journals and authors' distribution in the field of bibliometrics using data from Library And Information Science Abstracts(LISA). Up to September 2005, 3781
records were retrieved for the bibliometric analysis. Growth of literature does not show any definite pattern. Bradford’s law of scattering is used to identify core journals and determines ‘Scientometrics’ as the core journals in this field. Lotka’s law was used to identify authors’ productivity patterns. It is observed that authors’ distributions do not follow original Lotka’s law. Study also identified 12 most productive authors with more than 20 publications in this field.

2.2.20 Again, Patra & Chand (2006) carried out a bibliometric study on library & information science research literature emanating from India based on data abstracted in Library & Information Science Abstract (LISA). In this paper it was concluded that LIS literature from India was comparatively low as reflected by LISA database. This study showed that the LIS research output of India was mostly published in Indian journals.

2.2.21 Kanungo (2007) in her article analyses the citation pattern of the citations appended to articles covered in the volumes 59-63 of Journal of Asian Studies to determine the information use pattern of the social scientists. The study has covered 108 articles with total of 9111 citations contributed by 114 authors. The results indicate that books are highly cited followed by periodical literature, government publications, newspapers and conference proceedings, etc. The less number of electronic citations suggests that print literature then was still not the most preferred source of information for the social scientists.

2.2.22 Lokhanda (2007) studied the citations of doctoral dissertations submitted in the Department of Library and Information Science at Poona University and it was performed as way of determining the use of information sources made by the scholars of the university. A total of 20 dissertations studied generated a total of 5252 citations. The study reveals that journals are the most preferred sources of information.
used by the researchers in the said field. The journal Scientometrics has ranked the highest of total citations.

2.2.23 Nkiko and Adetoro (2007) analyse the Covenant University library with an opportunity to evaluate its collection, because it reflects the research interests of the students in the university. The authors of these research reports cited heavily from textbook holdings of the university library, even though one would expect more journal citations. Internet and electronic resources were less frequently cited, which could be due to a lack of information literacy skills. Those skills could be improved through user education programs. The average of 26.3% citations per report is encouraging, especially since the citations made were derived from sources in the university library only without using sources from other library collections. Project supervisors should instruct students to read material on their topics as a preliminary activity, before the actual literature review. This would sharpen focus and give direction to the authors, and would enrich the work, which would be reflected in the number of citations. Students must choose their research topics early, because haste leads to inadequate reading, resulting in poor citation and a lack of depth. Project supervisors should randomly check citations to deter students from using spurious and non-existent authors, and protect institutions from embarrassment and damaged credibility. Further studies could be conducted in the next five years to see whether degree students research report citations are consistent with the findings of this study. Further studies should in addition examine the subject areas and gender dimensions of the citations.

2.2.24 The obsolescence and aging studies are important areas of citation analysis in Library and Information Science. Sudheir (2007), in one of his papers attempts to examine the obsolescence of literature in physics by citation analysis and reviewed
various studies already done in the field and outlined the results. The study is based on the 3180 citations, cited in the 12 doctoral dissertations of physics awarded from the Department of Physics, University of Kerala, India during the period of 1999-2003. It is observed that journals and books are the most preferred bibliographic form of citations used by the physicists. The findings show that the half-life of journal citations was 14 years and for books it was 25 years. The mean year of journals was calculated as 17.58 and 23.09 years for the books.

2.2.25 Biswas and Haque(2008), in their study entitled “Information use pattern of researchers in veterinary science and animal husbandry: a citation study” found out the researchers under this study mainly depended on periodicals for their information use. Studying 3888 citations of 26 dissertations submitted to Bangladesh Agricultural University during the period 1990-2005, they revealed that the researchers largely use the literature published in periodicals during the recent period (1972-1991). For their original information the researchers depended on only few countries the USA, the UK and India.

2.2.26 Chikate and Patil(2008) in their paper “Citation Analysis of Theses in Library and Information Science Submitted to University of Pune: A Pilot Study” analyzed more than 6,000 citations from 27 doctoral dissertations were and the following conclusions are drawn:

- Nearly half of the citations recorded are from journal articles: 2,639 (42.2%)
- Nearly three quarters of the journal articles were from LIS journals, with the remainder from 33 other subject areas.
- ‘College and Research Libraries’ is the most cited journal, followed by ‘Scientometrics’.
- Most of the citations are from 55 journals out of the total number.
2.2.27 In their paper Kumar and Kumar (2008) analysed 8093 citations given in the Journal of Oilseeds Research (JOR) published during 1993 to 2004. Out of these citations, 5642 are given in main articles and 2551 in short communications of the JOR. It also analyses types of documents cited and identifies core journals. This paper also covers the analysis of authorship patterns of citations along with calculation of collaboration coefficient. Geographical distribution of cited references has also been analysed. The paper concludes that 20 core periodicals cover more than 50% references and also indicates that collaborative research is prevalent in oil seeds research.

2.2.28 To determine the use pattern of the literature by the researchers in economics, bibliometric analysis of 24,699 citations appended to 192 doctoral dissertations in the field of economics accepted by Andhra University has been carried out by Sasikala and Raju (2008). This study attempted to identify the bibliographic form and subject wise distribution of citations, authorship pattern and obsolescence of literature in economics. The findings reveal that maximum number of citations are from books and journals; main area of dissertations are industrial economics and labour economics; single author contributions are the major one and the half-life of economics literature is 14.5 years.

2.2.29 Swanepoel (2008), in his paper “Using citation analysis to determine the use of information sources in the humanities by postgraduate students in the health and biomedical sciences: a case study” discusses the method and results of a study done at the Tshwane University of Technology (TUT) in South Africa to determine the nature and extent of information sources used by postgraduate students in the health and biomedical sciences at that university, with special reference to the use of humanities information. The study covered the period 2004 – 2007 and used the
reference lists of theses and dissertations of masters and doctoral students in the health and biomedical sciences at TUT as data sources. The outcome of the study showed that citation analysis is a valid, reliable and practical method to provide reasonably accurate information on the use of humanities literature by postgraduate students in health and biomedical sciences. At TUT, it enabled researchers to establish that postgraduate students in health and biomedical sciences at that university make only very limited use of humanities literature for doing their master's and doctoral research. This is notwithstanding the fact that students have wide access to humanities literature in both paper and electronic formats. With the aid of citation analysis, the researchers could also establish that health and biomedical sciences students at TUT are not averse to citing information sources beyond their own discipline; just over 3% of all citations were to information sources in the social sciences, which mostly comprised psychology, business, law, management and public administration. Although the reasons for the outcome of this study have not been investigated, the most likely explanations are probably because TUT does not offer a course in medical humanities, and because medical humanities seldom pertain to purely research papers in narrow scientific areas.

2.2.30 Eckel (2009) in his article “The Emerging Engineering Scholar: A Citation Analysis of Theses and Dissertations at Western Michigan University” the author studied the citation patterns in 96 Master's theses and 24 Ph.D. dissertations completed at Western Michigan University's College of Engineering and Applied Sciences between 2002 and 2006. The data analysis indicated that doctoral engineering students used a significantly greater number of scholarly journal articles and conference papers than master's students. Also, master's students depended more heavily upon literature available on the web (web sites, government papers, grey
literature, trade magazines, and patents). This study showed that there is a significant difference in the proportions of scholarly and other research sources used by master's and doctoral engineering students. The implications of these citation patterns in the development of the engineering scholar are discussed in his paper.

2.2.31 Citation analysis of all the journal articles published in the Library Trends from 1994-2007 is carried out by Jan(2009). 593 articles are published in the journal during 14 years. Highest number (52) of articles is published in 2004. The Journal contained 15662 references for the study period of which 13783 are printed citations and 1879 are e-citations. Every issue published approximately 11 articles and each article has an average of 23.2 printed preferences 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% printed journals as against 11.82% e-journals. Figures shows that 88.14% other web references are used in the articles reference. Female contribution (52.34%) accounts more than male contribution (47.66%).

2.2.32 According to an article by Nandi & Bandyopadhyay (2009) the Physics Department of the Burdwan University has produced 67 theses during 1960-2000 with majority of theses produced during 1986-1990 in diverse areas of research such as Radio Physics and Electronics, Nuclear Physics, Solid State Physics and Laser Physics. Here scientometric analysis of 67 theses and 610 articles (based on these theses submitted by the scholars during 1960-2000 in the department of physics at the Burdwan University) scattered in eight subdivisions of Physics are analysed and year wise productivity, authorship pattern and collaboration are studied. The most prolific authors identified in the study shows that publication productivity is one of the important indicators to identify the scientists.
2.2.33 In “Citation Analysis of Doctoral Works Submitted to the Department of Animal Science, University of Ibadan, Nigeria” Olatokun and Makinde (2009) updates and expands on previous citation analysis studies that focused on agricultural science. This study analysed citation from 40 doctoral theses submitted to the department of animal science of Nigeria’s premier University, University of Ibadan between 2000 and 2007. Although, much citation analysis studies have not been done in the field of animal science in Nigeria with the search of the literature, nevertheless this study had its pivot on several citation analysis works that have been carried out in other fields (both related and unrelated fields). This study discovered that most of the cited sources were journals-well over 50% of the total citations for PhD works were to journals. The results support previous findings that journals are the most commonly cited format. This confirms that animal science PhD projects are not in isolation of similar works elsewhere. Consequently, this study should stimulate useful discussion among scientists and research managers about publication strategies and research directions. Also this study is useful in identifying journals worthy of closer examination by librarians that are expected to be familiar with local needs as this study has generously pointed out the core journals needed for research in animal science. Another striking agreement of this study is that only about 12 to 13 titles were needed to cover 50% of the journal citations. This points to the fact that this study could serve as a user study with implications for both collection development and user services design. This study also has serious implications on calling for the construction of citation indexes that will be web based at different levels especially institutional level being narrowed down to departmental level to ease citation practices of students, the academia and researchers. These citation indexes will also facilitate citation analysis study that entails manual and painful counts. This will save
the rigorous and time-wasting exertions as encountered in this study during the process of data collection. The index will help to correct the anomalies of the ISI's databases that cites more of North America's journals especially that of United States of America thus contributing to the low impact factor of our local journals. At least, this will boost our local citations towards achieving international visibility and influence. Also, local citation indexes will help to locate background sources and information for postgraduate students and researchers. Evaluation of how development and advancement have developed over the years can also be measured using this local citation indexes thus leading to an easy measure of most significant research and the most influential researcher on a national basis. Also in terms of citation practice, this study with its discoveries of variations in citations and its rule of application calls the more for the formulation of a detailed and comprehensive theory of citation that will foster the ideologies entrenched in the field of citation and it will brings into focus the “best-practice principle” in citation. Future studies could focus on ascertaining the implications of collection of reference materials to project and article referencing, instruction in classes and outreach.

2.2.34 Verma and Thakur (2010) made a citation analysis of 35 doctoral dissertations in Botany awarded during 1966-2004 submitted to Pt. Ravishankar University. It is made to determine the use pattern of literature in this area. A total of 7916 references are analysed for identifying their bibliographic form, authorship pattern and ranking of journals. The objective of the study are: to identify the forms of documents mostly used, to determine the authorship pattern in the field of botany, to find out a ranked list of highly cited titles of journals and to identify the country of publication.

2.2.35 Obsolescence studies play a vital role for librarians, researchers, and information managers as a decision support tool for the retention of the most
frequently-used literature, and is also useful for weeding out unused or less-used literature. Zafrunnisha and Pulla Reddy (2010) in their article attempts to discover the obsolescence rate of psychology literature cited in the doctoral theses awarded from 1963 to 2005, at S.V. University, Tirupati, Osmania University, Hyderabad, and Andhra University, Visakhapatnam. The study focuses on the citations included in doctoral theses awarded in psychology. They come to the conclusions that – i) Nearly 27 percent of journal citations are 8 years old or less, 50 percent are 14 years old or less, and 75 percent are 22 years old or less. ii) Twenty-seven percent of book citations are 11 years old or less. Fifty-one percent are 19 years old or less. Seventy-five percent are 28 years old or less. iii) The results of K-S test confirmed statistically that the obsolescence (distribution) rate of journal and book citations follows a negative exponential distribution. iv) Half-life of journal citations in psychology is 14 years, while it is 19 years for book citations. v) Psychology researchers prefer to refer to current journals. vi) There is a significant difference between the obsolescence of psychology journals and books.