CITATION ANALYSIS OF M.PHIL DISSERTATIONS IN LIBRARY AND INFORMATION SCIENCE, MIZORAM UNIVERSITY DURING 2007-2011

A Dissertation submitted in partial fulfillment of the requirement for the Degree of Master of Philosophy in Library and Information Science

Submitted by

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DECLARATION

I, S. Lalrempuii, hereby declare that the subject matter of the dissertation entitled '**CITATION ANALYSIS OF M.PHIL DISSERTATIONS IN LIBRARY AND INFORMATION SCIENCE, MIZORAM UNIVERSITY DURING 2007-2011**' is the result of the work done by me, that the contents of this dissertation did not form the basis for the award of any degree to me or to anybody else to the best of my knowledge, and that the dissertation has not been submitted by me for any research degree in any other University or Institute.

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This is to certify that, Ms. **S.Lalrempuii** has completed the dissertation entitled '**CITATION ANALYSIS OF M.PHIL DISSERTATIONS IN LIBRARY AND INFORMATION SCIENCE, MIZORAM UNIVERSITY DURING 2007-2011'** for the award degree of **Master of Philosophy in Library and Information Science** under my guidance and incorporates the student bona-fide research. This is the candidate original work and worthy of examination.

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PREFACE

A number of research studies are undertaken and accomplished year after year in Mizoram University. There are two paramount activities, study and research, which usually remain in the department and shape a great power in the socio-economic, scientific, cultural and technological fields if they are properly disseminated and used by the user in time.

The knowledge of social research is essential not only for social science students but also for those who engage in undertaking researches on evaluation for consumer research for business community as well as government welfare schemes and other researches which has been undertaken today. The publication of research studies in library and information science has got significance in this present day of information world for the students as well as researchers to get the latest information in different kinds of studies.

Bibliometric research of Citation Analysis in the field of Library and Information Science subject is taken for study, for giving information to the future generation in the subject and for the Librarians, while observing the ever-growing number of bibliographic units like articles etc., the utilization of documents, Library staff and users and for the students and researchers for getting up-to-date information, it is essential to know the importance of the subject and how much the subject has been published so far. The study refers to the contributions made by the authors, institution, titles, subject, country, etc. in the field of Library and Information Science taking the Bibliography used by M.Phil Scholar in their Dissertation.

The project work, therefore, is important in order to trace and highlight the present condition of articles on Library and Information Science provided by different countries with different author. Though it may not be up to satisfaction, this dissertation may somehow give a clear view about the articles published by different countries. The research study is confined to the field of Library and Information Science during the period of 2007-2011. Data collection is done from the Bibliography of M.Phil Dissertation during the period of this time.

It is hoped that this dissertation will prove to be inclusive and detail enough to convey the absorbing conceptual and theoretical knowledge to students and be a motivator for researchers in using an objective and scientific approach for conducting quality research and realising the need to incorporate theory and research.

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List of Abbreviation

Term	Description
ABM	Agent-Based Modeling
A.D	Anno Domini, in the Year of Lord
AEE	Agricultural Economics and Extension Department
AHCI	Arts and Humanities Citation Index
APA	American Psychological Association
ARIST	Annual Review of Information Science and Technology
ASLIB	Association of Special Libraries and Information Bureaux
BCKV	Bidhan Chandra Krishi Viswavidyalaya
CAS	Current Awareness Service
CD-ROM	Compact Disk Read Only Memory
C.F	Citation Frequency
CGM	Consumer Generated Media
CICR	Central Institute for Cotton Research
CLIEJ	Chinese librarianship International Electronic Journal
DESIDOC	Defense Scientific Information and Documentation Centre
DLIS	Department of Library and Information Science
DRTC	Documentation Research and Training Centre (Bangalore)
E-Journals	Electronic-Journals
E-Library	Electronic-Library
EPW	Economic Political Weekly
FID	Federation Internationale de la Documentation
FUTA	Federal University of Technology Akure
H-index	Hirsch
IACSIT	International Journal of Engineering and Technology
IASLIC	Indian Association of Special Libraries and Information Centre
IB	International Business
IBM	International Business Machine
IFLA	International Federation of Library association and Institution
INSDOC	Indian National Scientific Documentation Centre (New Delhi)
ISI	Institute of Scientific Information
ISSI	International Society for Scientometrics and Informetrics
IT	Information Technology
JASSS	Journal of Artificial Societies and Social Simulation
JCR	Journal Citation Report
JRR	Journal Reference Reports
LIS	Library and Information Science
LLM	Master of Law
M.A	Master of Arts
MARC	Machine Readable Catalogue
MeSH	Medical Subject Heading
MIT	Massachusetts Institute of Technology
M.Phil	Master of Philosophy
MLIS	Master of Library and Information Science
M. Tech	Master of Technology
Ms-Excel	Microsoft-Excel
NAAS	National Academy of Agricultural Science
NASA	National Aeronautics and Space Administration

Ph.D.	Doctor of Philosophy
PLANNER	Promotion of Library Automation in North Eastern Region
POP	Publish or Perish
RePEc	Research Papers in Economics
SCI	Science Citation Index
STSI	Science, Technology and Social Information
SSCI	Social Science Citation Index
TM	Trademark
TRECVid	Text Retrieval and Evaluation Conference, Video Retrieval Evaluation
UBC	Universal Bibliographic Control
UBCIM	Universal Bibliographic Control and International MARC
UBKV	Uttar Banga Krishi Viswavidyalaya
UGC	University Grants Commission
UGC – Infonet	UGC-Information Network
U.K.	United Kingdom
U.S.A	United States of America
WoS	Web of Science
WWW	World Wide Web

CHAPTER – 1

INTRODUCTION

1.1 Introduction

Citation analysis is a generic term for a set of well-known techniques that has worthy implications in Bibliometric studies of scholarly communication and has become a pragmatic approach to ascertain the use of library resources. Further it is a viable platform for the library to built user-centric collections. The study has become imminent in view of proliferation of resources in multiple forms due to increasing needs of the user communities, substantial increase in the cost of documents and the constraints of limited financial resources. These make necessary for the librarians to design and develop need-based information systems and services to meet the information needs and requirements of the users. Kumar and Reddy (2012, p.45) discussed citation analysis that a new technique used to measure quantitatively the value of document through arranging the citations in some kind of rank or order. It can be used for subject which is a helpful tool for the library management in selecting and weeding the materials in the face of ever expanding information environment. They further added that citation analysis refers to references in one text to another text with information on where that text can be found. Singh Burman and Sheela (2011) express their opinion of citation analysis that it is the applied research method by librarians, teachers and information scientists to indicate the relation that exists between cited and citing document. Before Eugene Garfield developed a method in 1955 for citation indexing for science literature Shephard's citations had been used in the legal profession since 1873 (Garfield 1955, cited in Levin-Clark and Gil, 2009, p.986). Shephard's citation was created by Frank Shephard, who listed each legal case heard by the Illinois Supreme Court that cited previous cases. This citation index grew to cover almost all jurisdictions and became a vital tool in the field of law for case verification. Any lawyer or law librarian still knows what it means to "shephardize" a case (Ballard, et.al, 2006). The first recorded citation analysis was done by Gross and Gross in 1927, when looking at citation patterns to determine the journals to be subscribed to and back volumes to be acquired for the library of Pomona college, using citation count to rank the periodicals in Chemistry. From the application point of view, citation analysis may be considered as a collaborative peer effort to study and promote the quality of scholarly publication and research (Kumar and Reddy, 2012, p.44).

In view of the above discussions, citation analysis is used for the study of the properties and behaviours of recorded knowledge (Dhanamjaya and Talawar, 2010, p.556). They further added that it is an examination of the frequency and patterns of references appear in published literature which also uses attentions in scholarly works to establish links to other researcher's works. Meho (2007, p.1) observes that citation analysis is actually a branch of information science in which researchers studies the way articles in a scholarly field are accessed and referenced by others. It has been used for the intention of scholarly analysis and evaluate in several fields of human endeavour. In this study, citation analysis is employed in studying M.Phil dissertations submitted to the department of Library

and Information Science, Mizoram University, Aizawl (2007-2011) with a view to find out citation practice in the dissertations.

1.2 Derivation of Bibliometrics

Cole and Eales use "Statistical analysis" in their study of "The History of Comparative Anatomy" Part I in 1917 and the study is considered to be the first bibliometric study. And researchers claim W.Wyndham Hulme (1922) to be the first to use the expression by changing the name to "Statistical Bibliography" and the one to describe the use and non-use of information. "Statistical Bibliography" is also used by Pritchard when he writes "Computers, Statistical Bibliography and Abstracting services" (Hertzel, 2010, p.550). Dr. S.R Ranganathan in 1948 gave the name "Librametry" to statistical calculus for handling the library work and services or observations and evaluating of an existing or proposed library services and resources (Guha, 1999, p.284). The word "Bibliometrics" first appeared in print form in 1969 in Alan Pritchard's article "Statistical Bibliography or Bibliometrics?" in the December issue of Journal of Documentation. He described it as the "application of mathematics and statistical methods to books and other media of communication". In a later, article, Pritchard described Bibliometrics as the "metrology of information transfer process and its purpose is analysis and control of the process" (Pritchard 1969, cited in Hertzel, 2010). Other related terms coming up were, "Scientometrics" the translation of the Russian term "naukometriya" coined by Vassily V.Nalimov and Mulchenko in 1969, "Informetrics" which comes from the German word "Informetrie" first proposed by Professor Otto in 1979 in London, "Webometrics" introduced by Almind and Ingwersen in 1997, and "Cybermetrics" whose origin is not clear: it might probably be attributed to Isidro Aguillo, the editor of the e-journal "Cybermetrics" founded in 1997 (Bar-Ilan, 2010, p.2756). During mid 1990s a range of new terms had emerged in this field coined by various scientists. They are "Netometrics", "Webometry", "Internetometrics", "Webometerics", and "Web Bibliometry" (Mukherjee, 2011, p.101).

1.2.1 Bibliometrics Indicators

Bibliometrics uses the three main types of indicators as noted below.

- **Publication count**

  The number of articles published in learned journals during a specific time frame is an indicator of the output of a set or subset within the science system. It is also possible to compare numbers in order to gauge output intensity in specific fields (Specialization index).

- **Citations and Impact Factor**

  Number of citations can be used to access the scientific impact of research. The number of citations receive by learned journals is systematically compiled by Thomson ISI and sold under the trademark Journal Citation Report (JCR). This product includes a number of indicators related to citations received by journals, and the impact factor is probably the one most commonly applied.

☞ **Co-citation , Co-word analysis and Bibliographic coupling**

Mapping is a means of studying the development of emerging fields using time as variable. Co-citation and Co-word indicators can be combined with publication and citation counts to build multifaceted representations of research fields: linkages among them, and the actors who are shaping them (Archambault and Vignola Gagne, 2004, p.2).

1.2.2 Types of Bibliometrics

Bibliometrics can be divided into two areas as follows:

⇨ **Productive count (Descriptive)**

1. Geographic (Countries)
2. Time periods (Eras)
3. Disciplines (Subjects)

⇨ **Literature usage count (Evaluative)**

1. Reference
2. Citation (Hertzel, 2010, p.553).

1.2.3 Laws of Bibliometrics

Three regularities occur in Bibliometrics to which have been given the name "law". Although claims have been made that the three laws are basically the same, one of their differences lies in the type of data.

Lotka's Law of Scientific Productivity (authors publishing in a certain discipline) where the Law describes the frequency of publication by authors in a given field. It states that " . . . the number (of authors) making *n* contributions is about $1/n^2$ of those making one; and the proportion of all contributors, that make a single contribution, is about 60 percent".

Bradford's Law of Scattering (Distribution of Publications), serves as a general guideline to librarians in determining the number of core journals in any given field. It states that journals in a single field can be divided into three parts, each containing the same number of articles:

⇨ First zone, where a core of journals on the subject, relatively few in number, that produces approximately one-third of all the articles,

⇨ Second zone, containing the same number of articles as the first, but a greater number of journals, and

⇨ Third zone which contains the same number of articles as the second, but still covers greater number of journals. The mathematical relationship of the number of journals in the core to the first zone is a constant *n* and to the second zone the relationship is n^2. Bradford expressed this relationship as $1:n:n^2$.

Zipf's Law of Word Occurrence (Ranking of Word Frequency) is often used to predict the frequency of words within a text. The Law states that in a relatively lengthy text, if you "list the words occurring within that text in order of

decreasing frequency, the rank of a word on that list multiplied by its frequency will equal a constant. The equation for this relationship is: r x $f = k$ where r is the rank of the word, f is the frequency, and k is the constant (Hertzel, 2010, p.560-573).

1.3 Significance and Scope of the study

Substantial numbers of citation studies have been carried out both in global and national level in the field of social science in general and Library and Information science in particular, and the results of such studies have been tested with bibliometric laws. This is a sporadic attempt of the scholar to carry out Bibliometrics study in higher degree of study i.e., in M.Phil level of the Department of Library & Information Science, Mizoram University and as such, this is the first of its kind. It is almost remanded of its virgin field of research by studying the implication of the two laws, i.e., Lotka's Law and Bradford's Law. The present work is confined to a total number of 15 M.Phil dissertations having more than 1100 citations submitted to the Department of Library & Information Science, Mizoram University from 2007-2011. The M.Phil dissertations for the year 2012 are still in progress and hence, could not be accommodated in the study.

The study finds its significance in the following areas pertaining to,

- ⇨ Forms of documents used by the scholars to prepare their Theses/Dissertations.
- ⇨ Relevance of the literature while shaping to dissertation and
- ⇨ Importance of web sites visited by the scholars for preparing Dissertations.

1.4 Review of Literature

The application of bibliometrics study has been made earlier by many scholars and students for their research in many branch of universe of knowledge. A literature review is a body of the text that aims to review the points of current knowledge on a particular topic. The ultimate goal of literature review is to bring the reader up-to-date with current literature on a topic and forms the basis for another goal, such as to defend for future research in the area.

It is an account of what has been published on a topic by attributed scholars and researchers. It provides with a handy guide to a special topic. Literature gives an overview or effect as a stepping stone. For professionals, they are benefit reports that keep them up to date with what is current in the field. For scholars, the depth and breadth of the literature review emphasizes the reputation of the writer in his or her field. Literature reviews also provide a solid background for a research paper's examination.

Comprehensive knowledge of the literature of the field is a must to most research papers. The purpose of a literature review is to carry to a reader what knowledge and ideas have been develop to set up on a topic and what are the strengths and

weaknesses. The literature review permits the reader to be brought up-to-date concerning the state of research in the field and close the reader with any difference perspective and viewpoints on the topic.

There are positive outcomes in review of literature at the beginning for the reasons as pointed out below. It includes to,

- ❖ Find out whether the investigation has been carry out or not;
- ❖ Develop general explanation for taking special notice variation in a behaviour or situation and one of the two research projects i.e. alternative research projects;
- ❖ Identify potential relationships between concepts, data sources that other researchers having already been used and testable hypothesis (hypothesis is nothing but the speculation of the subject and or statement);
- ❖ Learn the use of calculated key concepts by other scholars; and
- ❖ Discover the implications of a research project.

Literature reviews are secondary sources, and as such, do not report any new, first or original experimental works. More studies have been carried out in the area of Library and Information Science and related disciplines are reviewed here.

- ⇨ Banateppanvar, Koteppa, Biradar, B.S and Kannappanavar, B.U. (2013). Citation analysis of doctoral theses in Botany submitted to Kuvempu University, India: a case study. *Collection Building*; 32 (1); 12-21.

Both the authors found out that journals are the most preferred sources of information used by the researchers in the field of Botany securing 74.77% of 2086 citations. They observed that researchers are not taking much advantage of Internet resources. The major findings include Phytopathology from U.S is the most cited journals (7.57%) and authorship pattern for journal citations showed that, most of the citations are contributed by two authors out of 2086 citations securing 1,227 which was 58.82%. The most cited journal corresponding to Geographical distribution was India contributing 39.97% of literature.

- ⇨ Gawande, Nilesh N. (2013). Citation analysis of Doctoral research in Botany: special reference North Maharastra University, Jagaon. *E-Library Science Research Journal*; 1 (3); 1-9.

He analysed the Ph.D theses during 1995-2000 which were accepted as well as registered by North Maharastra University, Jalgaon. The subject discipline was Botany with the total of 93 Ph.D theses. Age wise distribution of citations to Journals in Botany had been revealed, and about 22% of Journal citations were 10 years old, about 50% of Journal citations were 15 years old, and more than 30 years old Journal citations percentage was 21.99%. The study concluded that the half life period of Botany Journal citations was 15 years.

⇨ Gawande, Shilpa R. and Choukhande, Vaishali. (2013). Citation use pattern of Doctoral theses and Information Science of Sant Gadge Baba Amravati University Amravati. *E-Library Science Research Journal*; 1 (4); 1-12.

They studied 1450 citation appended to the 12 doctoral theses during 1983 to 2010. They found out that journals are the most utilized reference materials in the theses as current literature and majority of citations found were single authored securing 72.68%. Researchers largely use literature published from India and U.S.A country. They applied Bradford's Law in their study and through the application it revealed 5 journals covered 269 citations and next 16 journals covered 257 citations followed by the next 117 journals covered 228 citations.

⇨ Rahman, Md Ziaur and Bhattacharya, Udayan. (2013). An analysis of Citation Frequency of Doctoral Theses in Zoology: A case study of North Bengal University. *IASLIC Bulletin*; 58 (2); 115-128.

They based a study on 8,478 citations appended to 43 Doctoral theses in Zoology, submitted to the North Bengal University, Darjeeling, during 1987-2007, with an average of 197.6 per thesis. They found out that the authorship trend is towards team works rather than a work in isolation. The findings include the most frequently cited journal titles was the Journal of Immunology.

⇨ Thirumagal, A. (2013). Osteoarthritis research growth during 2001-2012: A Bibliometric Study. *IASLIC Bulletin;* 58 (2); 81-92.

He studied Osteoorthritis research growth and collected the records from PubMed resource MEDLINE for the period of 2001 to 2012. The total numbers of record for this study include 31,465. The collected data were analysed with the help of "Bibexcel Tool". His major findings include Single author contribution is 2, 841 and Multiple authors are 28,614. The degree of collaboration has arrived at 0.9. In his study Relative Growth rate decreased by year after year (0.72 to 0.16) and Doubling Time increases from 0.95 to 4.29. His findings include "Osteoarthritis Cartilage" journal got first rank.

⇨ Tunga, Santosh Kumar. (2013). Application of Bradford's Law of Scattering to the Horticulture Literature: A Citation Study of Doctoral Dissertations 1991-2010. *SRELS Journal of Information Management;* 50 (3); 305-316.

He studied 80 Doctoral Dissertations submitted to the Bidhan Chandra Krishi Viswavidyalaya (BCKV) and Uttar Banga Krishi Viswavidyalaya (UBKV), West Bengal from 1991-2010 by the research scholars of Horticulture as the source materials. A total number of 10845 references were appended to the 80 dissertations of which 8437 were journal articles. His major findings include "Hort Science", a specialized journal in the area of Horticulture published from USA tops the list with the highest contribution of 441 (5.3%) citations. However, Bradford's Law of Scattering does not fit well in journals.

⇨ Haldua, Hema, Arya, Chanda and Kaushik, Arundhati. (2012). Citation analysis of Dissertations in Molecular Biology and Biotechnology: A case study of G.B Pant University of Agriculture and Technology, India. *Chinese Librarianship: an International Electronic Journal*; 33; 1-11.

They studied the reference lists of dissertations submitted by the doctoral students of the molecular Biology and Biotechnology sciences at the G.B Pant University of Agriculture and Technology, Pantnagar, India from 1998-2010. Their findings include, in the year 2009 the distribution of dissertations was very high which is 22.85% and lowest year was 2000 and the distribution rate of dissertations was zero. They also found out that the plant molecular biology had the greatest rates of the subject-wise distribution securing 31.42%. The major findings include that the types of documents refer most was Journals by securing 88.02% of 8,490 total citations and Journals cited in the dissertations were published most in United States followed by United Kingdom, India, Netherlands, Germany, Canada, Japan, Australia, Austria, Hungary and Kenya.

⇨ Kumar, K and Reddy, T. Raghunadha. (2012). Citation analysis of Dissertations submitted to the department of Library and Information Science, Sri Venkateswara University, Tirupati. *International Journal of Digital Library Services*; 2 (2); 44-84.

They analysed dissertations submitted to the Department of Library and Information Science, Sri Venkateswara University, Tirupathi during the period 2000-2007 for finding possible relationships between citing, citing articles and bibliographic forms. They presented Frequency and percentage distributions in charts, tables and graphs and used measures of central tendency for analysing the data. They found out that journals were the most utilized reference materials in the dissertations. They also found out that the highest number of citations goes to Library Science in general followed by Library management and cataloguing. The lowest numbers of citations were from Education followed by Literature and Social Sciences and Annals of Library Science and Documentation secured the most cited journals followed by Herald of Library Science.

⇨ Lee, Teck Heang, et. al. (2012). Accounting Researchers in Asia Pacific: A Study on Publication Productivity and Citation Analysis. *Asian Journal of Finance & Accounting*; 4(1); 132-150.

They measured the publication performance and citation analysis by using the number of citations of the researchers publication based on the search from Google scholar, Scopus and Social Science Citation Index. The most productive researcher from the results was Hun-Tong Tan. Gul (Monash U) secured the highest total citation both from Google Scholar and Scopus and in the Social Science Citation Index, T. J. Wong secured the highest total citation.

⇨ Lochan Jena, Kamal, Swain, Dillip K and Bihari Sahu, Sada. (2012). Scholarly communication of the Electronic Library from 2003-2009: a bibliometric study. *The Electronic Library*; 30 (1); 103-119.

They studied total number of 417 articles carrying 7,442 citations. They found that the average number of citations per article published in The Electronic Library was 18 (17.8%) which indicated that the publication policy of The Electronic Library conformed to the standard norm of citation. They also found that nearly half of the articles 46.283% fall under the category of research papers. In regard to authorship patterns, the single authored articles secured highest by 47.242%.

⇨ Rana, Shushan. (2012). Bibliometric analysis of output and visibility of science and technology in Singapore during 2000-2009. *Webology*; 9 (1); 1-12.

He studied 83,439 papers which were published in different ISI-listed periodicals between 2000 and 2009. The findings include Singapore produced an average of more than 8,000 scientific papers per year and alone in 2008. The paper had been concluded that High-tech local and international industries of information economy, digital libraries, well-trained employees and other financial enterprises along with political willingness had been crucial for economic development of Singapore.

⇨ Swain, Dillip K. and Lochan Jena, Kamal and Mahapatra, Rabindra K. (2012). Interlending & Document Supply: A bibliometric study from 2001 to 2010. *Webology*; 9 (2); article 103.

They applied Lotka's law to assess authorship pattern and Bradford law to ascertain the scattering of journals. They analyzed 315 scholarly articles and they revealed that the highest numbers of articles were found that single authored contribution. They found out that UK was the most productive country which was followed by USA and France. They also found out that Inter-lending and Document supply authors are found to have fairly cited recent literature in their papers which was evident from the half life period of documents in their study.

⇨ Zafrunnisha, N. (2012). Citations in the Sociology Doctoral Dissertations: A Quantitative analysis. *International Journal of Information Dissemination and Technology*; 2 (3); 212-218.

He collected 77 Ph.D theses in Sociology, which were submitted to Sri Venkateswara University, Tirupati during the period 1981-2005 and Osmania University, Hyderabad during the period 1974-2005 for the award of doctoral degree. A total number of 9,162 citations had been arrived and used a predefined worksheet and analysed them into number of authors, bibliographic form wise, language wise, country wise distribution of citations, rank wise periodicals are tabulated and analysed with the help of Ms-Excel software package. Ulrich's International Periodicals Directory was referred to identify country, subject and language of the cited journals.

⇨ Chen, Shu-Heng, Yang, Yu-Hsiang and Yu, Wen-Ten. (2011). A bibliometric study of Agent Based Modeling Literature in SSCI Database. *Agent-Based approaches in Economic and social complex system VI*; 8(6); 189-198.

They investigated the characteristics of international literature using Agent-Based Modeling (ABM) in SSCI for a bibliometric study. Most of the literature in their study came from various institutions in USA. They found out that applications of ABM are mainly found in the fields of social science/interdisciplinary studies, economics and environmental studies.

⇨ Garg, K.C, et.al. (2011). Plant Genetics and breeding research: Scientometric profile of selected countries with special reference to India. *Annals of Library and Information Studies*; 58(2); 184-197.

They studied bibliometric indicators on publication and citation data downloaded from Web of Science. The impact of research output was highest for UK. Emphasis of research shifted in 2009 as compared to 2005 for all countries. From the research, among the institutions, international institutes located in India had the highest impact and the proportion of single authored papers decreased, while the share of internationally co-authored papers has remained almost steady during the period of study.

⇨ Gupta, B. M. and Bala, Adarsh. (2011). A bibliometric analysis of Malaria research during 1998-2009. *Journal of Vector Borne Disease*; 48; 163-170.

They retrieved the publication data by using SCOPUS Citation database for a bibliometric analysis. 2786 papers in Malaria have been published by the Indian Scientist during the study period. Three years, two years and one year citation window had been used for Citation data. It had been noted out that the accumulation of malaria research output published under different subjects came higher than the total research output in malaria for the study period due to the overlapping of the subject areas.

⇨ Harande, Y I. (2011). Exploring the literature of Diabetes in Nigeria: a bibliometric study. *African Journal of Diabetes*; 19(2); pp. 8-11.

In his study, the National Library of Medicine pubMed was used as the database where a bibliometrics study of Bradford-Zipf distribution were utilised. He identified 512 articles where these articles were published in 57 journals. It has found out that there was a rapid growth of the literature of from the year 1986 onwards. The findings indicate that the literature of diabetes in Nigeria is in harmony with the Bradford-Zipf distribution.

⇨ Hussain, Akhtar and Fatima, Nishat. (2011). A bibliometrics analysis of the 'Chinese Librarianship: an International Electronic Journal, (2006-2010)'. *Chinese librarianship: an International Electronic Journal*; 3; 1-14.

After analysing CLIEJ (Chinese librarianship International Electronic Journal), they found out that the publishing trend totally depends on the output of contributors, patterns of contributions and the quality of research. Maximum number of contributions to CLIEJ corresponding to the year was 2007. They also found out that majority of the articles were contributed by single authors and most authors were librarians, faculty members or research affiliated with academic or research institutions. From their study, Gang Wan, Jian Anna Xiong and Zhixian Yi were the most proliferate authors. The country who contributed more articles other than India, Nigeria, China and Pakistan was the United States.

⇨ Joanna Sin, Sei-Ching. (2011). International Coauthorship and Citation Impact: A Bibliometric Study of Six LIS Journals, 1980-2008. *Journal of The American Society for Information Science and Technology*; 62 (9); 1770-1783.

He analyzed 7,489 papers published in six leading publication (ARIST, IP&M, JAMIA, JASIST, MISQ and Scientometrics) over the last 3 decades. Among the papers 93.6% belonged in the article category, 6% of them were reviewed and 0.3% was Bibliography. The number of papers published in each journal were ARIST, 255 (3.4%), IP&M 1,425 (19%), JAMIA 1,119 (14.9), JASIST 2,330 (3.1%), MISQ 631 (8.4%) and Scientometrics 1,729 (23.1%). The findings include that authors from 73 countries contributed papers to the six publications and overall, authors based in the U.S contributed the largest number of papers which was 4,095 papers out of the total 7,489 papers (57.7%) of all papers.

⇨ Kannappanavar, B.U and Roopashree, T.N. (2011). Journal of Genetics: A Bibliometric Study. *SRELS Journal of Information Management;* 48(6); 673-674.

They conducted bibliometric study and found that journals are heavily quote in support as compared to other forms of documents. The trend is towards team research according to the evident of their study as multi author guide over single author. It is found out that the United States contributes more number of articles in the subject. It has been realized that current literature is more important for research in the subject field.

⇨ Kehinde Fasae, Josheph. (2011). Citation analysis of M.Tech theses submitted in the department of Agricultural Economics and Extension, Federal University of Technology Akure, Nigeria. *Collection Building*; 30 (4); 179-183.

He studied the materials used in Master's theses of the Agricultural Economics and Extension Department (AEE), FUTA during the period of 2005-2009. In his findings Journals were more consulted compared to other sources of information materials. The further findings include the highest citation was recorded in 2006,

where 30.52% materials cited were 20 yrs old and above. He also found out that more than half of the cited materials were contributed by single author and foreign journals were more cited with 72% than local journals with 28%.

⇨ Kumar Singh, Neeraj, Sharma, Jyoti and Kaur, Navneet. (2011). Citation analysis of Journal Documentation. *Webology*; 8 (1); 1-9.

They conducted citation analysis of all the journals articles published in Journal of Documentation from 1996-2010. During the period 487 articles were published in the journal during 15 years. They found out that, in the year 2005, the highest number of articles had been published which was 44 articles. The citation during their study period was 15587 citations. The major findings includes single author citations were dominant than others and it was 201 (49%) and Journal of Documentation was the most preferred journal used by authors in their citation. They conclude their study that only 10 core periodicals can cover more than 2951 (16%) references.

⇨ Linder, Christian and Seidenstricker, Sven. (2011). The current Intellectual Property Debate: A Citation-based Analysis. *Management*; 6(1); pp. 003-024.

They analyzed the paper by using Social Network Analysis and the Co-Author Citation Approach for citation based analysis. The paper gives an overview of Intellectual Property research based on the quantitative output further research question can be formulated.

⇨ Maharana, Bulu, Majhi, Sabitri and Bihari Sethi, Bipin. (2011). Citation analysis of top research papers in Chemistry with specific reference to India. *Library Review*; 60 (6); 501-512.

The authors analysed citations of 450 research papers in Chemistry taken from the listing of top 25 papers in Science Direct database. They covered 18 issues of the Science Direct generated alert service for the period 2004-2008. They analysed their bibliographic data in Excel sheets. They found out that 8% were contributed by Indian researchers and as regards to number of citations, 25% of Indian papers were cited between 10 and 25 times each. Their further findings include the journal Tetrahedron was found as the highest publishing journal with 71 publications which was 6%. They ranked the contribution countries and USA was the highest contributor which was followed by China and India.

⇨ Modin N Mamdapur, Ghouse, Govanakoppa; Rajalaxmi A and Rajgoli, Iqbalahmad U. (2011). Baltic Astronomy (2000-2008) - A bibliometric study. *Annals of Library and Information studies*; 58; 34-40.

They conducted a bibliometric study on Baltic Astronomy from 2000-2008. They found out that authors from USA have contributed maximum number of papers as compared to other countries where India stood 21st in the ranked list. The ranked list of journals according to their study Astrophysical journals stood first followed by Astronomy and Astrophysics.

⇨ Nandi, Amitava and Kumar Bandyopadhyay, Amit. (2011). Research productivity of the Mathematics Department, the university of Burdwan during 1960-2000: A Bibliometric study. *IASLIC Bulletin*; 56(1); 23-40.

The study revealed that the highest number of thesis was 15 during 1986-1990 and 1996-2000 and also the highest number of article was 71 during 1991-1995. They conclude their study that Mathematicians were highly selective, publishing their research results, highly in specialized and impact factors journals.

⇨ Ram. (2011). Research output on Artemisia (Artemisia annua): a bibliometric study. *Annals of Library and Information studies*; 58; 237-248.

He collected data from PubMed database of National Center for Biological Information, U.S.A. for a bibliometric study. Medical Subject Heading (MeSH) indexing term were used to extract bibliographic information examining the research activity of Artemisia, a herb that yields a natural component known as 'Artemisinin' which is being used for the treatment of Malaria worldwide. From the study, it has been realized that China is one of the countries that has contributed a number of publications in the area.

⇨ Reidpath, Daniel D, Allotey, Pascale and Pokhrel, Subhash. (2011). Social sciences research in neglected tropical diseases 2: A bibliographic analysis. *Health Research Policy and System*; 9(1); pp. 1.

They conducted of NTDs related research papers published over the past 10 years in bibliographic analysis of biomedical sciences (i.e., medicine and the human health sciences), and in the social sciences. They conclude their research that there is little evidence of scientists pays any attention to the complex social, cultural, biological, and environmental dynamic involved in human pathogenesis.

⇨ Reis, Nuno Rosa, Ferreira, Manuel Portugal and Santos, Joao carvalho. (2011). *The cultural models in international business research: A bibliometric study in IB journals*; pp. 1-31.

They performed citation and co-citation analysis to find out the most influential model and to inspect the possible linkages between models and to the issues being researched. They also found that there are noticeable differences on how research in different journals makes use of the cultural models probably reflecting disciplinary emphases.

⇨ Singh Burman, Joginder and Sheela, M. (2011). Citation analysis of Dissertations of Law submitted to University of Delhi. *Library Philosophy and Practice*; 1-9.

A total of 3,052 citations had been analysed from 33 dissertations. They found out that the major source of information used by LLM students were from Journals articles securing 779 (25.52%) which was followed by Books 678 (22.21%). The most used journal was Indian Journal titled Economic Political Weekly (EPW)

securing 56 (7.19%). They also found out that 68.78% were from their own subject, i.e. Law. Their findings include 79.84% citations were produced by single author.

⇨ Singh, Kunwar P., Jain, Aarti and Babbar, Parveen. (2011). DESIDOC Bulletin of Information Technology: A bibliometric study. *SRELS Journals of Information Management*; 48(1); 57-68.

They analyzed by accessing the trends in the publication patterns of DESIDOC bulletin of Information Technology. One of the findings was that most of the contributed papers are single authors and the percentage was 66.90%.

⇨ Singh, Neeraj kumar, Sharma, Jyoti and Kaur, Navneet. (2011). Citation analysis of Journal of Documentation. *Webology*; 8(1).

They used Scopus the world's largest abstract and citation database of peer-reviewed literature and quality web sources for citation analysis. In the form of tables and figures, the collected data have been analyzed and presented. The study reveals that Journal of Documentation is the most preferred journal used by authors in their citation.

⇨ Thornley, Clare, et.al. (2011). A bibliometric study of video retrieval evaluation benchmarking (TRECVid): a methodological analysis. *Journal of Information Science*; 20 (10); 1-19.

They discussed and analysed within the field of computer science (TRECVid Text Retrieval and Evaluation Conference, Video Retrieval Evaluation) using a bibliometric study. Scopus and Google scholar has been discussed. The additional database capabilities and usefulness of "Scopus more" in addition to "Scopus general" is discussed and evaluated. Publish or Perish (POP), a software wrapper for Google scholar, is also examined. Scopus has been far more effective than Google scholar.

⇨ Viskari, Sari, Lukkari, Eero and Karri, Timo. (2011). State of working capital management research: Bibliometric study. *Middle Eastern Finance and Economics-issue 14*; 99-108.

They used the database of ISI Web of Science and Sciverse Scopus for a bibliometric study. It is discussed only in practitioner's paper: research for constructing tools for working capital management and qualitative research of the methods of managing working capital, and working capital management in the network context were the interesting areas.

⇨ Bedu, Odile. (2010). International collaborations in Research Institute: Bibliometric study. *Scientific and Technical Information and Rural Development IAALD XIIIth World Congress*; 1-7.

He provided data through the Web of Science for a bibliometric study. The Web of Science provides all the necessary information for his work in the address field. The harmonization of the writings of the addresses, essential before the statistical

treatment of data is the most important work. He concludes the study that, the global results confirm intuitive data: increase of the number of co-publications and broadening of the number of partner countries.

⇨ Dixit, Swati and Katare, V.V. (2010). Publication productivity of the scientist of the Central Institute for Cotton Research: A bibliometric study. *IASLIC Bulletin*; 55(3); 158-168.

They analyzed 204 papers with the help of bibliometric study. Through the study, 2006-07 has the highest number of publications with 47 publications. According to them, the most preferred subject for publication of the scientists of CICR (Central Institute for Cotton Research) is plant genetics and breeding (76) as it has the maximum number of publication (37.25%). It was found out that CICR scientists prefer publishing their papers in Indian journals for publication of papers.

⇨ Kumaragurupari, R, Sieving, Pamela C and Lalitha, Prajna. (2010). A bibliometric study of publications by Indian Ophthalmologists and vision researchers, 2001-2006. *Indian Journal of Ophthalmology*, 58(4), 275-279.

They searched pubMed for articles indicating vision related content and author affiliation with an Indian research centres for a bibliometric study. They identify research collaboration and funding from indexing for research support and classified articles as reporting basic science, clinical science or clinically descriptive research. The total number of published articles retrieved was 2163. Research productivity according to their result has increased during their study period.

⇨ Lin, Tsai-yuan and Cheng, Yun-Yao. (2010). Exploring the knowledge network of strategic alliance research: Co-citation analysis. *International Journal of Electronic Business Management*; 8(2); 152-160.

They analyzed using co-citation analysis. Bibliometrics methods, citation and co-citation counts and mapped with multivariate analysis and social network techniques. 521 articles with 21,493 cited references were extracted from the Social Science Citation Index and the Science Citation Index. Three main research themes strategic alliance formation, learning and absorptive capability, and the relationship and characteristics of partnership success were discovered.

⇨ Olakunle Simisaye, Ahmed and Osinaike, A.B. (2010). Citation analysis of Journal of Library and Information Science (2004-2009). *Brazilian Journal of Information Science*; 4 (1); 35-60.

They covered 72 articles during their 5 years of study. They found out that highest numbers of 14 articles were published in 2007 and 2008. The major findings include journals were the most cited materials by securing 37.14% of the total citations followed by books 33.14%. Individual article which had highest citation contained 44 citations which was published in volume 5 of December, 2008, whereas two articles that had the lowest citations had 5 citations each and were

published in volume 1 and 3. They also found out that out of 367 journal citations, 172 (46.86%) were from Library and Information Science journals. They also confirmed that most of the materials cited were written alone by single author and 60.46% of the Library and Information Sciences were cited from Nigeria.

⇨ Patil, S.B. (2010). Herald of Library Science: A Bibliometric study. *SRELS Journals of Information Management*; 47(3); 351-358.

He examines the articles published in Herald of Library science for authorship pattern, degree of collaboration and geographical distribution of papers. He found out that majority of papers are single authored. The degree of collaboration has been found out as 0.30. He reveals that the geographical distribution of the contribution by Andhra Pradesh is the highest in India and Nigeria is at top in case of foreign countries.

⇨ Ritz, Lindsay Sarah, Adam, Taghreed and Laing Richard. (2010). A bibliometric study of publication patterns in access to medicines research in developing countries. *Southern Medical Review*; 3(1); 2-6.

They used pubMed search to retrieve publication for a bibliometric study. Retrieved articles were categorized by research topics, year of publication, study area and country of residence of corresponding author. He concludes that there are few peer-reviewed publications on access to medicines in developing countries with an average of only 76 publications per year over the past 10 years.

⇨ Salomon, Yelina Piedra. (2010). The scientific field of communication: examining its intellectual structure through Co-citation analysis. *Revista Latina de Communication Social*; 65(879-921); 204-213.

They used the database of Social Science Citation Index (SSCI) available on Web of Science for co-citation analysis. It covers information of about 50 disciplines of Social Sciences. The result found that Communication is an area of interdisciplinary knowledge characterized were still insufficient epistemological legitimacy, with a marked absence of reflections and theoretical proposals within the same field. The intellectual structure is divided into two sub-disciplines: Interpersonal Communication and Mass Communication, which are crossed transversely by the New Technologies.

⇨ Sarkhel, Juran Krishna and RayChoudhury, Nitai. (2010). Contribution of Bidhan Chandra Krishi Viswavidyalaya to agricultural research: a bibliometric study. *Annals of Library and Information studies*; 57; 348-355.

They indexed the CD-ROM version of CAB Abstract from 1993-2007 for a bibliometric study and uses WinSPIRS 4.01 software of Silver platter. It has been revealed that journals in which papers have been published by BCKV have been ranked on the basis of number of paper with their NAAS (National Academy of Agricultural Science) rating.

⇨ Thanuskodi, S and Venkatalakshmi, V. (2010). The growth and development of research on ecology in India: A bibliometric study. *Library Philosophy and practice 2010; paper 359*; 1-10.

They analysed publication output reflected in Web of Science from 1990-2006 for a bibliometric study, with regards to 501 records, an abstract and citation database of research literature and web sources. They found out that more than 86% of publications were journals articles and more than 80% of the publications had 2 or more authors.

⇨ Yu, Wen-Jen and Chou, Shrane Koung. (2010). A bibliometric study of search engine literature in the SSCI database. *Journal of Software;* 5(12); 1317-1322.

They investigates the publishing trends of search engine literature as catalogued in the social sciences citation index (SSCI) database for a bibliometric study. The findings include, the quantity of recent research on search engine study is expanding remarkably, the frequency indices of author productivity appear to abide by Lotka's Law, most research papers on search engine study are generated by multiple authors and applications of search engine study are most frequent in research areas such as information science, information systems of computer science, and interdisciplinary applications of computer science.

⇨ Meyer, Matthias, Lordcheid, Iris and Troitzsch, Klaus G. (2009). The development of social simulation as reflected in the first ten years of JASSS: a citation and co-citation analysis. *Journal of Artificial Societies and Social Simulation*; 12(4).

They used citation analysis to identify the most influential publications and to verify characteristics of social simulation such as its multidisciplinary nature and also perform a co-citation analysis to visualize the intellectual structure of social simulation and its development. They concluded that the analysis shows social simulation both in its early stage and during its first steps towards becoming a more differentiated discipline.

⇨ Chikate, R. V and Patil, S. K. (2008). Citation analysis of Theses in Library and Information Science submitted to University of Pune: A pilot study. *Library Philosophy and Practice 2008*; 1-14.

Both the authors studied 27 Library and Information Science dissertations submitted to the University of Pune between 1982 and 2005. The total citations in the dissertations were 6,257. The major findings include nearly half of the citations recorded are from journal articles by securing 42.2% and 2,639 in number and nearly 3 quarters of the journal articles were from Library and Information Science journals, with the remainder from 33 other subject areas. They also found out that College and Research Libraries journals was the most cited journal, followed by Scientometrics.

⇨ Mishra, R. N and Panda, K. C. (1997). Citation Analysis of Doctoral Dissertations in LIS Accepted by the Universities of Orissa and Manipur till 1993: A Comparative study. R. G. Prasher (ed.), *Library and Information Science Parameters and Perspectives*; 2; 254-277. New Delhi: Concept Publishing Co.

Both the authors conducted citation analysis of Doctoral Dissertations in Library and Information Science. Their study includes 3,094 citations over 15 bibliographical forms. They found out that periodical literature ranks as the first most frequently cited form of documents other than Books and conference proceedings by securing 48.416% (1,498) of the total citations, where Herald of Library Science (India) was the most cited periodical literature by constituting 95 times out of total 1,498 citations corresponding to the ranking order of countries in regard to citations of periodicals, they found out that USA keeps the formidable position for 623 citations which constituted 41.589%, followed by India for 499 citations (33.311%) and UK 209 citations, which constituted (13.952%).

1.5 Research Design

1.5.1 Statement of Problem

Citation analysis of dissertations and ranking of journals are useful in determining information sources that are vital for students, research scholars, faculties and the library as well in a given subject area. It also helps the library in judicious budget planning for collection development. This is intermittent attempt by the scholar to come up with a solution to the ever increasing literature.

It is the requirement of the university and the University central library to assess the use of information resources by the students in their dissertation preparation and make changes to the collection development wherever appropriate. It is necessary to see whether the students are able to comprehend their subject area in the ever changing library trends. The present research topic will also be used to find out which authors and publications are best utilized by the students in writing their dissertations.

The problems associated with the study are mentioned below:

⇨ Bibliographies appended at the end of all 15 M.Phil dissertations need application of specific style manual for a scientific approach to the users and some of the dissertations are lacking of arrangement of bibliographies in a uniform standard causing thereby, serious constraints in scientific communications among the users.

⇨ The dissertations under discussion also lack of adequate bibliographic details of literature source causing thereby to derive the list of core literature central to the field of research.

⇨ Further, the dissertations do not have clear indications about the year of publication of either published literature or the electronic sources used by the scholars causing thereby, serious problems to find out the obsolescence of literature.

1.5.2 Objectives of the study

The aims of the present study are to,

- ☞ Find out the core list of important documents required to fulfil the needs of the students in Library and Information Science.
- ☞ Prepare ranking list of documents which may be supportive for collection development of the library under study.
- ☞ Recognize the core literature and/or group of authors concerned in the field of Library and Information Science
- ☞ Ascertain the obsolescence of literature
- ☞ Study the implication of Bradford's Law of Scattering and Lotka's Law of Productivity in LIS.

1.5.3 Research Methodology

Data relating to the present study were collected from a total number of 15 M.Phil dissertations accepted by the Department of Library and Information Science, Mizoram University from 2007-2011. The bibliographical references cited at the end of each dissertation were taken as the source of data for the study. The present study contains a total number of 1116 citations which is the total population of the study. The scholar has taken adequate measure in photocopying all references (bibliographies) appended at the end of each dissertation and each bibliography were scientifically analysed with regard to the forms of documents such as, Books, Journals, Reports, Conference Proceedings, and Newspapers etc., used by the scholars, authorship pattern, place of occurrence, and place of publication of the documents. The data so obtained were tabulated for each component for analysis which apart from other inferences revealed the authors central to the publication, most preferred form of documents, core literature on the subject, obsolescence of literature etc. Further, the data were tested to confirm the Lotka's Law of Productivity and Bradford's Law of Scattering of Journals. The scholar also used excels spreadsheet and log tables while analysing the data to draw inferences.

1.5.4 Chapterization

The present study is divided into 6 (Six) chapters. While, the first chapter of the study deals with Introduction, Derivation of Bibliometrics, Significance and Scope of the study, Review of Literature and Research Design, the second chapter is deliberated on Purpose of Citation Analysis, Need of Citation Analysis, Theoretical Framework, Journal Citation Reports, Citation Outline, List of Tools for conducting Citation Analysis, Bibliometrics, Scientometrics, and Informetrics and Web-based Metrics such as, Webometrics and Cybermetrics in clear concept also have been dealt with in the chapter. The third chapter of the study is described on Introduction, Information Employs Studies, Information Sources, Development of Information, Role of Information in Management for Socio-Economic Development and Technology Transfer, Bibliographic Control in LIS, Role of Citation Analysis in Collection Development etc. The fourth chapter of

the present study focuses on Introduction, Bibliometrics Laws- Conceptual View and basic laws of Bibliometrics. The fifth chapter deals with Introduction, Form of Documents, Authorship Pattern, Degree of Collaboration; Single Vs. Multiple authors, Citation of Websites, Website Citation Frequencies, Editorship Pattern, Editorialship cited in the edited volume, Ranking of Editors, Cited Articles from the Journals, Categorization of Journals, Ranking of Journals, Place-Wise Distribution of Articles, Categorization of Places, Ranking of Top Cited Places, Publisher-wise Distribution of Articles, Categorization of Publishers, Ranking of Publishers, Subject Wise Distribution of Articles, Chronological distribution of Articles, Application of Lotka's Law of Scientific productivity, Application of Bradford's Law of Scattering, and Findings and lastly, the sixth chapter deals with suggestion and conclusion.

At the end, the scholar has submitted a comprehensive list of bibliography arranged according APA style manual.

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CHAPTER – 2

CITATION ANALYSIS: BASIC ISSUES

2.1 INTRODUCTION

The commencement of human civilization to the present day, information has been an intrinsic of growth and amelioration in living standards of the people. Today information industry is emanating as one of the major among modern industries.

Escalate demands of the user communities, substantial increase in the cost of documents and the coercion of limited financial resources are the major indispensable components for the librarians to design and develop need-based collections and services to meet increasing information demand of the users. A meticulous knowledge of the characteristics of the subject literature entailed by the users is also very essential in planning and designing of such information systems and services. To confront this, librarians requires using quantitative techniques effectively.

In order to surmount the difficulties and to obtain a thorough understanding of the characteristics of the literature, the great library science theoretician S.R Ranganathan coined the term "Librametry" at Association of Special Libraries and Information Bureaux (ASLIB) conference at Leamington Spa, the United Kingdom on September, 1948. The early 20th Century mathematical and statistical techniques to bibliographical units applied by documentalist has led to the emergence of a new branch of knowledge in the field of Library and Information known as "Bibliometrics" coined by the British Librarian Alan Pritchard (Nisonger, 2003).

Bibliometrics has entrenched itself as a variable and particular research technique for measurement of science based on citation data. As citations are the formal explicit linkage between scientific communications that have specific points in common, it is one of the most significant bibliometric techniques which entail analysis of references forming part of primary communication.

Bibliometric studies are employed to recognize the pattern of publication, authorship and citation analysis with the hope that such regularities can give an insight into the dynamics of the area under deliberation. The portion of literature which is cited most and in which part of globe such relevant works are going on can be adjudicate through citation study which contribute helpful guidance in the process of collection development of the library.

2.2 PURPOSE OF CITATION ANALYSIS

Citation Analysis established references to a specific journal article reflect a scholarly impact of the article on the author of the citing work. Besides, Citation Analysis is largely employed for putting things in order. Those ordered possibly will be journals, authors for papers in journals or organizations to which authors of journal papers are united. The kind of order be able to be linear as in ranking or multidimensional as in the generation of citation networks.

The purposes of Citation Analysis are:-

- Depicting the basic structure of a discipline's literature.
- Performance evaluation or ranking or both of authors, academic departments, research institutes, or even nations in terms of research productivity;
- Demonstrating literature growth, especially in particular disciplines and subject areas;
- Indicating cross-citation patterns among disciplines, nations and languages. (i.e. analyzing the proportion of Library and Information Science (LIS) citations to other disciplines versus the proportion of other disciplines citation to LIS);
- Identifying research fronts;
- Examining scholarly communication patterns; and
- Evaluating the effects of funded versus non funded research (Balakrishnan and Paliwal, 2000).

2.3 NEED OF CITATION ANALYSIS

Citation Analysis is essential for measuring the reach, influence and success of the efforts by many non-profit and profit companies. An organization's publications (e.g. reports, conference proceedings, authored works, etc) are an excellent starting place where impact can be measured, in organizations where an information professional is employed; the work is cut out for them. Tracking and measuring the need of organizations output is a clear-cut way to prove the worth, contribute to department goals and generate useful statistics that will profit the employer.

Many Information professionals will be alert of the concept of citation analysis and its application in the activities of scholarly research. Citation Analysis is a method of Bibliometrics that attempt to evaluate the impact of an author's work through the frequency of being cited in other works. The procedure of citing acknowledges previous works, and disputable, implies that a work is important. Citation Analysis is also recognized (and of greater interest) in academic environments where an author's published research increases their professional profile.

Due to its wide acceptance in academic settings, several of the tools available to study citations do not incorporate "non-scholarly" literature (often termed "grey literature" e.g. working papers. As they do not experience the same scholarly publishing process, the majority of grey literature is not indexed in free citation databases, as it is not controlled by commercial publishing and citation analysis is needed (Zackosborne, 2011).

2.4 CITATION ANALYSIS- THEORETICAL FRAMEWORK

Garfield's article Citation Indexes for Science of 1955 was a turning point in a way information scientists conceptualized the role of bibliographic citations in the knowledge creation process.

In the literary sense, Citation means a reference to a text that have been quoted or the precise words of another speaker or writer that have been used in a write-up. A citation either means referencing another author's work in an endnote or footnote, or being referenced in another author's work where the former is cited reference and the latter as citing reference but somehow it is uncertain. The term "Ceremonial Citation" makes it more lucid the precise meaning of citation. Ceremonial citation is the case in which an identify authority is cited just to confirm the author has done his or her homework, even though the cited work may not have been cautiously examined. The fact that it is possible that an author could cite a work without actually grants it. In both cases, that a work has been cited without serious sound out identifying its status.

Citation Analysis can assist librarians with serials management in numerous ways including,

- ❖ Journal Citation Record, for such collection management decisions as subscription and cancellation.
- ❖ Citation-based journal rankings
- ❖ Bradfordian analysis, to help assess a journal's relative importance to its discipline;
- ❖ Identification of core journals in a discipline or subject area;
- ❖ JCR cited half-life data, to assist with weeding, relegation to remove storage and filling in gap decisions;
- ❖ Citation analysis of a discipline's structure, to aid budget allocation decisions; and
- ❖ Cited references to serials, used as a checklist for collection evaluation (Balakrishnan and Paliwal, 2000).

2.4.1 Definitions of Citation Analysis

- ❖ Gawande and Choukhande (2013) defined Citation Analysis that it is a mathematical analysis of references or citations appended at the end of each scientific communication as an essential part of it. They added that it is used to identify the core references in a subject by counting the citations appended at the end of each scientific article.
- ❖ Balakrishnan and Paliwal (2000) describe Citation Analysis that it is based on the underlying assumption that an author who cites an item must have somehow used it in the preparation of his or her publication for collection management.
- ❖ Chikate and Patil (2008) defined Citation Analysis as references in one text to another text, with information on where that text can be found. They added that it is useful for understanding subject relationships author effectiveness and publication trends.

- ❖ Doraswamy and Reddy (2000) defined Citation Analysis as one areas of Bibliometric which can be used for identifying the core journals and for knowing the characteristics features of a discipline such as authorship pattern, scatter of literature in different bibliographic forms and in different subjects.
- ❖ Singh Burman and Sheela (2011) Citation Analysis is the applied research method by librarians, teachers and information scientist to indicate the relationship that exist between cited and citing documents.

2.5 JOURNAL CITATION REPORTS

Journal Citation Reports are primarily intended for information retrieval of scientific information, library science and research evaluation and are applied at all levels of collections. Mention may be made that, the former name of Journal Citation Reports was known as Journal Citation Measures.

The Institute of Scientific Information (ISI) located at Philadelphia founded by Eugene Garfield, North America's is the most illustrious advocate of citation analysis. The ISI shouldered the responsibility for bringing out indexes covering each of the broad areas of human knowledge which consist of several major components including, The Citation Index, The Source Index, The Corporate Index and the Permuterm Subject Index (Balakrishnan and Paliwal, 2000).

2.5.1 Major Components of ISI Published Indexes:

The major components of ISI published indexes can be categorised in to four types of indexes. They are,

- ➢ Citation Index;
- ➢ Source Index;
- ➢ Corporate Index and
- ➢ Permuterm Subject Index

➔ Citation Index

Garfield seems to have found a solution when Samuel Clement Bradford supports cooperation in indexing science articles intended for a universal index. Samuel Clement Bradford would be delighted if he were to see Eugene Garfield's work (Hertzel, 2010).

According to Eugene Garfield Citation Index can be defined as,

> "*A directory of cited references where each reference is accompanied by a list of source documents which cite it"*.

He added that,

> "*The most characteristic feature of the citation index is that the user begins a search with a specific known paper (target reference)"*.

From his starting point, one is brought forward in time to succeed papers correlated to the earlier paper (Garfield, 1963).

The Citation Index is arranged alphabetically by cited author and lists all citations made during the current calendar year to an author's works published during any year (Balakrishnan and Paliwal, 2000).

It is listed in alphabetical order by name of the first author only; all the documents cited in the source articles and linked each one to the corresponding set of citing articles (De Bellis, 2009)

➔ **Source Index**

The Source Index was formerly called as Source Article Index. Eugene Garfield describes as

> *"An index, alphabetically arranged by first citing (source) author, of those source articles used to produce the citation index"* (Garfield, 1963).

To locate sources which cite a particular target paper, it is sufficient to recognize the first name of the first author. In the citation index, the cited or references author is easily positioned on the left. (Garfield, 1963). The source index is arranged alphabetically by mentioning author. In short, the citation index deals with who cited an author and the source index specify who an author cited (Balakrishnan and Paliwal, 2000).

It consist of the full bibliographic records of all the articles issued by the core journals whose reference section had been scanned for citation processing and Indexing (De Bellis, 2009).

➔ **Corporate Index**

The Corporate Index lists source articles in the first author's institutional affliction (Balakrishnan and Paliwal, 2000). It allows searches by organizations (Glanzel, 2003).

➔ **Permuterm Subject Index**

The Permuterm Subject Index offers subject access, as its name implies the annual cumulations fill numerous volumes, with the precise number varying from year to year (Balakrishnan and Paliwal, 2000). The Permuterm Subject Index goes further than a conventional title-word index. The Permuterm Subject Index lists under each term all the other title words by means of which it appeared. The refinement facilitates the user to search a combination of two terms, thus increasing the specificity of the search and decreasing the percentage of irrelevant material (Glanzel, 2003).

It has exploited all possible permutations of title words from source articles so as to construct a searchable list of natural language keywords. In 1990, it was improved by a kind of algorithmic indexing, which further exploited the idea of subject affinity between citing and cited papers.

The keywords plus system, developed by Irving Sher out of a series of previous experiments and insights, enhanced the indexed record of a paper with additional terms (words and Phrases) appearing in the titles of its cited references. In the architecture of the SCI, keyword searches are most excellent, a simple starting point, a shortcut to the retrieval of a relevant, seminal document useful to spark off the citation cycling routine (De Bellis, 2009).

2.5.2 Major Citation Indexes:

Now, the three major citation indexes covering each of the broad areas of human knowledge can be explained as the major components have already been discussed:

- **Science Citation Index**

Introducing the Science Citation Index (SCI) in 1964, Garfield offered a new dimension to the concept of evaluation process of scientific articles and index system as a whole. Science Citation Index is considered as one of the most dominant tool for measuring values of information.

The Science Citation Index gives access to current and retrospective bibliographic information, author abstract, and cited references which are found in leading scholarly science and technical journals covering more than 100 disciplines. Garfield considered citation analysis as an effectual tool for tracing scientific information and for journal evaluation as well. Practically, it interlinks scientific papers and in the process establishes network among the scientific papers on identical subjects. It affords methodology to rank scientific journal according to their relative degree of importance (Jose, 2012).

- **Social Science Citation Index**

The Social Science Citation Index (SSCI) is a database of scholarly literature and employed in many important ways. The SSCI is a product of ISI, which is a production of the Thompson Corporation.

After building SCI model, Garfield commenced other index product on 1973 named Social Science Citation Index. The SSCI is an important element in the academic apparatus of rank and prestige. Those who decide which journal are to be included in the SSCI implement an enormous influence over the social sciences (Klein and Chiang, 2004).

- **Arts and Humanities Citation Index**

Subsequent to the development of SCI and SSCI models, Garfield further launched the Arts and Humanities Citation Index (AHCI) in the domain of indexing in 1978. According to him, the index covers up a little more than a thousand journals with the ambition to become an imperative tool for researchers in humanities (Leyesdroff, Hammarfelt and Akdag Salah, 2012).

AHCI provides access to diversified disciplines such as archaeology, linguistics, philosophy, musicology, literature and others in the art and humanities (Garfield, 1997). The Arts and Humanities Citation Index is not associated with JCR-probably because those journals are less critical in the humanities.

2.5.3 Citation Measures

Citation measures signify to the type of literatures used in a given field of research. The four citations measures as available in Journal Citation Report are enumerated below.

⇛ **Total Citation Received**

Counting of the total citations received by a journal represents the most fundamental citation factor. In fact, the earlier citation studies of journals carried out during the 1920's and 1930's were based on total citation count. In the Journal Citation Report a journal's "total citations" count consist of the citation received by any issue (current as well as all back runs) during the current year from all other journals in the ISI's database.

The figure counts citations to any kind of item, including articles, book reviews, editorials, letter etc. However, the total citations excludes the books or journals those are not included in the ISI database (Balakrishnan and Paliwal, 2000, p.258-259). The total citations figure has often been represented as a crude, primitive measure. Its' advantages are for both old journals by means of more backruns to be cited and new journals that publish more articles. High citation- count titles may in fact be the most important journals in terms of their contribution to scholarly communication over the time and the emphasis they deserve in library collection management decisions. It has been used by libraries for serials collection management particularly, the states University of New York (SUNY at Albany and the Louisiana State University libraries).

⇛ **Impact Factor**

Impact factor symbolises the reputation of a journals by the users while using for research and this is primarily due to the embodiments of value added research articles in the journals. Generally, it is counted in 10 point scale in the international field. The relative importance of a journal is measured with the journals of the subject/ fields. More the impact factor, more the status of the journals in the global sphere. The impact factor of the journal is a measurement applied to the average number of citations to articles published in journals, books, patent document, thesis, project reports, news papers, conference/ seminar proceedings, documents published in internet, notes and any other approved documents. The Journal Impact factors are calculated in yearly/half- yearly/ Quarterly/Monthly for those journals that are indexed in Journal Reference Reports (JRR) (http://www.jifactor.com/).

According Eugene Garfield

> *"Impact factor is the ratio of number of citations received by source items in a particular year to the number of source items published over a fixed period of time in a particular periodic publication, say a journal"*.

Source items state in the definition include original articles, editorials, letters, short communications, report of meetings, correction, notes and review articles.

The Impact factors provided in Journal Citation Reports are computed bearing in mind the 'fixed period of time' as two years. This particular impact factor, popularly known as Journal Citation Report Impact Factor or SCI (Science Citation Index) impact factor, is naturally used all over the world.

While defining the name "Impact Factor" Garfield did not suggest any symbol for the term. For now, Sen proposed symbol i.e. I_f has been highlighted.

The impact factor can be represented as

$$I_{f\,(J)} = \frac{C_1 + C_2}{S_1 + S_2}$$

Where $I_{f\,(J)}$ denotes the impact factor of the Journal J for the year Y;
C_1 denotes the number of citations received by S_1 source items in the year Y;
C_2 denotes the number of citations received by S_2 source items in the year Y;
S_1 denotes the number of source items published in the Journal J in the year Y-1; and
S_2 denotes the number of source items published in the Journal J in the year Y-2.
Suppose the Journal J has published 32 and 36 source items in the years 2010 and 2011 respectively. These source items have received respectively 40 and 28 citations in 2012.

Now the impact factor of the Journal (J) will be

$$\frac{40+28}{32+36} = 1$$

It may be noted that the 'Journal Citation Report Impact factor' of a journal cannot be determined till the journal has finished two consecutive calendar years of its life and all its' issues are published in time. For a journal that has started publishing in the year 2011, its impact factor will be known only in 2013 provided that the journal has been very regular in publishing its issues i.e., 2012 & 2013.
In course of the time, impact factor is gaining momentum and finding more and more uses. Some of the uses are being highlighted as below.

- **Selection of Journals**

While selecting journals for acquisition in a library, the librarians tend to prefer for selection of journals on the basis of Impact Factors as it clearly reveals the global position of the journal in a given subject.

- **Discontinuation of Journals**

Many a time the libraries discontinue some journals because of the shrinking budget allocations along with many related factors such as, absence of adequate professionals, changing information needs of the users, lack of administrative support, irregular publications, price hike of the print journals etc.

- **Placing a paper**

Every researcher after completing the paper desires a reputed journal to place his/her paper so that the paper comes to the notice of the researchers of his field all over the World. In such cases the list of Journals arranged subject-wise according to the impact factor in Journal Citation Reports verified to be of immense help (Sen, 2010).

⇛ **Cited half-life**

In 1960, Robert E. Burton and R.W Kebler wrote "The half-life of some scientific and technical Literature" in which they evaluated the rate of obsolescence of scientific literature of radioactive substances (Hertzel, 2010). It is defined as the time for the duration of which half the total use of a given literature has been made (De Bellis, 2009).

A Journal's cited half-life is defined as,

> *"The number of years going back from the current year which account for 50% of the total citations received by the cited journal in the current year".*

Cited half-life information can be helpful for serials collection management. It is not evaluative in the sense that a high half-life is tentatively better than a low half-life. However, high-half-life journals will possibly be used for a longer period of time than low-half-life journals, which will become obsolete more rapidly (Balakrishnan and Paliwal, 2000).

The three types of Half-Life have been discussed as under.

❖ **Corrected Half-Life**

The half-life as estimated by removing the growth element from the median citation age.

❖ **Apparent Half-Life or Median Citation Age**

The time within which half of the citations in a citation study occurs.

❖ **Item Half-Life**

The time (actual or expected) within which half the total use of an individual item has been, or is expected to be, made (Kawatra, 2008).

⇛ **Immediacy Index**

According to the ISI's definition,

> *"A journals [SIC] immediacy index considers citations made during the year in which the cited items were published. Thus, the immediacy index of the Journal X would be calculated by dividing the number of all current citations of current source items published in Journal X by the total number of articles Journal X published that year".*

The calculation of a Journal immediacy index is highlighted as under

$$\text{2012 Immediacy Index} = \frac{\text{Number of 2012 citations to 2012 items}}{\text{Number of citable Items published in 2012}}$$

Just as impact factor signifies the number of times an average article has been cited, immediacy index reveals the number of times a hypothetical average article is cited during the year of its publication. As with cited half-life, a high or low immediacy index is not essentially good or bad, however, some authorities consider it evaluative.

For instance, Bert R. Boyce and Janet Sue Pollents terms immediacy index as a measure of quality – an expression generally reserved for impact factor.

There was anticipation of an inverse relationship between a journal's immediacy index and cited half-life. The two measures deal with separate concepts; immediacy index investigates how quickly a journal is cited, and cited half-life indicates how long a journal continues to be cited. The immediacy index is of theoretical interest to information scientist because it indicates how rapidly knowledge is being distributed. A low immediacy index exposes researchers are citing (and thus using) a journal soon after publication and a high immediacy index indicates a time lag between publication and citation.

As we enter the era of electronic publishing, potential practical applications of the immediacy index can simply be imagined. If a library is allowing for an electronic subscription in lieu of the print format or a simultaneous electronic subscription while maintaining the print version, a journals immediacy index might be considered in the decision. A high immediacy index would involve that speedy access to the title is important and thus support the case for an electronic subscription. Searching CD-ROM databases shaped no reported cases of libraries using the immediacy index in collection management decisions (Balakrishnan and Paliwal, 2000).

2.5.4 A range of other measures have been developed which complement the impact factor:

- **Eigenfactor Metrics**

While the impact factor has been famous as one way of measuring journals, it does not measure the quality or influence of a paper. Eigenvector Centrality developed by sociologist Philip Bonacin in 1972, quantities an individual's rank in communication networks. This progress is used for Google's PageRank algorithm; examining citation networks and is a foundation of Eigenfactor™ score and Article Influence™ Score. The Eigenfactor™ score of a journal is based on calculation of the percentage of the time that the model researcher visits that journal in his walk through the library. The measure is a way of rating the significance of a Journal. Journals are rated according to the number of incoming citations, through citations from highly-ranked journals weighted to make a larger contribution to the Eigenfactor than those journals with lower rankings. The Eigenfactor™ score is intended to give a measure of how probably a journal is to be used. (http://admin-apps. webofknowledge.com/JCR/help/h_eigenfact.htm)

The Article Influence™ Score processes the influence, per article, of a given journal. Unlike the impact factor, Article Influence™ Score regulate for differences in citation patterns between disciplines.

As a result of the improvement of Eigenfactor Metrics, publishers, such as EBSCO and Thomson Reuters are utilising the advancements in their product development and are promoting the new forms of metrics as a point of differentiation in their marketing campaigns.

⇨ **Eigenfactor Score**

The Eigenfactor Metrics is determined by the *Eigenfactor* Score, the calculation of which is based on the number of times articles from the journal are published in the past five years and have been cited in the Journal Citation Report in the year. It also considers the journals where contributions to these citations have been made so as to influence on the network with highly cited journals and it maintains the decreasing sequence. References from one article in a journal to another article from the same journal are removed, so that *Eigenfactor* Scores are not influenced by journal self-citation

⇨ **Article Influence Score**

The a*rticle influence* determines the average influence of a journal's articles over the first five years after publication. It is calculated by dividing a journal's *Eigenfactor* Score by the number of articles in the journal, normalized as a fraction of all articles in all publications. This measure is roughly analogous to the 5-Year Journal Impact Factor in that it is a ratio of a journal's citation influence to the size of the journal's article contribution over a period of five years. The mean *Article Influence* Score is 1.00. A score greater than 1.00 indicate that each article in the journal has above-average influence. A score less than 1.00 indicate that each article in the journal has below-average influence. (Thomson Reuters, 2012).

✹ **H-index**

The h-index was developed in 2005 by J.E Hirsch as a way to improve the evaluation of an author. A high h-index specifies that a scientist has published a considerable body of highly cited work. It is a metric that is simply calculated (as long as citation data can be obtained). Papers are able to be listed in order of most cited to least cited. The h-index is the point where the number of papers equals the number of citations.

The h-index is considered a reasonably robust pointer of a scientist's productivity as it provides an overview of an author's citation and publication patterns over time and helps to put the author's carrier into contexts. H-indexes can be calculated over particular time periods or can be calculated for the entire period of a researcher's career. The date range constraint could be useful in comparing two author's; one may be an experienced researcher whose active publication is not new, and the other researcher may be in the early stages of a career, newer on the scene but with a more fresh volume of work. Limiting the time periods in the calculation of the h-index may endow with a different perspective for the assessment of the two researchers.

Both Scopus and Web of Science have characters which automatically calculate the h-index of authors. In Scopus, the h-index is available for all authors in Scopus users can view an author's h-index either by selecting the Scopus Citation Tracker on the author search results page or by viewing the author details page. In Web of Science, the h-index of an author is automatically calculated by choosing the create Citation Report Link on the Results page (Horwood and Robertson, 2010).

2.6 CITATION OUTLINE

2.6.1 Self citations

They are unusual type citation. A number of forms of self-citations can be distinguished; two of them are of particular importance. Both forms have to be visibly distinguished from each other.

- **Journal self-citation**

It happens if a paper published in a given journal is cited by a paper published in the same journal. A great share of Self-citations permits the conclusion that the journal in question is highly specialized, low share indicates in a sense a "lack of originally", a low share of journal self citations (for instance, <10%) is for example, characteristic for review journals (Schubert and Braun, 1993 cited in Glanzel, 2003). Journal self-citations are also exciting in the context of obsolescence studies.

- **Author-self citations**

In the discussion on the principles of the role of author- self citations, there is no real agreement concerning how this type of self-citation should be defined operatively. In practice two different approaches to direct self-citations are utilized.

At the micro level, that is, on the level of individual authors, a self citation for an author A arises whenever A is also (co-)- author of a paper citing a publication by A. This definition cannot, though, be applied to higher levels of aggregation, that is, when publications and citations are aggregated over sets of different (co-) authors and the notion of self-citations is uncoupled from an individual author A.

According to the method given by Snyder, Bonzi (1998) and Asknes (2002) cited in Glanzel 2003,

> "*A Self-Citation occurs whenever the set of co-authors of the citing paper and that of the cited one are not disjoint, that is, if these sets share at least one author. Although the reliability of this methodology is affected by homonyms and spelling variances/misspellings of author names, at high level of aggregation, that is at the meso and macro level, there is no feasible alternative to this method*".

2.6.2 Bibliographic coupling

The application of bibliographic coupling first emerges in the CD ROM version of SCI and SSCI in 1988. The proposal of bibliographic coupling was developed by M.M Kessler in 1963 at Massachusetts Institute of Technology (MIT) in a project. But the name was first suggested by Fano. The concept of bibliographic coupling occurs when two articles cite one or more papers in common. Bibliographic coupling will visibly link most successfully those papers that provide historical references.

If only a few references are found to be common between two papers it will be interrelated in some way. The numbers of common reference in two articles are employed to measure the coupling strength between them.

Kessler believed bibliographic coupling as a retrieval tool. He observed that the concept of the bibliographic coupling unit is not a suitable measure of relationship because of the fact that, when two papers are having a common reference, the information may be different.

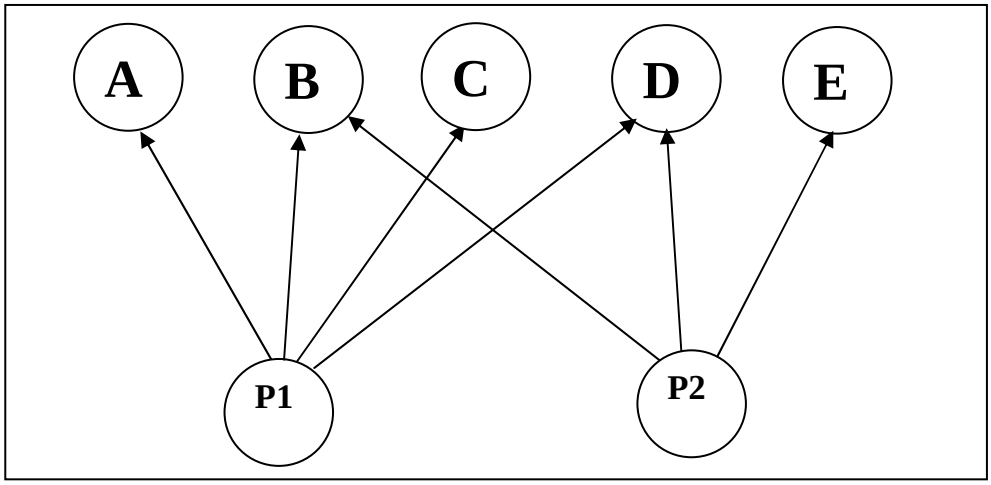

Fig.1: Bibliographic Coupling

2.6.3 Co-Citation

Two documents are believed to be co-cited when they both appear in the reference list of a third document. The concept of co-citation was suggested first by Small and Marshakova at the same time in 1973. The co-citation frequency is described as the frequency which two documents are cited together. Therefore bibliographic coupling focuses on groups of papers which cite a source document and co-citation focuses on references which frequently come in pairs. The co-citation pattern may vary as the interest and intellectual patterns of the field change with time. Co-citation is a complementary thought to bibliographic coupling. The disadvantage of co-citation is that it necessitates comprehensive citation data (Jose, 2012).

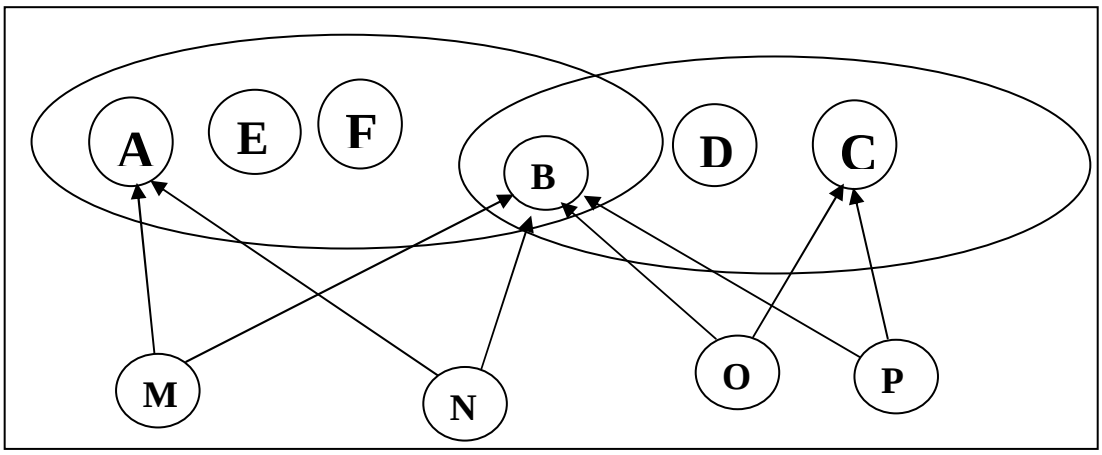

Fig.2: Co-Citation

2.6.4 Co-word analysis

Co-word analysis can be used to recognize research fronts, which are represented by cluster of articles sharing a key term in the title or abstract (Archambault and Gagne, 2004). In 1983, the impact of co-word analysis by callon in France gives additional impetus to the field. Later the efforts of Van Raan combined co-word analysis with co-citation analysis (Garfield, 2001).

2.7 A LIST OF TOOLS FOR CONDUCTING CITATION ANALYSIS

2.7.1 Thomson Reuter's Web of Science/ Knowledge: (http:// thomsonreuters.com/products_services/science/science_products/a-z/web_of_science/)

Web of Science (WoS) which requires subscription is the first citation index and includes an extensive range of very impressive analysis tools. With a high price tag, not every organization will be able to afford this product (and unfortunately, they do not offer a non-profit rate). Thomson Reuters also offers access to "Highly Cited Research" (http://www.highlycited.com), a free resource to identify highly cited authors and works. WoS is extremely useful for tracking cites in academic journals, but quite disappointing for measuring citations from grey literature.

2.7.2 Elsevier's Scopus: (http://www.scopus.com/home.url)

The subscription based Scopus is a little less expensive alternative to Web of Science, and boasts having "the largest abstract and citation database of research literature and quality web sources." Scopus has a free author/organization stare up tool. This will provide an idea of organization's cited works in the Scopus indexed content. Similar to WoS, grey literature is relatively missing from this database.

2.7.3 Google Scholar: (http://scholar.google.ca/)

Using the advanced Google Scholar search option, searches can be carried out through author, affiliated organization etc. to retrieve articles where either are mentioned or cited. This can be complicated however, as it is not possible to narrow search results to the bibliography or footnotes. Search results might consist of many unwanted items.

That said, Google does a much better job than WoS or Scopus of retrieving unclear and grey literature citation mentions.

2.7.4 Publish or Perish: (http://www.harzing.com/pop.htm)

Public or Perish (PoP) employed Google Scholar citations, and runs as standalone software that links to the web. Downloading PoP, and then carry out citation queries to retrieve the analysis of an author or publisher's works. It is less accurate than the fee-based products like Scopus or WoS, but PoP is also quite straightforward about its limitations. PoP achieved much better than Google on the web, and as free software, it is worthwhile and effective.

2.7.5 CiteSeerX: (http://citeseerx.ist.psu.edu/)

CiteSeerX focuses on (but is not inadequate to) literature in the areas of computer and information-science. As an index database, CiteSeerX is unique for adding complex metadata to its contents, which permits a greater capacity for linking documents, and locating related materials. Documents are automatically produces from the web, so indexed content is continuously up-to-date.

2.7.6 Scirus:(http://www.scirus.com/)

Scirus is a science-specific index database surrounding a very wide range of web pages, government resources, academic articles, and special information sources (e.g. patent data from LexisNexis, technical reports from NASA, institutional digital repositories, etc.). Scirus potentialities rival some fee-based indexes, and it also includes an impressive range of non-scholarly grey literature content.

2.7.7 RePEc: (http://repec.org/)

Research Papers in Economics (RePEc) is a database of more than one million items, largely in the social sciences, economics, finance, and computer sciences. The items in RePEc are unpublished papers, non-commercially published materials, and also pre-published versions of academic articles. RePEc is useful for many types of organizations that produce literature because it supports free and open dissemination of these materials throughout a variety of outlets. It works by users (e.g. authors of works, or information professionals on behalf on their organization) uploading publications and make available the metadata and bibliographic information. To carry out citation analyses, RePEc has an embedded system for tracking these uploaded items. Through this, we can quantify how often our publications are downloaded, cited, and shared. RePEc is also a collaborative effort with many other repositories, such as EconLit, EDIRC, and IDEAS.

Although these options may not provide the complete tools for conducting Citation Analysis, however a combination of these tools can produce a rough, but useful solution. Optimistically, there are ongoing developments in this field, such as Google Scholar Citations (http://scholar.google.ca/intl/en/scholar/citations.html), and Open Grey (www.opengrey.eu), and the maturation of these products will benefit the efforts of citation analysis for grey literature (Zackosborne, 2011).

S\N	Citation Analysis Tools	Sub. Status	URL
1	Thomson Reuter's Web of Science/ Knowledge	Priced	http:// thomsonreuters. com/products_services/science/science_products/a-z/web_of_science/
2	Elsevier's Scopus	Priced	http://www.scopus.com/home.url
3	Google Scholar	Free	http://scholar.google.ca/
4	Publish or Perish	Free	http://www.harzing.com/pop.htm
5	CiteSeerX	Free	http://citeseerx.ist.psu.edu/
6	Scirus	Free	http://www.scirus.com/
7	RePEc	Free	http://repec.org/

Table 1: Tools for conducting Citation Analysis

2.8 BIBLIOMETRICS, SCIENTOMETRICS, AND INFORMETRICS

In order to assess library resources and services more objectively and effectively, Library and Information Science managers have adopted a number of quantitative methods in recent years. This has now appears as a research front in its own right in Library and Information Science.

Different areas of research are explained under the following:

2.8.1 Bibliometrics

When Alan Pritchard coined Bibliometrics, the term "Bibliometrics" has two roots: 'biblio' and 'metric'. The term 'biblio' is derived from the combination of Latin and Greek word 'biblion' equal to 'Bylos' means book, paper which in turn was derived from the word 'Bylos', a city of Phenonicia, a noted city for export trade in paper. The word 'Metrics' on the other hand signifies the science of meter i.e. measurement and is derived either from Latin or Greek word 'metricus' or 'metricos' respectively each managing measurement.

Bibliometric studies consist of studies of the growth of the literature in some subject, how much literature is contributed by various individuals, groups or organizations or countries, how much exists various languages, how the literature on some subject scattered (e.g. over documentary types, language journals), and how quickly the literature on some subject becomes out of date.

Another important group of Bibliometric studies relates to author citing sources and day-by-day this study attaining sophistication and complexity having national, international and interdisciplinary character.

The backbone of Bibliometrics lies in its sound theoretical basis most successfully laid by some pioneers like Lotka, Gross, Bradford, Zipf. Duck J De Sola Price, Bookstein, Mundelbro, Brooker, Narin, Garfield, Vickery, Moraves, Hulme, Fairthorne, and many others and their techniques are capable of throwing light on various complicated problems faced by information scientists to quantify the process of written communication (Sangam, 2008).

► **Definitions of Bibliometrics**

Mamdapur, Govanakoppa and Rajgoli (2011) defined the term Bibliometrics as an important field of information science as it represents a unique set of techniques for the monitoring and analysis of information resources and for the management of knowledge in social and organizational contexts.

Babu and Muthusamy (1998) described Bibliometrics that it is the application of mathematical and statistical methods to the published information study and measure the publication patterns of all forms of documents and their authors.

Harande (2012) define by stating that Bibliometrics involves the quantitative analysis of bibliographic data derived from scientific documents. He added that it refers to the study of information materials using relevant statistical and mathematical approaches.

Thanuskodi and Venkatalakshmi (2010) defined the term Bibliometrics as a quantitative study of the literature on a topic and are used to identify patterns of publication, authorship and secondary journal coverage to get an insight into the growth of knowledge on that topic.

2.8.2 Scientometrics

Scientometrics is primarily used for the study of all aspects of the literature of science and technology. The term had gained wide appreciation by the foundation in 1978 of the journal 'Scientometrics' by Tibor Braun in Hungary and currently from Amsterdam. According to the subtitle, Scientometrics consist of all quantitative aspects of the science of Science, communication in science, and science policy (Hood and Wilson, 2001). As Nalimov and Mul'chenko proposed the term Scientometrics in the former Soviet Union to explain research on the quantitative study of scientific activities, it has been more extensively used in Europe and the former Soviet Union (Wolfram, 2003).

Citation Reports of ISI citation database (Web of Science) and Scopus are two essential tools for Scientometrics (Shahbodaghi and Sajjadi, 2010).

Scientometrics used to denote communication process in science including socio-cultural aspects and appear to be almost synonymous to science of science with more pressure on quantitative aspects. It also used as a generic term for the system of knowledge, which endeavours to study the scientific (and technological) system using a range of approaches within the area of science and technology studies. Thus Scientometrics is a component of sociology of science and has application to science policy making (Sangam, 2008).

2.8.3 Informetrics

When Professor Otto proposed the term "Informetrics" in 1979, he means to describe the area of information science dealing with,

> "*The measurement of information phenomena and the application of mathematical methods to the discipline's problems*" (Wilson, 1999 cited in Wolfram, 2003).

The used of the term informetrics has been rising since early 1990s. It has been recognized by International organization such as the Federation Internationale de la Documentation (FID) and has been implemented by the International Society for Scientometrics and Informetrics (ISSI) (Wolfram, 2003).

The term is also understood to related areas of investigation such as citation analysis and other areas of scholarly communication, which are sometimes treated as distinct from informetrics (Garfield, 1998 cited in Wolfram, 2003).

Informetrics research is carry out by scholars from many disciplines, including library and information science, history of science, computer science, communications, sociology and linguistics. The different disciplinary outlooks have shaped researcher motivations for undertaking informetric studies and the processes studied. Object studied consist of the document themselves, the creators of documents (authors), document dissemination (publication) and utilization and the document content attributes. These objects are studied within contexts defined by time frames, geography, and the discipline in which the object are employed. In Library and Information Science and Computer Science, applications of informetrics broaden out to information services and system analysis and design (Wolfram, 2003).

2.9 WEB-BASED METRICS: WEBOMETRICS AND CYBERMETRICS

2.9.1 Webometrics

Webometric basically deals with quantitative analysis of various attribute of web resources. The science of Webometrics attempts to measure the World Wide Web (WWW) to identify about the number and the type of hyperlinks, structure of WWW and the usage patterns. It is the study of quantitative feature of the construction and the use of information resources, structure and technologies on the web drawing on bibliometric and information approaches.

- **Web Impact Factor**

The concept of Web Impact Factor was introduced by Ingwersen (Ingwersen, 1998 cited in Rao, 2010). It is calculated as the number of web pages in a web site receiving links from other web sites, divided by the number of web pages published in the site that are accessible to the crawler. It works well only within a single Country's Webosphere, by means of a single subject field (Noruzi, 2006 cited in Rao, 2010). While analysing the web impact factor, one can even limit the links to inlinks only (no self link)

Webometrics in general aims at designing and developing methodologies to measure visibility, such as, web impact factor. The web impact factor provides a way to evaluate a web site's relative importance, especially when we compare it to others in the same field or a country's domains (no comparison in different fields). It is computable in relation to a national, sector and larger web segments or top-level domains. It provides a quantitative indicator of web sites long-term influence; it simply reflects the ability of web sites and webmasters to attract users. It may provide novel insight into the retrieval process on to web.

- **Web citation analysis**

A number of webometric investigations have determined not only on the web sites but also an academic publications; for example, there are instances of using the web to count how often journal articles are cited. The rationale behind this is partly to give as second opinion for the traditional ISI data and partly to see if the web can generate evidence of wider use of research including informal scholarly communication and for commercial applications as an important amount of webometrics research has also evaluated commercial search engine.

- **Measuring Web 2.0**

In Web 2.0, Web sites are mostly determined by consumer content-blogs, Wikipedia and social network sites, particularly in the context of data mining. It should be possible to extract pattern such as consumer reactions to products or world events. To deal with these issues, software has been developed by IBM (Web Fountain), Microsoft (Pulse) etc.

A good example of research initiative to harness Consumer Generated Media (CGM) is attempt to envisage sales patterns for books based upon the volume of BLOG discussions of them (as compared to reviews) (Rao, 2010).

2.9.2 Cybermetrics

Cybermetrics is one of the newly emerged fields in the line of metric studies. It has achieved much popularity since the mid 1990's with the advent of information technology. As it is mainly concerned with the computer science-based approaches, it has outdated all the other metrics studies in the Internet era.

Cybermetrics is proposed as the generic term for

> "*The study of the quantitative aspects of the construction and use of information resources, structures and the technologies on the whole internet drawing on Bibliometric and Informetric approaches"*.

Cybermetrics thus includes statistical studies of discussion groups, mailing lists and other Computer- mediated communication on the internet including WWW. Moreover, covering all the computer-mediated communication using internet applications, this definition of Cybermetrics also covers quantitative measures of internet backbone technology, topology and traffic. The breadth of coverage of cybermetrics implies large overlaps with reproducing computer-science-based approaches in analyses of web content, link structure, and web usage and web technologies (Sangam, 2008).

Relationship between the Bibliometrics, Scientometrics, Informetrics, Webometrics and Cybermetrics has been highlighted under the following diagram:

Where,

A - INFORMETRICS
B - BIBLIOMETRICS
C - SCIENTOMETRICS
D - CYBERMETRICS
E - WEBOMETRICS

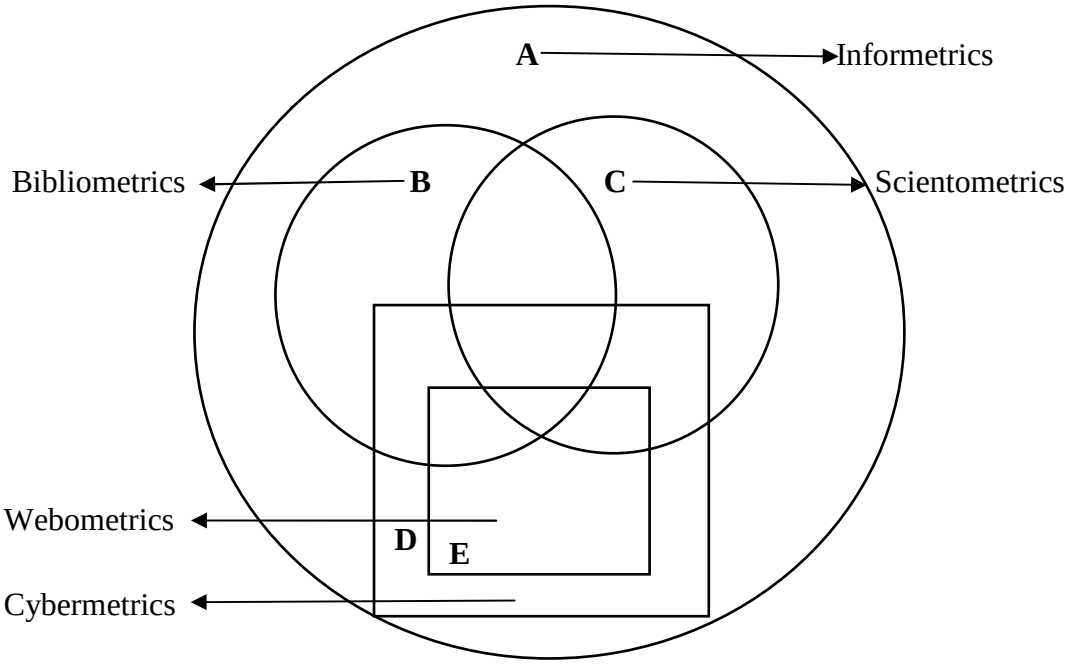

Fig.3. Relationship between the Bibliometrics, Scientometrics, Informetrics, Webometrics and Cybermetrics

Conclusion

It could be observed from the above discussions that multiple parameters are associated to judge the citation analysis. The Citation analysis which reveals the use of literature in the scholarly literature is well described through the different Bibliometric laws and this has become a pragmatic area of research to ascertain citation which include journal article, author etc. The citation measures which include the impact factor indicate the strength of the journal referred by the user in their scholarly output. Like impact factor, other measuring tendencies like Eigenfactor metrics, Eigenfactor Score also equally contribute to deduce the strength of the journal. Moreover, the H-index also reasonably contributes the scientist's productivity in different field of research. The overall discussion helps the library system in developing user-based collection development to meet the various requirements to promote research and development including facilitating the researchers with multiple resources.

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CHAPTER – 3

USE OF INFORMATION IN CITATION ANALYSIS

3.1 INTRODUCTION

Man has recognized the need for collecting and preserving the records of human thought since the dawn of civilization. Books and other graphical material are the records of human thoughts, actions and accomplishment and can serve as the basis for future achievement. Library and institutions provide as a purpose for collecting, preserving and dissemination of information resources. Through the invention of printing in 1440 A.D., sharing of information and communication among individuals becomes much easier which gradually led to the development of books and periodical publications. Various disciplines all over the world have observed an incredible growth in their respective fields in terms of scholarly publications like books, journals, magazines, conference papers, trade publications, and monographs. The steady growth in the output of various types of documents, the nature and complexity of the thought content of the subject matter presented in the various forms of document etc requires distinct methods of information management for the effective library and information services. With the increase of information technologies, the field of library and information science is no longer restricted to four walls of classification and cataloguing but has been broadened to hold new concepts like automation, information retrieval, digitization, metadata, blogging, podcasts, open access, and other web related technologies. Hence the involvement for library and information science education is much experience among librarians and documentalist.

Library Science refers to

> "*The professional knowledge and skill with which recorded information is selected, acquired, organized, stored, maintained, retrieved and disseminated to meet the needs of a specific clientele, usually taught at a professional library school...*" (Reitz, 2004).

Whereas Information Science denotes

> "*The systematic study and analysis of the sources, development, collection, organization, dissemination, evaluation, use and management of information in all its forms, including the channels (formal and informal) and technology used in its communication*" (Reitz, 2004).

Library and information Science is a combination of information science and library science. Regularly, library science is considered traditional area of study and information science is regarded as modern field of study that deals with different features of information, concerning application of information technologies. Library and Information Science (LIS) education related to education for library and information professionals. The role of the 21st century LIS professionals is familiarize to changing technologies, information environment and customers expectations. Library professionals are ever more responsible not only to provide traditional library information services but also to carry online information services according to the definite user needs. Librarians necessitate keeping up with their user's expectations to survive and service them.

Librarians necessitate becoming information Knowledge guides who process data into usable information.

3.2 INFORMATION EMPLOYS STUDIES

Lal and Kumar (2010) explained the term information that various kinds of thoughts and ideas created inside a man where these are based on certain facts and derived by continuous observances and experiences. A number of authors defined information as follows:

According to J. Beeker information is

> "*Facts concerned with a subject"*.

According to Houfman,

> *"The information is a collection of statements, facts and the figures"*.

According to Faibisoff and Ely information can be defined as,

> *"A symbol or set of symbols which has the potential for meaning"* (Lal and Kumar, 2010, p.8-9).

The value of information lies solely in its ability to affect a behaviour, decision, or outcome. The online Dictionary of Library and Information Science defined information as:

> *"Data presented in readily comprehensible form to which meaning has been attributed within the context of its use"*.

With reference to library and information science, information can be defined as the structure of any text which is capable of changing the image-structure of a recipient or any stimulus that reduces uncertainty. So a specific data can be considered as information if it conveys a meaning to the person who receives it. Over time the term information need has been used in variety of ways.

Belkin and Croft (1992) suggest that a search begins with a problem and a need to solve it the gap between these is defined as the information needs. Information needs, and then leads to information seeking. Information may be sought for different needs and purposes of the information seekers. The users may have different information seeking behaviour, attitudes and tastes. To provide qualitative information, 5 major aspects should be accept in mind which include,

- To whom the information is to be disclosed
- Purpose of information requirement
- Quantum of information to be provided with
- Type of information and
- Time duration for supplying the information (Rajkumar and Gopal Krishnan, 1991).

It is crucial that the right information should be imparted to the right reader at the right time which can only be achieved through systematic collection, processing, storage and retrieval of the gathered information. Rojas (1984) has suggested the following qualities for retrieval of need-based information to its target population which include,

- Accessibility which means ease and speed of information
- Comprehensiveness
- Precision
- Compatibility
- Timeliness
- Clarity
- Flexibility
- Verifiability
- Free from bias.

3.3 INFORMATION SOURCES

The sources of information can be broadly classified into 5 categories namely,

- Documentary
- Organizations
- Human
- Information services and
- Field sources

3.3.1 Documentary

Information sources comprise published and unpublished records of information in all fields of knowledge. They may be textual, numeric or graphic, in any physical form, in any language, produced within the country or outside. These types of material may include know-why, know-how, and show-how information, each having its own set of intrinsic characteristics. Only a part of this information is available in the market place; the rest has to be collected carefully in relation to user needs by the respective information systems in relevant subject areas.

By information character, the Documentary source of information can be divided into three (3) categories, such as, Primary, Secondary and Tertiary.

- ⇛ Primary sources are original materials. They are from the time period involved and have not been filtered through interpretation or evaluation. Primary sources are original materials on which other research is based. They are usually the first formal appearance of results in physical, print or electronic format. They present original thinking, report a discovery, or share new information.
- ⇛ Secondary sources are less easily defined than primary sources. Generally, they are accounts written after the fact with the benefit of hindsight. They are interpretations and evaluations of primary sources.

Secondary sources are not evidence, but rather commentary on and discussion of evidence. However, what some define as a secondary source, others define as a tertiary source. Context is everything.

⇛ Tertiary sources consist of information which is a distillation and collection of primary and secondary sources.

3.3.2 Organizations

Some organizations use to supply a guide to both national and international coverage providing information relating to various educational institutions, such as universities, institutions, deemed universities, colleges, libraries and archives, museums, learned bodies, professional associations, etc along with a subject index.

3.3.3 Human

People happen to be the chief and potential source of information. Approaching people directly can be a quick way of obtaining information as well as getting access to their unpublished work. Attending conferences and seminars plays a vital role in information dissemination.

3.3.4 Information Services

An information service is that agency or department responsible for providing processed or published information on specific topics to an organization's internal users, its customers, or the general public. It relates to those organizations which supply information or at least references directly to the users. Such services range from answering simple telephone queries to the supply of computer generated printout of references specific to the clientele's requests. Information services such as providing references, CAS, bibliographical services, appropriate search terms, search profile, abstracting and indexing services etc are some of the way that lead to reach the sources of information.

3.3.5 Field sources

The field source of information include living persons, those who have the fund of knowledge about social conditions and changes that takes place over a considerate period of time. Data from these sources may be obtained through participation in observation, personal interview, conference, correspondence, questionnaire etc (Rajan, Subbarao, Ramaswami, Yashpal, 1975 and Parker and Turley, 1975).

3.4 DEVELOPMENT OF INFORMATION

The literary sphere is facing publication deluge. This is due to the over flow of information. According to Ningam (1991), the growth of literature is indicated by the following factors:

- Books
- Periodicals
- Indexing and Abstracting Periodicals
- Learned Societies

- Information Technology
- News Agencies

The proliferation of literature has taken various forms. Two centuries following the invention of printing press, publication was restricted almost entirely to the book, the monograph. Then, in 1665, with the inauguration of Royal Society's Philosophical Transactions, the publication of periodical literature has risen steadily. Subsequently, the books and the Journals were joined by tremendous output of government publications, by great collections of historical sources and texts, and other varied types of records that pour into libraries (Downs, 1968). The present era sees an unaccountable growth of literature owing it to development of ICTs. The use of internet and its applications such as web pages, blogs, social networks etc made available easy access to input and output of information where one cannot entirely rely on the information credibility. Hence, information explosion is at stake and affects the quality control of literatures. As the amount of available information sources grows, the problem of managing the information becomes more difficult, which can lead to information overload.

3.5 ROLE OF INFORMATION IN MANAGEMENT, SOCIO-ECONOMIC DEVELOPMENT AND TECHNOLOGY TRANSFER

A fusion of Science and Technology as an integrated framework of reference resulted offering much greater explanatory power. Technology is the instrumental mode of rational action, this new methodological development is also known as "intellectual technology" which constitutes a set of algorithm that is embodied in a computer program to represent a formalisation of judgements. Their routine application on many situations is becoming predominant in the management of organisation and enterprises today.

The organising principle for information systems and services today is a mix of Science, Technology and Social Information (STSI). Development, being a complex and multidimensional process involves information and knowledge inputs of Science and Technology and their applications. They combine with other forms of society-related information such as political, economic, sociological, demographic, occupational, health, legal, regulatory and environmental information to provide complete information universally. Development is said to be not merely cultivating the physical resources, but also human resources as well. Any imbalance in these development approaches weakens the overall capacity of a society to transform itself.

Information Technology has revolutionised information processing, storage dissemination and distribution and has been the chief instrument and a major contributing factor to changes in society. These technologies are not merely rapidly developing, but they are also covering and integrating, giving an unprecedented push to growth and development in every space.

The daily life of an ordinary person is dependent on the access to information for his day-today activities with the advent of IT, access to such information is made

very easy such as News on current events, activities and personalities, weather, current programmes on television, radio, theatre, films, travel, (road, rail, water and air), recipes, games and quizzes, information for children, consumer advice, health tips, home shopping, home banking, even encyclopaedic information etc. A consumer today is also informed through a variety of trade literature and advertisements in newspapers, etc. Substantially the living standard on the socio-economic condition of the society has improved.

Information and knowledge have become a tremendous source of economic and political power as they become the principal driving force for the acquisition of wealth, political strength and more knowledge. Information rich countries of today are becoming even more powerful. Hence, there is a strong need of technology transfer which is possible through education, research and development, mass contact, Government policies, business and industry, etc.

3.6 BIBLIOGRAPHIC CONTROL IN LIS

The rise of information production has caused difficulty in proper and efficient distribution of the user need-based information. Therefore, it became necessary for librarians and information scientists to come up with ideas to control the production of literature so that redundant literatures can be avoided. The controlling of bibliographical records of the published documents was thus started and in the process have been developed an assortment of bibliographical tools for the convenience of providing quick answers to users query such as indexing, abstracting, subject bibliography etc.

The term "Bibliographic Control" refers to

> "*The operations by which recorded information is organized or arranged according to established standards and thereby made readily retrievable*" (Chan, 1994).

Bibliographic control according to Ghosh (1988) is

> "*a mechanism of for the systematic listing of recorded knowledge in all forms including published as well as unpublished documents"*.

It is the identification, description, analysis and classification of books and other materials of communication so that they may be effectively organized, stored, retrieved and used when needed. It is all activities involved in creating, organizing, managing and maintaining the file of bibliographic records like materials held in a library or archival collection or the sources listed in an index or database. It is to provide information to the readers or users and includes scientific description and subject access by means of uniform catalogue code, classification scheme and name authorities.

The earliest attempt for bibliographic control may have been traced back to Conrad Gesner of Zurich, in 1545, about a century after printing began, published his Bibliotheca Universalis. Universal bibliographies were made by Gottlieb Georgi about the middle of the 18th century and by Jacques Brunet, a Frenchman and Johann Grasse, a German, in the second half of the 19th Century. Probably the

most ambitious of all enterprises in general or international bibliography is the great Brussels union catalogue, sponsored by the International Institute of Bibliography, also founded in 1895. In 1969, IFLA sponsored an International meeting of Cataloguing Experts at Copenhagen. The meeting held a discussion on proposal for conforming to a universal standard bibliographical description for each item published in the country of origin. The programme was finally launched in 1974 with the objective of making an internationally accepted basic bibliographical data on all publications issued in all countries. (Mgaywa and Chakrabarty, 1992). Thus the Universal Bibliographic Control (UBC) was conceived, formerly known as the UBCIM (Universal Bibliographic Control and International MARC). UBC was part of an international effort to set up an information infrastructure. It aims to collect information on all documents published in the world and presenting them in standard format. Efforts are being made by several countries in maintaining records their country's literature output. However, bibliographic control has its own limitation, as the execution itself involves a time consuming and arduous work. It would be difficult to contain publications under bibliographical control until there are one or more sources which follow up the previous research publication.

3.7 ROLE OF CITATION ANALYSIS IN COLLECTION DEVELOPMENT

Library collection development is the process of meeting the information needs of the users in a timely and economical manner using information resources locally held, as well as from other organizations. Collections are developed be librarians and information professionals by buying or otherwise acquiring materials over a period, based on assessment of the information needs of the library's users. Collection development involves the creation of policies to guide material selection. The frequency of the document being consulted or cited by the users is one of the parameter for evaluating the document value. Decisions whether to acquire or not to acquire a particular title or to continue or discontinue subscription of a periodical etc is influenced by the number of times the document is being used. Citation refers to the list of references to other works in a published work. "Referring" means mentioning in the proper context and giving an explicit bibliographical statement in a list of references.

Typically, citation shows that a relationship exists between the work of an author and the previous work done in that field. Authors contribute to existing knowledge and demonstrate that they are current with activity in their fields. Smith (1981) suggests that citation analysis of theses and dissertations can have implications for both collection development and user services. She cautions librarians that citation does not imply quality or importance. It is controversial methodology because it does not represent all the possible needs or uses for information (Haycock, 2004). Though valid criticism of citation analysis exists, several authors have shown that citations correlate with other methods of collection analysis, including impact factors, circulation statistics, in-house use and user survey.

Citation analysis in spite of its problems, limitations and criticisms still exists and has become an entrench part of information research. Citation measures have emerged from studies of citation databases. These include Journal Impact factor and Relative Impact Factor. Today, Bibliometrics and Scientometrics make an extensive use of citations to assess quality and trace patterns of scholarly communication. It also still accounts for the methods of book and periodical selection by knowledge institutions.

Conclusion

It may be concluded that bibliometric studies are very useful for LIS professionals for evaluating library services, collection development, policy making and refinement, decision making, resource allocation, analysis of curriculum and quality assessment of research output. These studies have the potential to determine the causes of problems faced by the LIS profession. Bibliometric methods have been effectively utilized to solve a variety of issues in LIS. The situation of LIS research needs to be analyzed to explore trends and provide base for future research.

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CHAPTER – 4

LAWS OF CITATION ANALYSIS: AN OVERVIEW

4.1 INTRODUCTION

Research field and Information technology development are incessant progress in Science and Technology of any nation. Amenities should be made available to Scientists engaged in carrying out their scientific activities. A substantial growth of literature in the field of Library and Information Science has excited the Scientist in the field to have intensive studies. The growth of literature in a subject desires a quantitative analysis for its better production. The research output of these scientists can be seen in the form of experiments they bear out and results are arrived in their experiments. Research productions are available in the form of research articles published in Journals, International and National Periodicals and Papers presented in various Symposia, International and National Conferences. Assessing published or semi published literature, Bibliometric studies are carried out as it is referring to the science of measurement relating to the books.

In the process, the bibliometricians have approved certain empirical laws and models out of which, quite a few of them are mere speculation than anything else. When Hulme in 1923, used the term Statistical Bibliography, he used to mean the enlightenment of the process of Science and Technology by means of counting documents. There are two types of Bibliometric studies namely, Qualitative and Quantitative. The Qualitative Studies are based on the three basic laws which are identified as Bradford's Law of Scattering, Zipf's Law of Frequency of Words and Lotka's Law of Productivity of Authors. The other study i.e. Quantitative Study is based on the citation analysis and employ to quantify the literature published during a particular time (Sinha and Dhiman, 2001).

The Bibliometric laws assist in understanding some of the information phenomenon and help in proper planning of library activities, as they specify certain basic patterns and relationships that govern information items and activities.

Abraham Bookstein (1977, cited in Hertzel, 2010) has set stipulations for laws,

> *"When new law is proposed, it may be reasonable to demand of it, on intuitive grounds, that it remain true under a variety of circumstances differing from those in which it was discovered. Should it satisfy these demands, we may increase the validity of the law; if it does not, and yet we still wish to maintain the validity of the law, we ought to feel an obligation to explain the discrepancy".*

The laws of nature has two basic outlines such as,

- **Universal**

A law is universal provided it is found together with certain other conditions; and

- **Probabilistic**

Probabilistic affirms the average if a stated fraction of cases displaying a given condition reveals certain other conditions as well. In either case, a law may be valid even though it gets hold of only under special circumstances or as a convenient approximation. Besides, a law of nature has no logical requirement;

rather, it rests directly or indirectly upon the evidence of experience (Ralte, 2012, p.34-35).

Contrasting to the Laws of nature, Bibliometric laws are empirical laws and employed simple mathematical statements and graphical devices to express the empirical relation between sources and the items they turn out in three areas: authors producing papers, journals producing papers on a given subject, and texts producing words with a given frequency. Their common denominator is a striking inequality in the pattern of the information processes under surveillance: a few authors turn out to be responsible for the largest portion of scientific literature in a specified research field; a few scientific journals seem to focus the literature required to satisfy their needs; and a relatively small number of recurring word units preside over their (and not only their) linguistic habits (De Bellis, 2009).
The objectives of such empirical studies other than the description of empirical phenomenon are recognized through laws and theories, general principles by which empirical phenomena can be better elucidated. An empirical law engaged at least two variables representing minimum two different parameters. For example, if a law is from $y = a + bx$, where y and x are the variables measured and also the parameter (a and b) are assessable in the same scale, otherwise, a and bx cannot be added together (Rao, 1988, p. BBL24, cited in Ralte, 2012).

4.2 BIBLIOMETRICS LAWS- CONCEPTUAL VIEW

Inconvenience of the present library and Information Centres are the short of adequate space, insufficient budget provision, and increase in the rate of production of a variety of documents and the unprecedented hike in prices of documents. As a result the quality of the library collection is gradually deteriorating and ultimately affecting the services of the library. However, the librarians have to play an immense responsibility in this context. They have to adopt some determined policy of choosing the best documents, so that the most important and up to date information can be brought to the notice of their clientele with their limited library budgets. The librarians have to develop appropriate collection development policy so that they can administer the situation.
The application of bibliometric technique in selecting the most relevant documents on any field is a well established device. Pritchard first used the term Bibliometrics and described it as all studies which try to find out to quantify the process of written communication. Bibliometrics has instructed the concentration of numerous individuals in library and information science. The measurement of bibliographic information presents the promise of providing a theory that will determine many practical problems. It is affirmed that patterns of author productivity, literature growth rates and related statistical distributions can be used to assess authors and disciplines as well as managing collections.

Organizing and counting scientists, books, papers, and citations, as early statistical bibliographers set out to do, remain a fairly extemporary activity as long as data sustained to be examined outside a mathematical framework that would let them reveal meaningful patterns in the documentation process. The turning point, or at least the introduction to a turning point, occurred between the 1920s and the 1930s, when three basic bibliometric studies were published namely Lotka's Law, Bradford's Law and Zipf's Law where,

Lotka's Law works on the distribution of scientific papers among authors, Bradford's Law contribution on the scattering of papers on a given subject in scientific journals and Zipf's Law works on the distribution of words in a text (De Bellis, 2009, p.75).

Bibliometric Laws usually quantifies the use of documents in a library or in an information Centre. They can be used as a device to study the library problems and its results can be used for making a variety of library policies and management studies. Bibliometric Laws are mathematically correlated to each other, not unlike the very relationships each law seeks to find out. Like Physical Laws, they seek out to explain the functioning of a system by mathematical means. Besides, all these laws can be applied to World Wide Web content and in ascertaining patterns of Web usage.

4.2.1 Basic Laws of Bibliometrics

There are three basic laws of Bibliometrics which are enumerated below:

4.2.1.1 Bradford's Law of Scattering

Samuel Clement Bradford was a very strong-minded and dedicated person which is very evident in his writing. His thinking was definitely influenced by Paul Otlet and Henry La Fontaine, who organized the First International Conference on Bibliography held in Brussels in 1895. The topic of the conference was the need for international cooperation to develop a universal index which would identify the requirement of a standard subject classification to be backed by a central universal library. The idea was loyally supported by Bradford, as shown in the following.

In 1927 "Bibliography by Cooperation" emerges in Library Association Record (LAR). Here Bradford point out his concern for the speed up accumulation of "useful scientific and technical literature" and repeat the need for "bibliographical work. . . [to] be brought together" by the use of one system of classification "as an index to all the papers that relate to a particular subject of study, no matter when they were written". Because "Every bureau indexes or abstracts papers that are done by other bureaux, and only a portion of the literature is covered," he assumed a universal classification system would get rid of repetition or classifying the same articles, use items not catalogue, and thereby save time, information, and money, and provide better service.

In his paper Bradford integrated a list of science subjects and the number of bibliographic references for each to alert the readers as to what the Science Library, to develop into an "information service covering the whole field of Science and Technology". At that time, Bradford declared the number of references assembled, covering many aspect of science and technology, as 1, 212,700.

This article was followed by Bradford's "The Necessity for the Standardisation of Bibliographical Methods" in which he explained the Science Library's method of classification and again stressed the requirement for cooperation. By the time of the introduction of the paper, a form of interlibrary loan had already been practiced for 2 years by the Science Library, with requests having been arrived from a number of other countries.

In 1934, Bradford's classic article enclosing his law was printed. Again he wrote about the number of articles abstracting and indexing journals showing his continuous concern about wasted money and skills brought about by duplication of effort. He stated that "although the 300 abstracting and indexing journals notice 759,000 articles each year...only 250,000 different articles are dealt with and 500,000 are missed". His anxiety was shared by Ernest Lancaster-Jones, assistant keeper in the Science Museum. As a result, "A statistical analysis was made of the references in two quarterly bibliographies compiled in the science Library, i.e. the *Current Bibliography of Applied Geophysics* and the *Quarterly Bibliography of Lubrication"* by Lancaster-Jones, a qualified mathematician who also "had received recognition as an expert in applied geophysics". Bradford, using the data, developed gradually his "law" (Hertzel, 2010, p.563).

The process Bradford used was this: For each two subjects, geophysics and lubrication, a table was made, listing "number of journals producing a corresponding given number of references" and each growth. It seems that such a list of subjects and the number of references for each, plus a very limited budget and a heartfelt desire to give exceptionally good library service would cause an active and curious mind, such as Bradford's, to wonder about the actual number of journals needed for coverage.

One of Bradford's hypotheses was that

> *"References are scattered throughout all periodicals with a frequency approximately related inversely to the scope. On this hypothesis, the aggregate of periodicals can be subject concerned, but the more remote classes will, in the aggregate, produce as many references as the more related classes".*

Observations of the tables showed three "rough" zones or grouping which Bradford graded as

1. Those producing more than 4 reference a year.
2. Those producing more than 1 and not more than 4 a year.
3. Those producing 1 or less a year

Bradford found

> *"The groups thus produce about the same proportion of references in each case, and the number of constituents increases from group to group, by a multiplier which, though by no means constant, approximates fairly closely to the number 5, especially for the two larger groups".*

From his data, Bradford put up two graphs, plotting the logarithms of cumulated number of journals in relation to the cumulated number of references for each, geophysics and lubrication. He renowned that "the later portion of each curve is remarkably close to a straight line", and observed that

> *"The aggregate of references in a given subject, apart from those produce by the first group of large producers, is proportional to the logarithm of number of sources concerned, when these are arranged in order of productivity".*

With this surveillance in mind, Bradford constructed a second graph or diagram. In this diagram he used to develop an algebraic relation, but only for the "straight" part of the curve noted originally. From his he assumed his "law":

> *"Therefore, the law of distribution of papers on a given subject in scientific periodicals may thus be stated: if scientific journals are arranged in order of decreasing productivity of articles on a given subject they may be divided into nucleus of periodicals more particularly devoted to the subject and several groups or zones containing the same number of articles as the nucleus, when the numbers of periodicals in the nucleus and succeeding zones will be as 1:n:n^2... "*(Hertzel, 2010, p.563).

This was the first announcement of what was later to be called the verbal part of Bradford's Law. This usually referred to as Bradford's Law of Distribution of Scattering, "sometimes this regularity is also called the law of dispersal of publications".
Bradford came to the conclusion that

> *"A standard classification must be adopted, so that references to the same subject would be brought together by the classification, irrespective of source or abstracting bureau, when, without increase of labour, a complete index to scientific literature would be achieved"* (Hertzel, 2010, p.564).

In a paper on abstracting and indexing periodicals, presented in 1937 at the ASLIB Proceedings 14th Conference, Bradford told that the information of the analysis "to determine the extent to which scientific papers are scattered in periodicals devoted to other subjects", published in *Engineering* in 1934, were reprinted "in publication No. 1 of the British Society for International Bibliography, 1934" and added, "Only the results need be quoted here".

> *"The law of scattering may thus be stated. If periodicals containing articles on the given subject are arranged in decreasing order of the number of such articles they contain and divided into nucleus of journals more specifically devoted to the subject and zones of periodicals containing the same number of special articles as the nucleus, the numbers of journals in the nucleus and succeeding zones are as 1:N:N^2...where N is about 5 or 6".*

In his first article Bradford employed the value of 5. In the discussion which pursued his presentation, Bradford admitted:

> *"The whole object of the elaborate statistical investigations reported in this paper is to prove beyond any question that quantities of important scientific papers are neither abstracted nor indexed. This is one of the main reasons why so much time and expense is being wasted in duplicating previous work. The other main reason is the adoption of archaic alphabetical methods of indexing, which hide the information and prevent it being found. The adoption of standard methods would go far to remove both these defects".*

The International Federation for Documentation in 1946 published Bradford's "Complete Documentation in Science and Technology" which Bradford presented at Paris in the 16th Conference. Bradford presented another time the statistics he used in "Sources of Information on Specific Subjects". He repeated his explanation on the "law of distribution" as given in his previous papers and again holds up the use of the Universal Decimal Classification. A synopsis of this paper was moreover printed in *Nature* of January 1947.

Two more of his publications are simply mentioned here: "Complete Documentation" presented at the 1946 Royal Society Empire Scientific Conference while Bradford was president of the British Society for International Bibliography, and his book *Documentation* first published in 1948. In both cases, Bradford utilized the same statistics he had used in his paper which first offered his law. The statistics were principally used to support his ideas about cooperative, universal classification; the law was a natural outcome of Bradford's wish to give added proof and credibility to his reliable conviction (Hertzel, 2010, p.564).

The study of the Bradford law has until now been concerned to theoretical models which are too static, too deterministic and too physical. All Bradford data are derived by examining the *activities* of a set of sources over some appropriate period and by noting these activities, as calculated in terms of the numbers of items each source accounts for in that time.

Thus, the Bradford law is concerned with:

- A finite set of active sources (an ensemble) whose activities are made manifest by the generation or consumption of a specified type of item.
- Observation of those activities over a specific sampling period.
- Items of some homogenous kind which are discrete and countable.

One of the points that have so far escaped analysis is the fact that the statistical distributions of such collection of activity must depend on relationships between the number of active sources, the range and intensity of their activities, and the period of observation which offered the sample data. All Bradford distributions are samples of some ongoing activity but, all too often, the sample data have been observed as constituting a total population (Hertzel, 2010, p.567).

4.2.1.2 Lotka's Law of Scientific Productivity

Alfred J. Lotka was a mathematician and supervisor of mathematical research from 1924 to 1933 in the Statistical Bureau of the Metropolitan Life Insurance Company. It was during this time, 1926, that his definitive work, later called Lotka's law was formed. His enquiry was a productivity analysis. Counting names and the number of publications listed for each, the exposure was for only A and B names in *Chemical Abstracts* for 1907 to 1916 and for Auerbach's *Geschichtstafeln der Physik* from its beginning through 1900. The data were tabulated and plotted, from which Lotka build up a "general formula for the relation . . . between the frequency *y* of persons making *x* contributions" as $x^n y = const$".

Finding the value of the constant when $n = 2$, he scrutinizes that:

> *"The number of persons making 2 contributions is about one-fourth of those making one; the number making 3 contributions is about one-ninth, etc.; the number making n contributions is about $1/n^2$ of those making one, and the proportion, of all contributors, that make a single contribution, is about 60 per cent"*.

Observing that Lotka's observation deals with the least number of productions

> *"Since the publication of Lotka's original article in 1926, much research has been done on author productivity in various subject fields. The publications arising from this research have come to be associated with Lotka's work and are often cited as proving or supporting his findings. However, a review of this literature reveals that Lotka's article was not cited until 1941, that his distribution was not termed 'Lotka's Law' until 1949, and that no attempts were made to test the applicability of Lotka's law to other disciplines until 1973"*(Hertzel, 2010).

Based on his data, he proposed an inverse square law of scientific productivity:

$$Y_x = \frac{ß}{x^a / n^2}$$

$a > 0$

$x = 1, 2, 3 \ldots$

where,

Y*x* is the relative frequency of authors publishing *x* papers; the value of *a* is found to be 1.89 for chemist and 2 for physicist.
If N is the total number of authors, NY_1 in Lotka's equation, gives the number of authors who have published single paper each.

Thus, Lotka's equation is influential in its general form by three parameters:

- The number of scientist with minimal productivity (authors with single paper each...NY_1)
- The maximal productivity of a scientist (X_{max})
- The characteristic exponent (Kumar, 2002, p.932).

Lotka's equation can also be written in the following type:

$$Yx = \frac{k}{x}$$

$x = 1, 2, 3, 4. \ldots$

$$k = \frac{6}{n^2} \quad \text{for a} = 2$$

Thus, Lotka's equation proposes that the portion of single authors [*k*] is a function of *a*, that is:

$$K[a] = \left(\sum_{x=1}^{X_{max}} \frac{1}{X^a} \right)^{-1}$$

This implies that the increase of *a* is accompanied by the increase of low productive scientists. This entailed that for given N and for a large value of *a*, the position of highly productive scientists will decrease. Therefore, one can dispute that the large the parameter, the greater is the gap between the productivity of individual groups of scientists. In this sense, it is regarded as a measure of inequality in the distribution of scientific papers (Kumar, 2002, p.933).

4.2.1.3 Zipf's Law of Word Occurrence

The most influential, wide-ranging law of bibliometrics is Zipf's Law. In his book *Human Behaviour & The Principle of Least Effort*, George Kingsley Zipf describes the essence of what became known as his law, called The Principle of Least effort, as "the primary principle that governs our entire individual and collective behaviour or all sorts, including the behaviour of our language and preconceptions" (Zipf, 1949 cited in Chao, Detlor and Turnbull, 2001, p.139). Zipf is saying that the main forecaster of human behaviour is that we always endeavour to minimize our effort. Therefore, Zipf's work applies to almost any field where human production is concerned. He notes that his principle proves that a person will

> *"Expand in solving both his immediate problems and his probable future problems which in turn means that the person will strive to minimize the probable average rate of his work-experience (over time) and thus, minimizes the effort. Least effort, therefore, according to him is a variant of least work"* (Zipf, 1949, p.1, cited in Chao, Detlor and Turnbull, 2001, p.139).

He also found that,

> *"The distribution of words in English approximates with remarkable precision a harmonic series . . . an unmistakable progression according to the inverse square, valid for well over 95% of all the different words used in the sample"* (Zipf, 1935, cited in Hertzel, 2010, p.567).

Zipf wrote number of books "On the theory and application of his principle of relative frequency in the structure and development of language". In his first thesis, *Relative Frequency: A determinant of Phonetic Change*, available in the Harvard Studies in Classical Philology in 1920, Zipf wrote:

> "*Observing the speech of many hundreds of millions of people, we have demonstrated, in part actually, in part by induction, that the conspicuousness or intensity of any element of language is inversely proportionate to its frequency. Using X for frequency, and Y for conspicuousness (rank) we can express our thesis"*.

Thus: $Y/X = n$ or $XY = n$

where,

n is some constant, the actual size or value of which need to be our immediate concern (Zipf, 1929, cited in Hertzel, 2010, p.568).

Zipf also functionalized his principle to other aspects of communication, from the distribution of population sizes among towns and cities to the number of newspapers and to the balance of equipments and work.

Originally, Zipf's law basically envisages the phenomenon that familiar words with high frequency. In order to minimize attempt in remembering or alternating similar word use, we tend to keep using the same words and phrases continually in a document. Particularly, for a distribution applied to word frequency in a text, a word's rank *r* occurs *f* times (frequency) where *c* is the constant for the text examined. This provides us the formula which is

$$r \times f = c.$$

Pro analysis, this can be functionalised by counting all the words in a document with the most frequent occurrences representing the subject matter of the document. We could also employ relative frequency as a replacement for of absolute frequency to determine when a new word is entering a vocabulary.

But, what makes Zipf's law so outstanding is its use in other fields as well. In fact, the common applicability of Zipf's Law can paradoxically be used to prove itself. Being so extensively known, it is widely used, possibly, so much so in meaningful, that are becomes the bibliometric law used and referred through the highest frequency by far. Zipf points out

"That individuals will at times try to minimize effort, then it follows that the reason for their buying and reading newspapers is that such conduct is an economical method of learning of those events in their environment that may be of positive or negative value for their particular economies . . . in order to lure these potential buyers into the paper's reader population for the sake of increasing the circulation, the editor must increase the diversity of his news items".

This can be relevant to more than just newspapers and it could be any information source. The World Wide Web is truly spread out and not limited by page size (as Zipf was concerned through print), but financial resources limits the amount of any one organization can publish. For example, Huberman et. al. (1998) indicates that an empirical study of Web use that there are Zipf-like distributions in path lengths (i.e. the number of characters in the Web page's URL) and page visits to sites on the World Wide Web (Chao, Detlor and Turnbull, 2001, p.140).

Conclusion

Various Bibliometric laws have been promulgated by the scientists to measure the bibliography which establishes scientific communications to the future researchers. The laws specify their implications such as, measuring the scattering of journals, scientific productivity, and word of occurrence. The laws extend the strength of productivity of the journals which also can be well applied to measure the use of web through statistical measures. Regularly in the history of science, the pursuit for certainty and sound theoretical foundations are satisfied by the decreasing of a complex matter to a small set of basic principles from which specific statements are subsequently derived through logic or mathematical reasoning. This occurred constantly from the 1970s onward, bibliometricians

hunted to reveal that, under certain conditions, the laws of Lotka, Bradford, and Zipf are mathematically equivalent, that an exact relation between the corresponding parameters can be given, and that, in the last analysis, they can be described in a mathematical sense on the basis of more basic principles, whether in a stochastic or a deterministic fashion. Further frequently than not, such descriptions rely on real numbers and real analysis techniques, remarkably integration and differentiation, which provide a mathematical approximation to the distinct reality of informetric data which is authors ranks are natural numbers, and so are productivity and citation scores.

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CHAPTER – 5

DATA ANALYSIS AND FINDINGS

5.1 INTRODUCTION

Analysis of data is the ultimate step in research process. It links between raw data and significant results leading to conclusions. This process of result has to be oriented. In other words, it must aim at setting objectives and hypothesis (hypothesis is nothing but the attentative of the subject or statement). According to Richard Budd, analysis is something which leads eventually to summarizing procedures resulting in some sacrifice of details.

Citation Analysis is useful for understanding subject relationships between documents, author's effectiveness, user behaviour, publication pattern and also for assessing collection development of a library or research institutions. All references (bibliographies) were photocopied and each reference was categorized according to the format or genre i.e. book, journal, report, conference proceedings etc. A total of 1116 citations were collected for bibliographic study.

Data collected from M.Phil dissertations have been classified, tabulated and analyzed to:

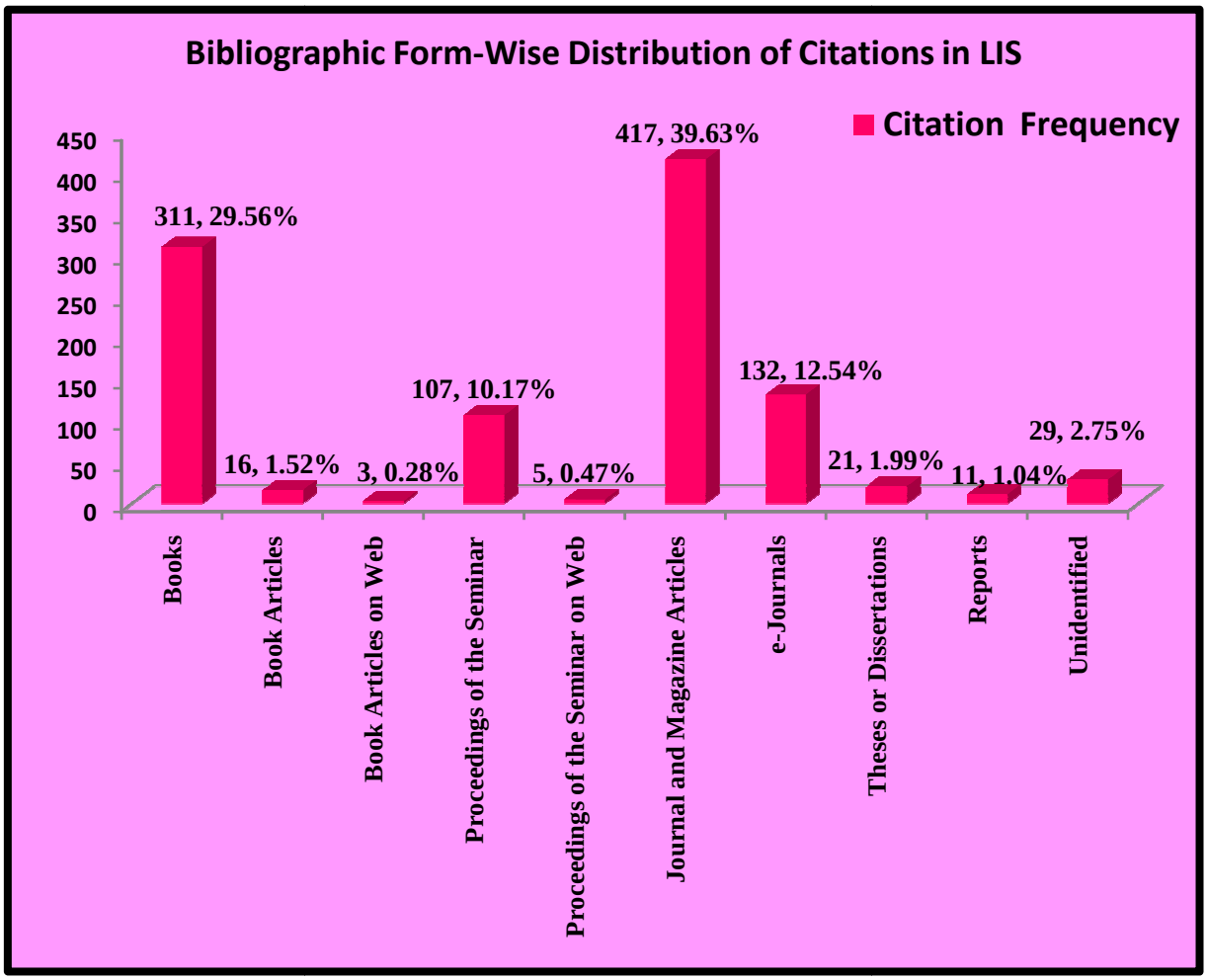
- Study from what forms of documents the scholars have cited;
- Identify the authorship patterns of cited resources;
- Find out the most highly cited authors;
- Determine core periodicals/ most frequently cited periodicals;
- Test the validity of Bradford's Law of Scattering among the cited subject specific journals and Lotka's Law of Scientific Productivity of an author.

5.2 FORM-WISE DISTRIBUTION OF CITED DOCUMENTS

Multiple forms of documents support the researchers, students to elicit information in the field of their research and or study. With the availability wide information sources, the scholars have a wide range of options for choosing the right and authentic sources of information from prints to e-books, e-journal and the Web. Most cited forms of documents by the scholars in LIS of the university under study in M.Phil dissertations are given below in Table-2 supported with Graph-1 for clear vision.

Table-2: Bibliographic Form-Wise Distribution of Citations in LIS

S/N	Cited Forms of documents	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	Books	311	29.56	311	29.56
2	Book Articles	16	1.52	327	31.08
3	Book Articles on Web	3	0.28	330	31.36
4	Proceedings of the Seminar	107	10.17	437	41.53
5	Proceedings of the Seminar on Web	5	0.47	442	42.01
6	Journal and Magazine Articles	417	39.63	859	81.65
7	e-Journals	132	12.54	991	94.2
8	Theses or Dissertations	21	1.99	1012	96.19
9	Reports	11	1.04	1023	97.24
10	Unidentified	29	2.75	1052	100
	Total	**1052**	**99.95 or 100**		



Graph-1: Bibliographic Form-Wise Distribution of Citations in LIS

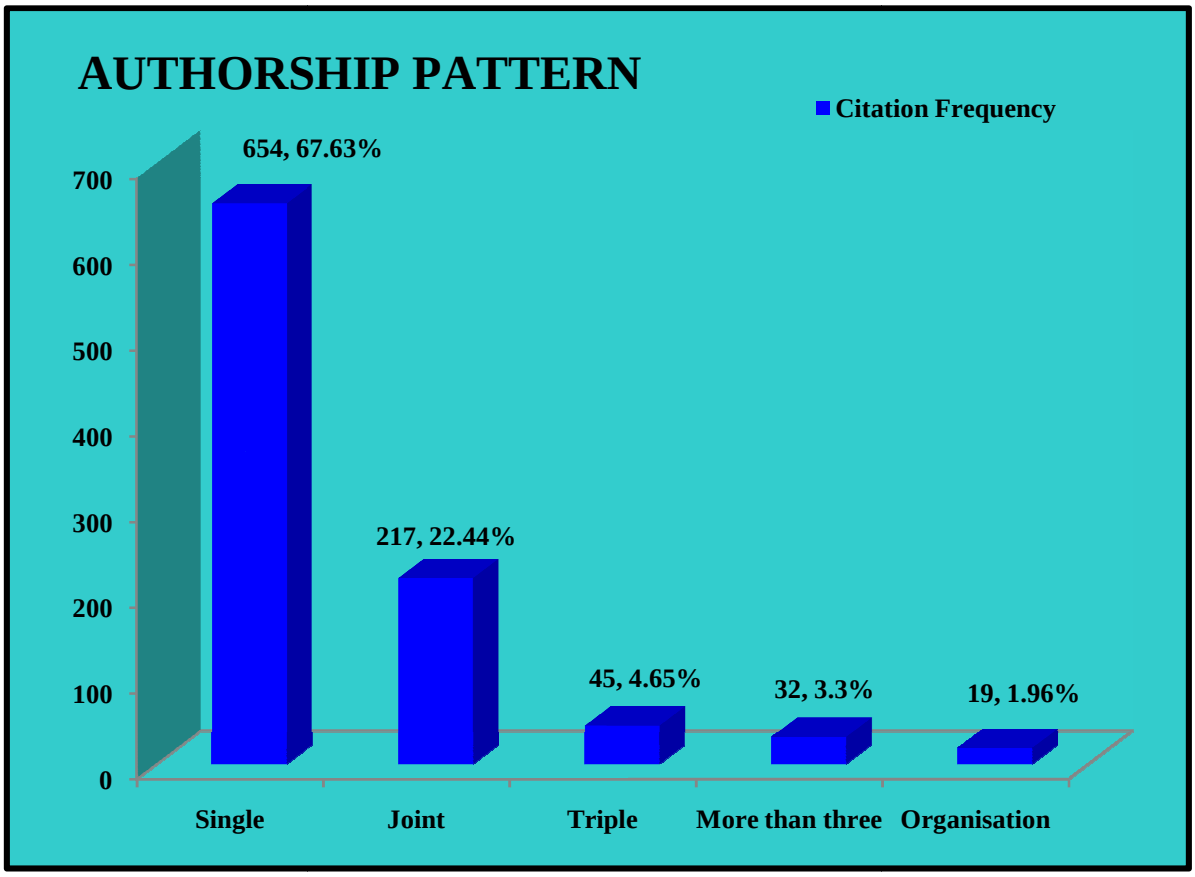
Multiple forms of documents cater information to the researcher, educationist, students for teaching and research. The students particularly access multiple forms of documents for different academic purposes. Likewise, the M.Phil scholars of the department under study equally access various forms of documents as reflected in Table-2 above. While analyzing the forms of documents placed in Table-2, it revealed that all 15 M.Phil dissertations reflect the use of documents where, the highest number of citations i.e. 417 (39.63%) are from Journals and Magazine Article followed by 311 (29.56%) citations from books. The e-Journals referred by the scholars come to 132 (12.54%). Thus, in order of ranking, Journals and Magazine Article, Books and e-Journals are ranked with 1st, 2nd and 3rd respectively. However, other forms of documents equally contributed significantly for information as used by the scholars. The analysis further viewed that, the scholars are more prone to Journal and Magazine Articles due to their latest contents in different field of research and this the most preferred shape of documents.

5.3 AUTHORSHIP PATTERN

Authors contribute potentially in the domain of research through articles which are available in both print and electronic form and the scholars get a free hand to access the same in multiple means. The authors may be single, joint, triple etc. The citations of all 15 dissertations were evaluated in order to ascertain the authorship pattern which comes to a total number of 967 authors out of 1116 citations. All authors irrespective of the types of documents were categorized into single, joint, triple, more than three and organisation authors. The authorship patterns of the citations by the scholars made in their dissertations are placed in Table-3 supported with Graph-2 for clear understanding. The table also clearly indicates the cumulative frequencies including the percentage thereof for clear vision.

Table-3: Authorship Pattern

S/N	Author(s)	# of Authors	%	Cumulative Frequencies	Cumulative %
1	Single	654	67.63	654	67.63
2	Joint	217	22.44	871	90.07
3	Triple	45	4.65	916	94.72
4	More than Three	32	3.3	948	98.03
5	Organisation	19	1.96	967	100
	Total	**967**	**99.98 or 100**		



Graph-2: Authorship Pattern

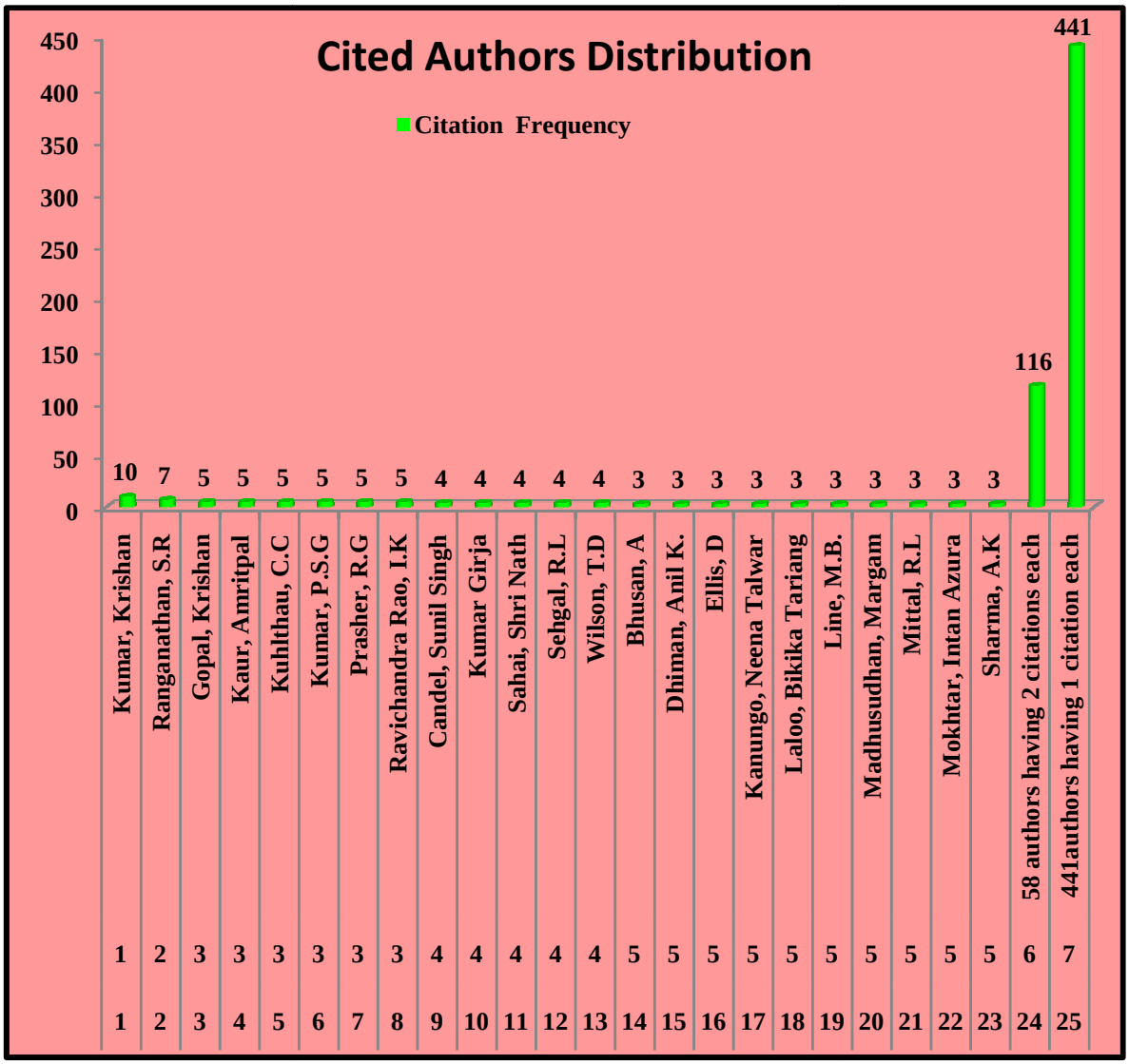
While making an analysis of the authorship pattern placed in Table-3 of the study it was revealed that the contribution of articles by single author are significant which comes to 654 out of 967 thus coming to 67.63% compared to the articles contributed by joint authors which comes to 217 (22.44%) followed by 45 numbers having three authors which constitutes 4.6%. This further revealed that among the 5 group of the authors, single author, joint authors, triple authors ranks First, Second and Third position respectively while, more than 3 authors and organisation as author are insignificant. This may be due to the fact that the organisation is lacking of creation of institutional repository and available of electronic resources thereof.

5.4 AUTHORS DISTRIBUTION

Authorship pattern are studied among the cited LIS articles by the M.Phil scholars in their dissertations. Among the list of articles cited, a total of 654 single authors were cited by the M.Phil scholars in their dissertation work. The single author position has been shown in the Table-4 showing their percentage. The data reflected in the Table-4 has been supported with Graph-3 for clear understanding.

Table-4: Cited Authors Distribution

S/N	Rank	Authors Cited	Citation Frequency	%
1	1	Kumar, Krishan	10	1.52
2	2	Ranganathan, S.R	7	1.07
3	3	Gopal, Krishan	5	0.76
4	3	Kaur, Amritpal	5	0.76
5	3	Kuhlthau, C.C	5	0.76
6	3	Kumar, P.S.G	5	0.76
7	3	Prasher, R.G	5	0.76
8	3	Ravichandra Rao, I.K	5	0.76
9	4	Candel, Sunil Singh	4	0.61
10	4	Kumar Girja	4	0.61
11	4	Sahai, Shri Nath	4	0.61
12	4	Sehgal, R.L	4	0.61
13	4	Wilson, T.D	4	0.61
14	5	Bhusan, A	3	0.45
15	5	Dhiman, Anil K.	3	0.45
16	5	Ellis, D	3	0.45
17	5	Kanungo, Neena Talwar	3	0.45
18	5	Laloo, Bikika Tariang	3	0.45
19	5	Line, M.B.	3	0.45
20	5	Madhusudhan, Margam	3	0.45
21	5	Mittal, R.L	3	0.45
22	5	Mokhtar, Intan Azura	3	0.45
23	5	Sharma, A.K	3	0.45
24	6	58 authors having 2 citations each	116	17.73
25	7	441authors having 1 citation each	441	67.43
		Total	**654**	**99.86 or 100**



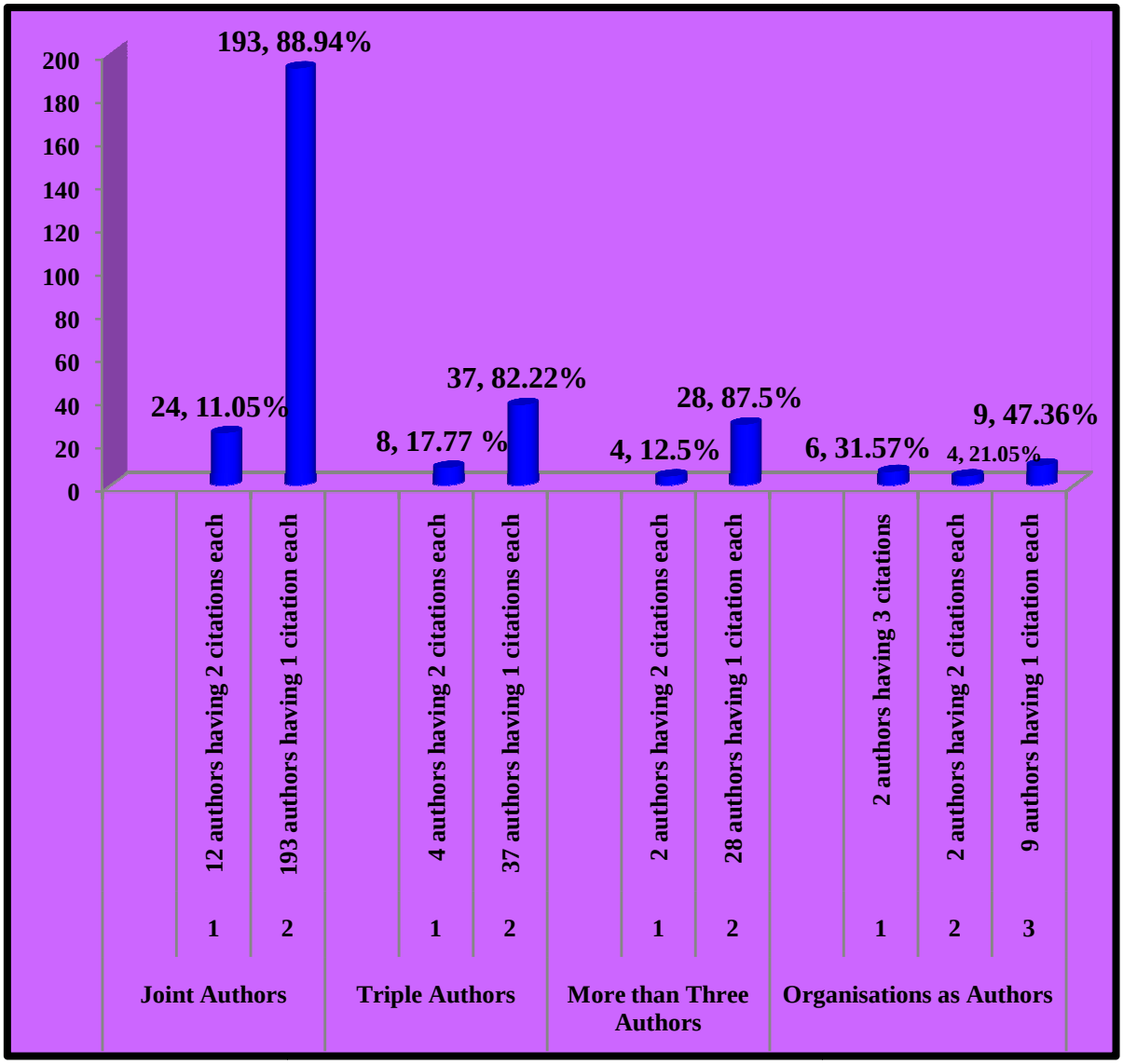
Graph-3: Cited Authors Distribution

While analyzing the cited author distribution placed in Table-4 reveals that there are a total number of 654 single authors and the ranking order has been mention in detail up to 5 where _Kumar, Krishan is cited maximum i.e. 10 times (1.52%) followed by Ranganathan, S.R, 7 times (1.07%) and Gopal, Krishan, Kaur, Amritpal, Kuhlthau, C.C, Kumar, P.S.G, Prasher, R.G and Ravichandra Rao, I.K 5 times each (0.76%) and thus it ranks 1st, 2nd and 3rd respectively. Further, the authors who have been cited up to 3 times are reflected in the table as well as the following graph to make it more visible. Further the table reflects that 58 authors having 2 citations each constitute 116 citation frequency (17.73%) followed by 441 authors having 1 citations each with a citation frequency of 441 (67.43%). The author citation depends upon the research output of the authors where the scholars access concerning to their research work. It may be deduced that the scholars access the literature provided a scope is there. Due to limited scope and constraints in internet access along with the availability of E-Journals the scholars highly get access to the research output of the authors.

Table-4A- Other Authors

S/N	Rank	Authors Cited	Citation Frequency	%
Joint Authors				
1	1	12 authors having 2 citations each	24	11.05
2	2	193 authors having 1 citation each	193	88.94
		Total	**217**	**99.99 or 100**
Triple Authors				
1	1	4 authors having 2 citations each	8	17.77
2	2	37 authors having 1 citations each	37	82.22
		Total	**45**	**99.99 or 100**
More than Three Authors				
1	1	2 authors having 2 citations each	4	12.5
2	2	28 authors having 1 citation each	28	87.5
		Total	**32**	**100**
Organisations as Authors				
1	1	2 authors having 3 citations	6	31.57
2	2	2 authors having 2 citations each	4	21.05
3	3	9 authors having 1 citation each	9	47.36
		Total	**19**	**99.98 or 100**

The other authors which constitute joint authors, triple authors, more than three authors and organisation as authors has been placed in Table-4A to have a detailed study about the citations made by the scholars in their dissertations. The table reflects the ranking position of all type of authors as discussed. The data reflected in the Table-4A has been supported with Graph-3A for clear understanding.



Graph-3A: Other Authors

The analysis of Table-4A reflects that with regard to Joint authors , there are 12 authors who have been cited 2 times constituting thereby, the citation frequency of 24 (11.05%) out of 217 in total followed 193 authors who have been cited 1 time each thus, comes to 193 (88.94%).

Likewise, while discussing about citation of triple authors make by the scholars in their dissertation, the table revealed that 4 authors were having 2 citations each which comes to 8 out of 45 in total (17.77%) followed by 37 authors having 1 citation each thus coming to 37 (82.22%). Further the analysis for more than 3 authors shows that there are 2 authors having 2 citations each constituting thereby 4 in total out of 32 (12.5%) and 28 authors having 1 citation each thus coming to 28 (87.5%). The organisation as author was also analysed which shows that the scholar have cited 2 organisation as author with 3 citations coming to 6 citations in total (31.57%) out of 19 in total followed by 2organisation as author having 2 citation each which comes to 4 (21.05%) followed by 9 organisation as author having 1 citation which comes to 9 (47.36%).

5.5 DEGREE OF COLLABORATION: SINGLE vs. MULTIPLE AUTHORS

To determine the degree of collaboration in quantitative terms, the formula given by Subramanayam was used. The formula for being:

$$C = \frac{N_m}{N_s}$$

where,

C = Degree of collaboration in discipline,

N_m = number of multi-authored papers, and

N_s = number of single authored papers.

Hence, the degree of collaboration of citations made in the M.Phil dissertations is,

$$C = \frac{313}{654} = 0.47$$

Where, 313 represents the total number of multiple authors like, joint authors, triple authors, more than three authors and organisation as authors in the given study and 654 represents the single authors.

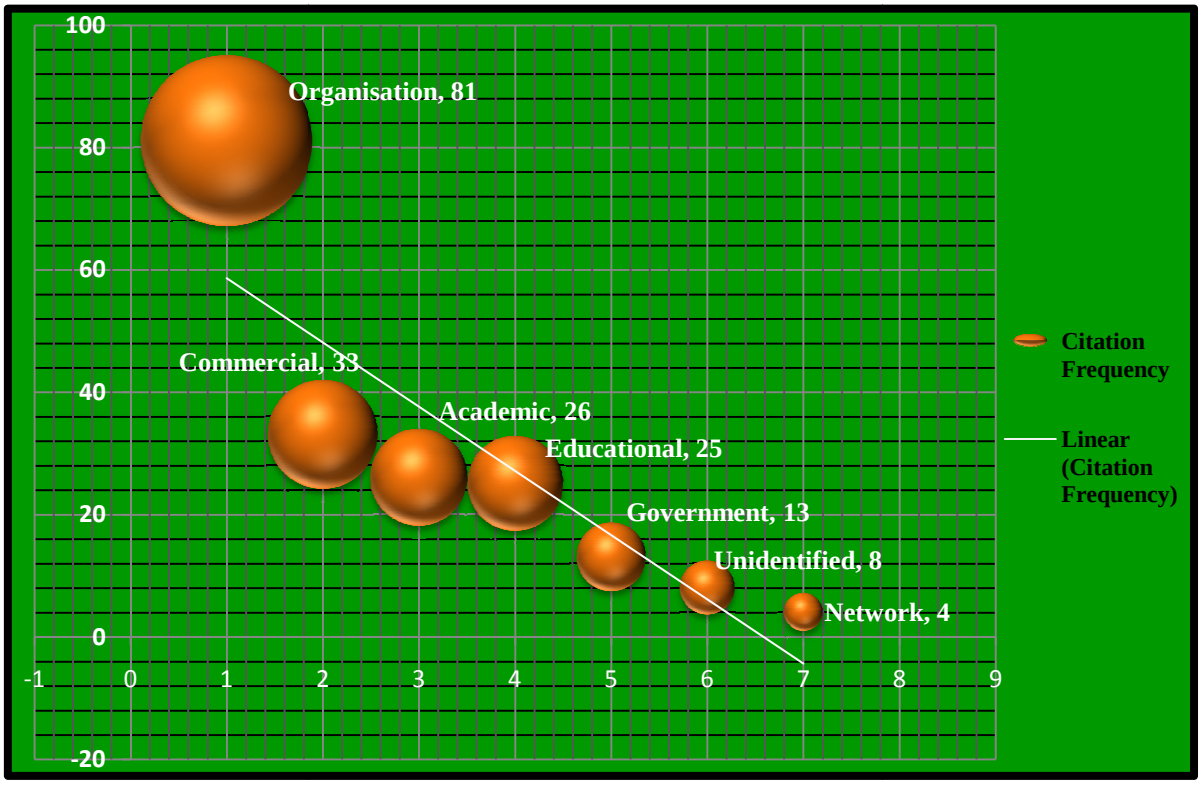
Again while making an analysis of the degree of collaboration i.e. single vs. multiple authors which constitute joint, triple, more than three, and organisation, it was observed that the degree of collaboration in the discipline is calculated as 0.47 and this shows the prevalence solo research in the field.

5.6 CITATIONS OF WEBSITE

Websites facilitates a good length of information to scholars for research. Most of the organisation, authors publishers place the research output through electronic means either through open source or price or social networking sites which allow a researcher to come across the electronic resources concerning to their research area. The scholars also equally accessed various websites available through organisation, commercial, academic, educational etc to elicit the information for their research work. The data relating to the websites visited by the scholar and citations of the same in their dissertations has been placed in Table-5 which reflects the domain name, citation frequency and the percentage along with cumulative frequencies and percentage. This is well supported with the graph placed in 4 for clear understanding.

Table-5: Citations of Website

S/N	Domain name	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	Organisation	81	42.63	81	42.63
2	Commercial	33	17.36	114	60
3	Academic	26	13.68	140	73.68
4	Educational	25	13.15	165	86.84
6	Government	13	6.84	178	93.68
7	Unidentified	8	4.21	186	97.89
8	Network	4	2.10	190	100
	Total	**190**	**99.96 or 100**		



Graph-4: Citations of Website

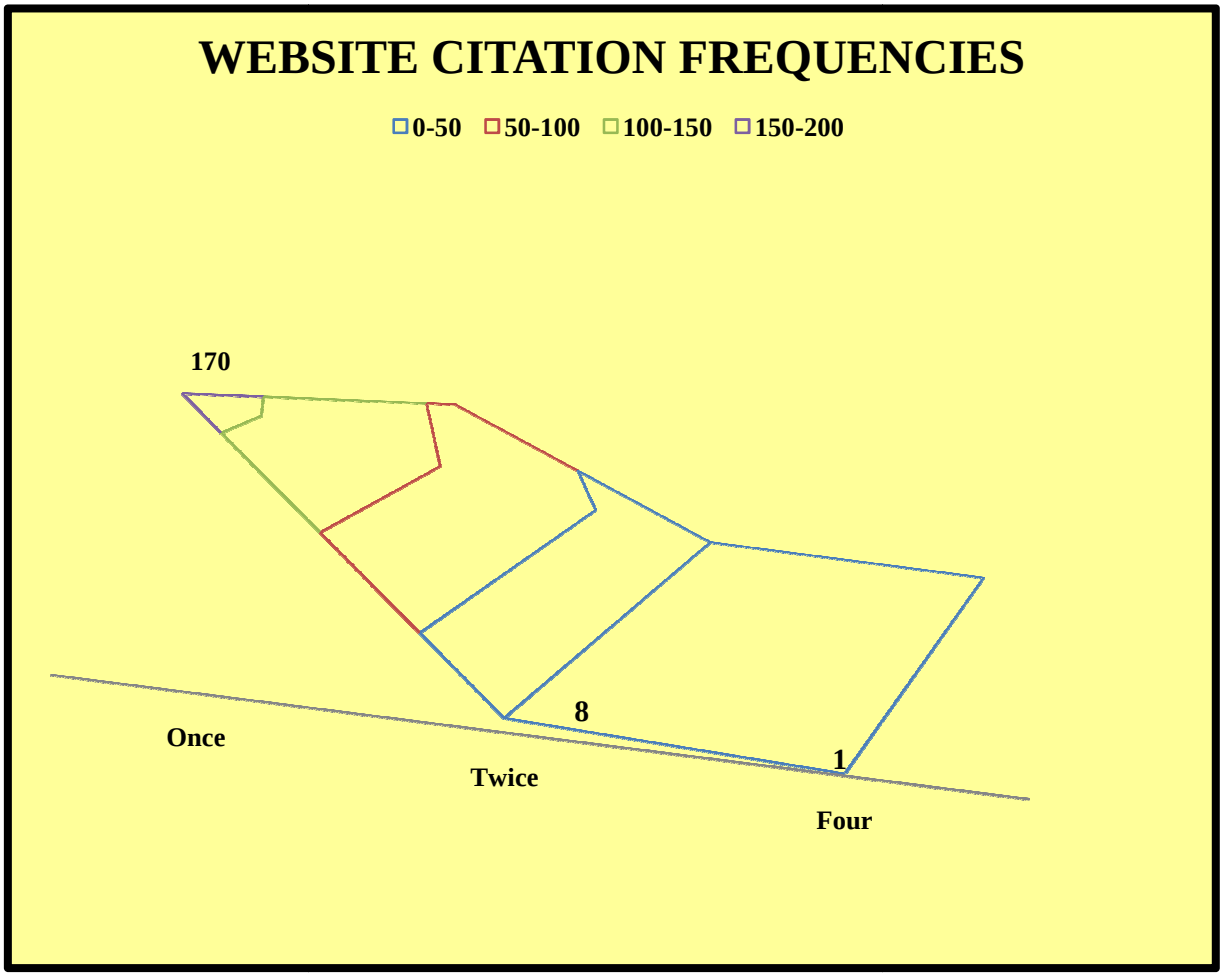
Analysis of the Table-5 reflects that organisation sites stands at the apex because of 81 citations (42.63%) out of 190 in total followed by commercial sites 33 (17.36%) and academic sites 26 (13.68%) which constitute 1st, 2nd, 3rd in ranking order. It is further deduced from the analysis that the other websites such as educational, government sites equally contribute a plethora of information in various fields of study which is mostly relevant for research purpose. The research scholars get access to such websites to substantiate information requirement for their research work. This further reveals that the scholars are quite used to computer literacy and network literacy to elicit information in various field of research from multiple websites.

5.7 WEBSTE CITATION FREQUENCIES

In the present ICT arena, information prevailing in websites contribute immensely for research work and it substantiate value added information/ data especially from Govt., Organisation, Education and commercial sites as well. The scholars visiting various websites and citations of the same thereto in their dissertation has been mentioned in Table-6 for analysis supplemented with Graph-5 for clear understanding. The table especially reflects the citation frequencies of the website cited in the dissertation.

Table-6: Website Citation Frequencies

S/N	Citation of Website	Citation Status (in no.)	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	Once	1	170	89.47	170	89.47
2	Twice	2	8	8.42	186	97.89
3	Four	4	1	2.1	190	100
		Total	**190**	**99.99 or 100**		



Graph-5: Website Citation Frequencies

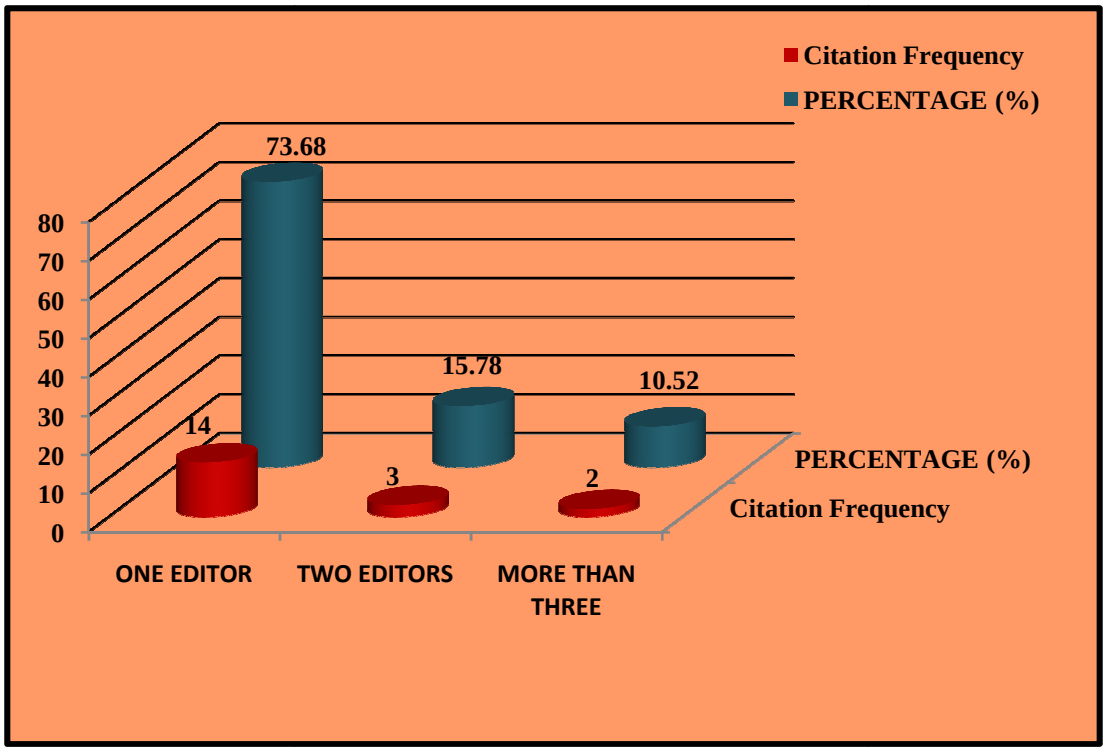
Analysis of the citation frequencies of the websites placed in the Table-6 reveals that, the research scholars have cited in three categories such as, one time, two times and four times. Hence, onetime citation of the website constitute 170 followed by two times citations which forms 8 and four times citation for only 1 and this, represents 89.47% followed by 8.42% and 2.1% thus, coming to 1st, 2nd and 3rd respectively in the ranking order. This shows the searching of websites to elicit information in different ways.

5.8 EDITORSHIP PATTERN

All the 1116 citations from 15 M.Phil dissertations covered under study also constitute the documents edited by different authors, organisers etc. and as such, there are 19 documents which were having the editors. Data relating to the number of editors such as, one editor, two editors, and more than 3 editors irrespective of the types of documents were placed in Table-7 supported with Graph-6 for clear understanding.

Table-7: Editorship Pattern

S/N	Citation Status	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	One editor	14	73.68	14	73.68
2	Two editors	3	15.78	17	89.47
3	More than three	2	10.52	19	100
	Total	**19**	**99.98 or 100**		



Graph-6: Editorship Pattern

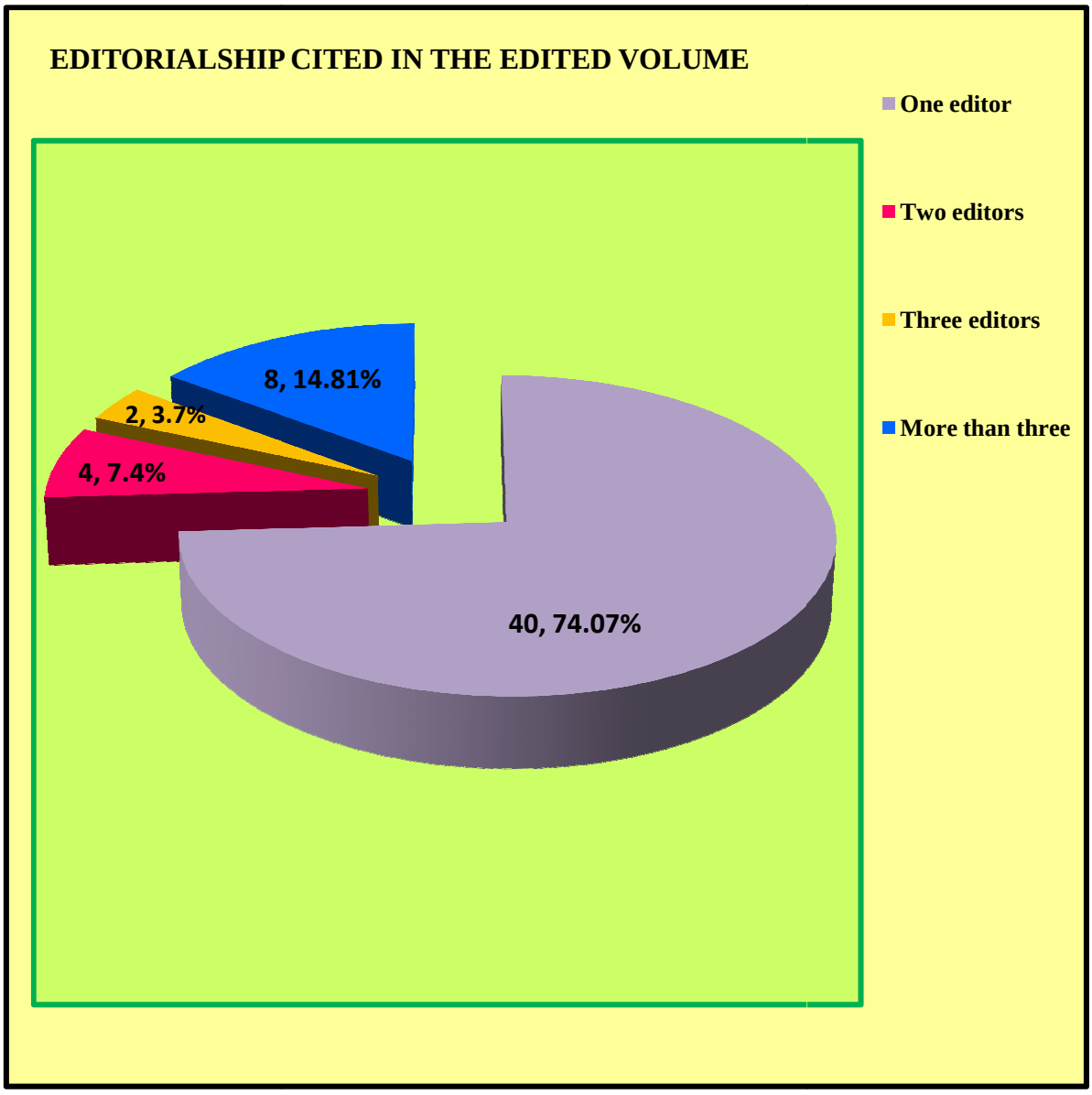
While analysing the data placed of the editorship pattern placed in Table-7, it was revealed that the contribution of articles by single editor is significant which comes to 14 out of 19 thus coming to 73.68% followed by 3 numbers having two editors which constitute 15.78% and more than 3 editors having 2 numbers of citations i.e. 10.52%. This shows that the editors are preferred to be solo than the team. This is more prevalent in festschrift volume, seminar proceedings etc.

5.9 EDITORIALSHIP CITED IN THE EDITED VOLUME

The authors are the central in giving the intellectual output in shape of articles which are found in journals, edited volumes, seminar proceedings, conference proceedings etc. The editors equally contribute the useful information in the documents and therefore the editors equally are responsible in providing the useful information in the volume. Further, the editors also change the languages suitable for research publication. Therefore, determining the editorialship is also equally important like author for analysis. Therefore, the scholar has made an attempt to submit a list of editors like, one editor, two editors etc. available in all the cited volumes of all 15 dissertations covered under study and the same has been reflected in Table-8 supported with Graph-7 for clear vision. The table has been arranged on the basis of citation status i.e., one editor, two editors, three editors and more than three editors which reflects the number of citation frequency of different edited volumes.

Table-8: Editorialship cited in the edited volume

S/N	Citation Status	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	One editor	40	74.07	40	74.07
2	Two editors	4	7.4	44	81.48
3	Three editors	2	3.7	46	85.18
4	More than three	8	14.81	54	100
	Total	**54**	**99.98 or 100**		



Graph-7: Editorialship cited in the edited volume

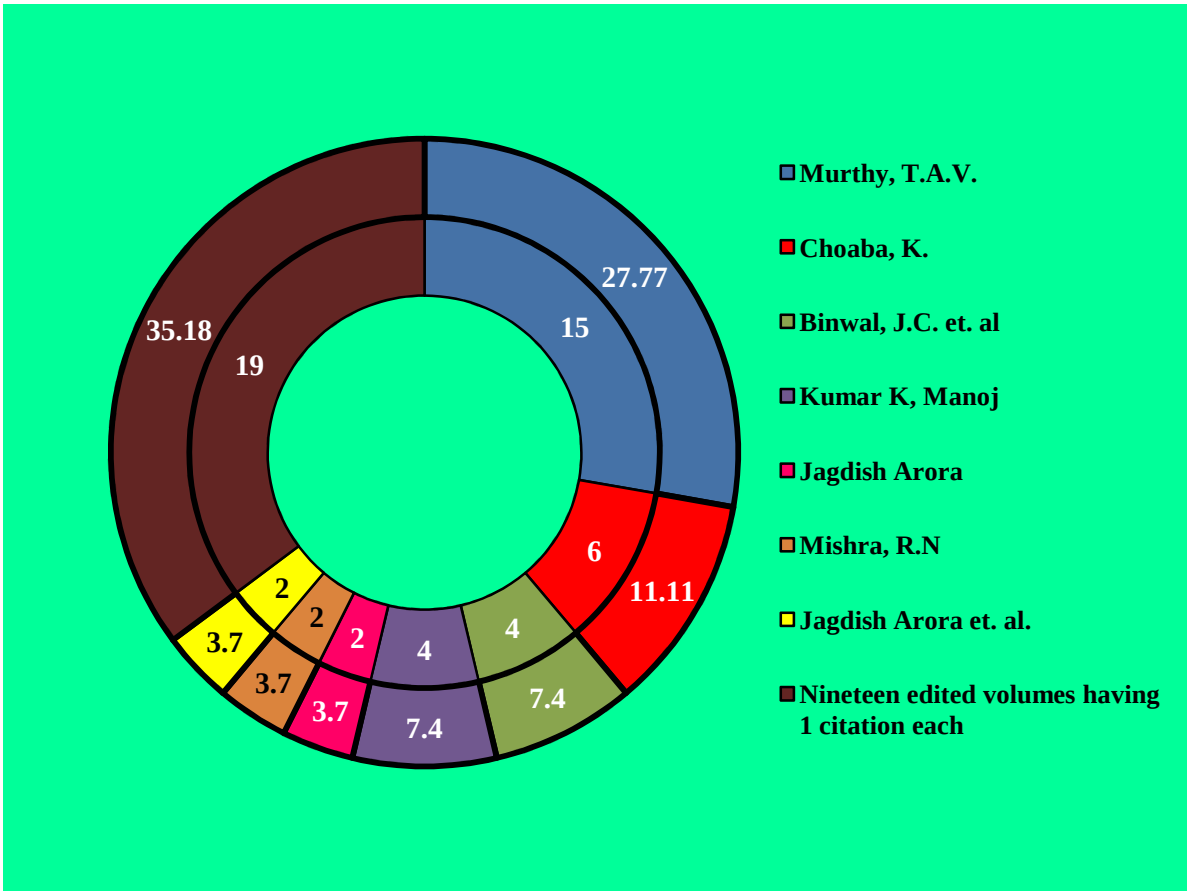
The analysis reflects that the scholars have cited the articles of different editors of the cited volumes by only one editor which comes to 40 (70.07%) out of 54 followed by the citation of different editors of the edited volume by more than 3 editors i.e. 8 in total constituting thereby (14.81%) and different editors of the book edited by 2 editors which forms 4 in total (7.4%) and in the ranking order, one editor, more than three editors and two editors comes 1st, 2nd and 3rd respectively. However, this further shows that the editor prefers to be solo than to be a team by taking the responsibility for editing the documents.

5.10 RANKING OF EDITORS

The scholar made an attempt to put forth the ranking order of editor of various edited volumes covered in 15 M.Phil dissertations which have been reflected in order of citation frequency in Table-9 showing the percentage thereof. The data placed in the Table-9 has been clearly shown in Graph-8 for clear understanding.

Table-9: Ranking of Editors in edited volumes

S/N	NAME	Type of Article cited (editor with author attached)	Citation Frequency	%
1	Murthy, T.A.V.	1	15	27.77
2	Choaba, K.	1	6	11.11
3	Binwal, J.C. et. al	3+	4	7.40
4	Kumar K, Manoj	1	4	7.40
5	Jadgish Arora	1	2	3.70
6	Mishra, R.N	1	2	3.70
7	Jagdish Arora et. al	3+	2	3.70
8	19 edited volumes having 1 citation each	1	19	35.18
	Total		**54**	**99.98 or 100**



Graph-8: Ranking Of Editor in Edited Volumes

The editor distribution in cited editorial volume in its ranking order is placed in Table-9 which after analysis reflects that Murthy, T.A.V is cited maximum i.e. 15 times (27.77%) followed by Chaoba, K, 6 times (11.11%) and Binwal, J.C. et. al., Kumar, K. Manoj, 4 times each (7.40%) and Jagdish Arora, Mishra, R.N, Jagdish Arora et.al., 2 times each (3.70%) and thus, it ranks 1st, 2nd ,3rd, and 4th respectively. This shows the research value of the editors in cited volumes.

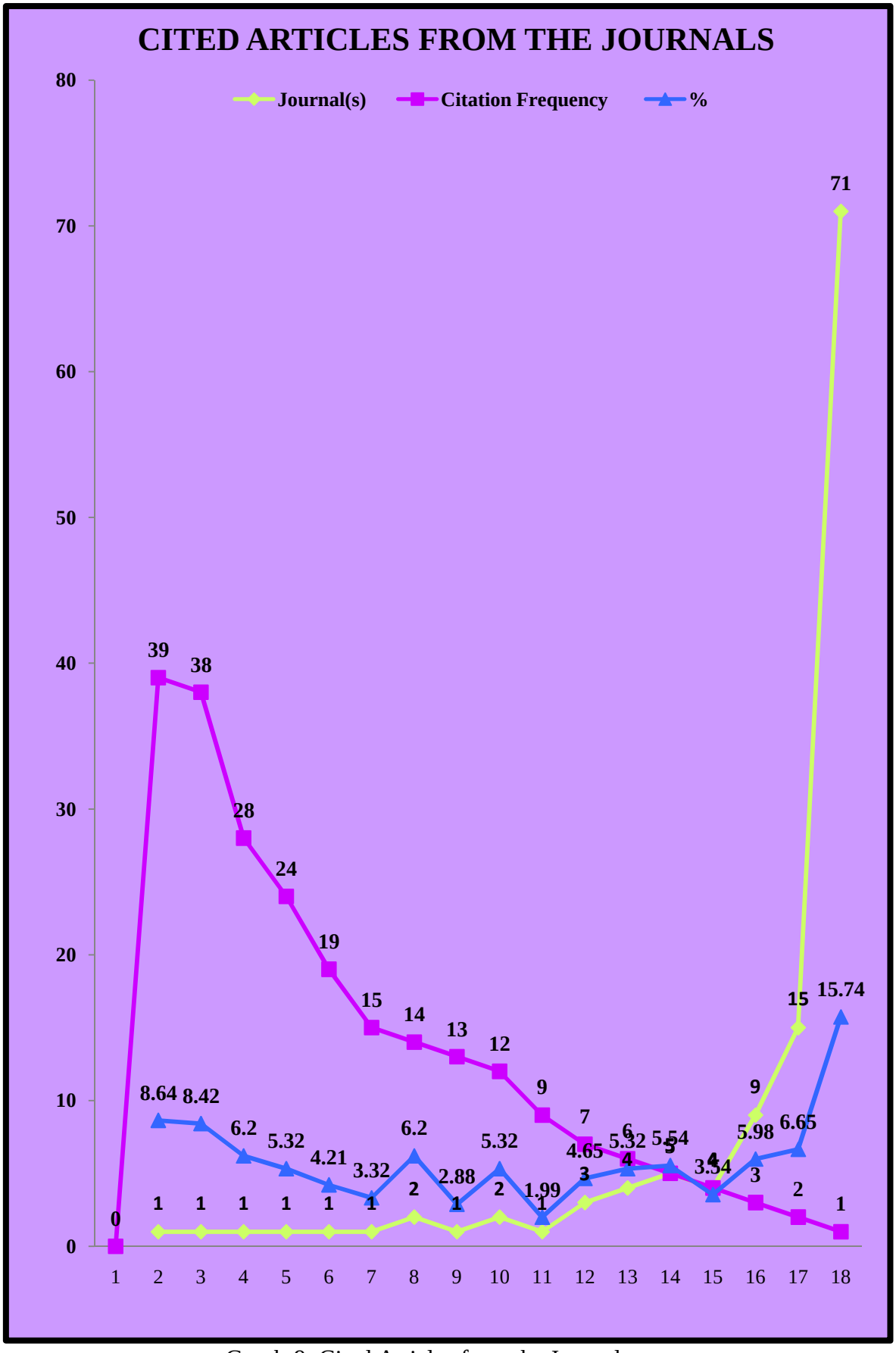
Further, a citation depends upon the subject and topic of research of the scholars including the availability of the publications. The scholars get a chance to access the articles provided there is a wide publication of the documents either in traditional or electronic form.

5.11 CITED ARTICLES FROM JOURNALS

Journal-wise distributions of articles are studied among the cited articles from national and international journals. Among the list of articles cited from the journals, a total number of 123 were cited by M.Phil scholars in their dissertations. Most highly cited articles i.e., the number of times from the journals in the dissertations covered under the study have been placed below in Table-10 supplemented with Graph-9 in the decreasing sequence. The scholar has distributed all the 451 citations from 123 journals in the table showing the percentage including the cumulative frequencies and percentage.

Table-10: Cited Articles from the Journals

S/N	Journal(s)	Citation Frequency (No. of times)	%	Cumulative Frequencies	Cumulative %
1	1	39	8.64	39	8.64
2	1	38	8.42	77	17.07
3	1	28	6.20	105	23.28
4	1	24	5.32	129	28.60
5	1	19	4.21	148	32.81
6	1	15	3.32	163	36.14
7	2	14	6.20	191	42.35
8	1	13	2.88	204	45.23
9	2	12	5.32	228	50.55
10	1	9	1.99	237	52.54
11	3	7	4.65	258	57.20
12	4	6	5.32	282	62.52
13	5	5	5.54	307	68.07
14	4	4	3.54	323	71.61
15	9	3	5.98	350	77.60
16	15	2	6.65	380	84.25
17	71	1	15.74	451	100
Total	**123**	**451**	**99.92 or 100**		



Graph-9: Cited Articles from the Journals

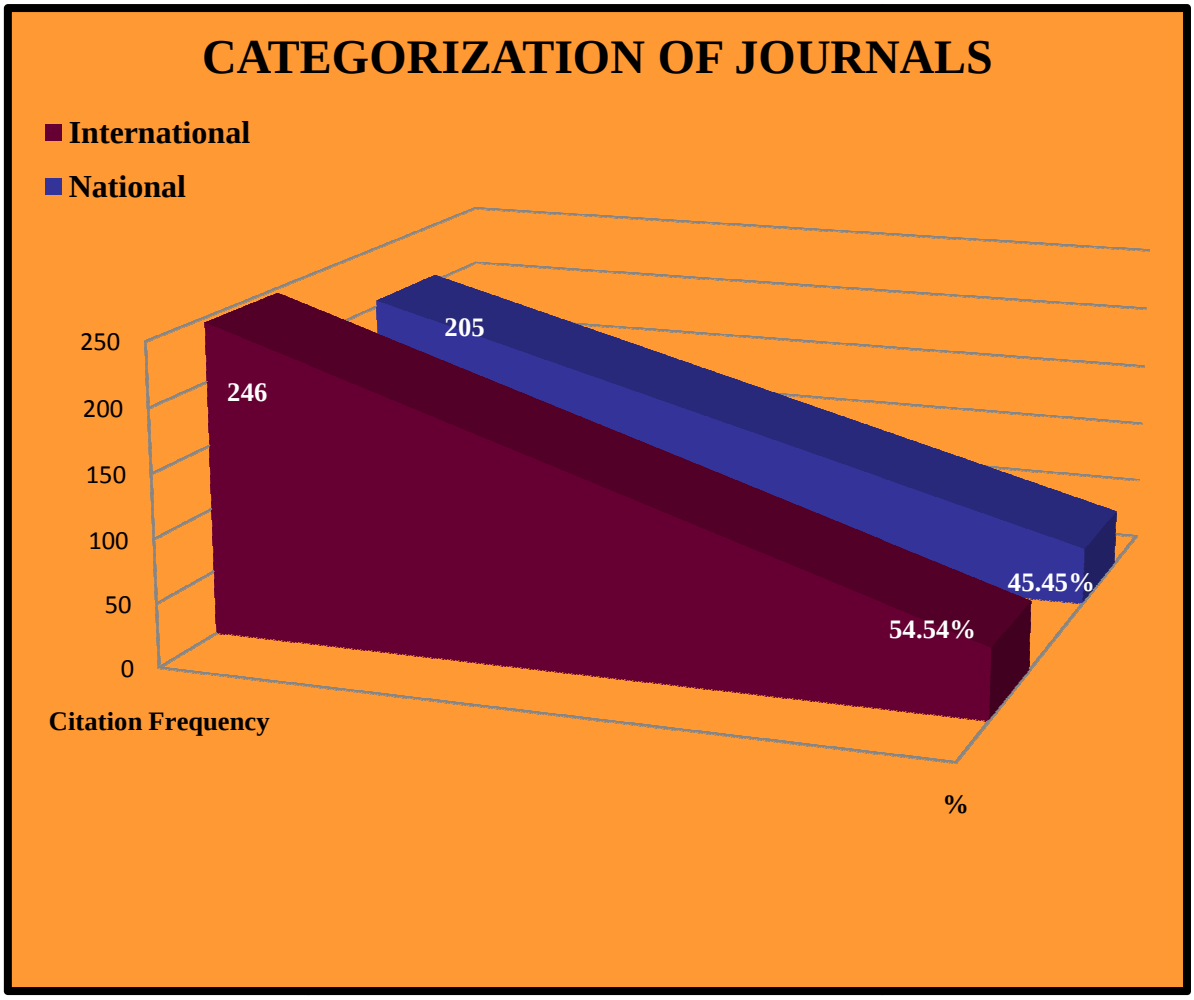
Analysis of the data placed in Table-10 reflects that the highly cited rate is 39 times (8.64%), followed by 38 times (8.42%), 28 times (6.20%), 24 times (5.32%), 19 times (4.21%), 15 times each for 1 journal (3.32%), 14 times for 2 journals (6.20%), 13 times (2.88%) for 1 journal, 12 times (5.32%) for 2 journal. Further the scholars have cited 9 times for 1 journal i.e. 1.99, 7 times for 3 journals constituting thereby, 4.65%, 6 times for 4 journals (5.32%), 5 times for 5 journals etc. The scholars also have cited 1 time for 71 journals which comes to 15.74%. This shows the importance of the research articles of the journals. However, due to multiple access provisions, the scholars also cite other journals in the research subject.

5.12 CATEGORIZATION OF JOURNALS

Categorizations of journals are studied from among the cited articles by the scholars of all dissertations covered under study. Among the list of articles cited, a total of 451 citations from 123 journals were cited by the scholars. The categorization of journal has been classified into two types such as, National and International and has been listed in decreasing order of their citing frequency in Table-11 supported with Graph-10 for clear understanding.

Table-11: Categorization of Journals

S/N	Type	No. of Journals	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	International	96 (78%)	246	54.54	246	54.54
2	National	27 (22%)	205	45.45	451	100
	Total	**123**	**451**	**99.99 or 100**		



Graph-10: Categorization of Journals

In all 15 M.Phil dissertations, a total number of 1116 citations were examined where the scholar identified 451 citations from 123 different journals in total that comprises both national and international. Analysis of the Table-11 reflects that while, there are 96 international (78%) journals, national journals comes to 27 (22%). Further, out of 451 citations in total from both the types of journals, 246 citations (54.54%) are having international status while, 205 citations are having national status which constitute 45.45%. This visualises that, the scholars are more prone to cite the journals emanated from outside rather home. This is primarily due to the availability of international journals through consortia in the libraries. However, sporadic attempts are required to be initiated by the library to use more e-resources available through consortia to get the return value.

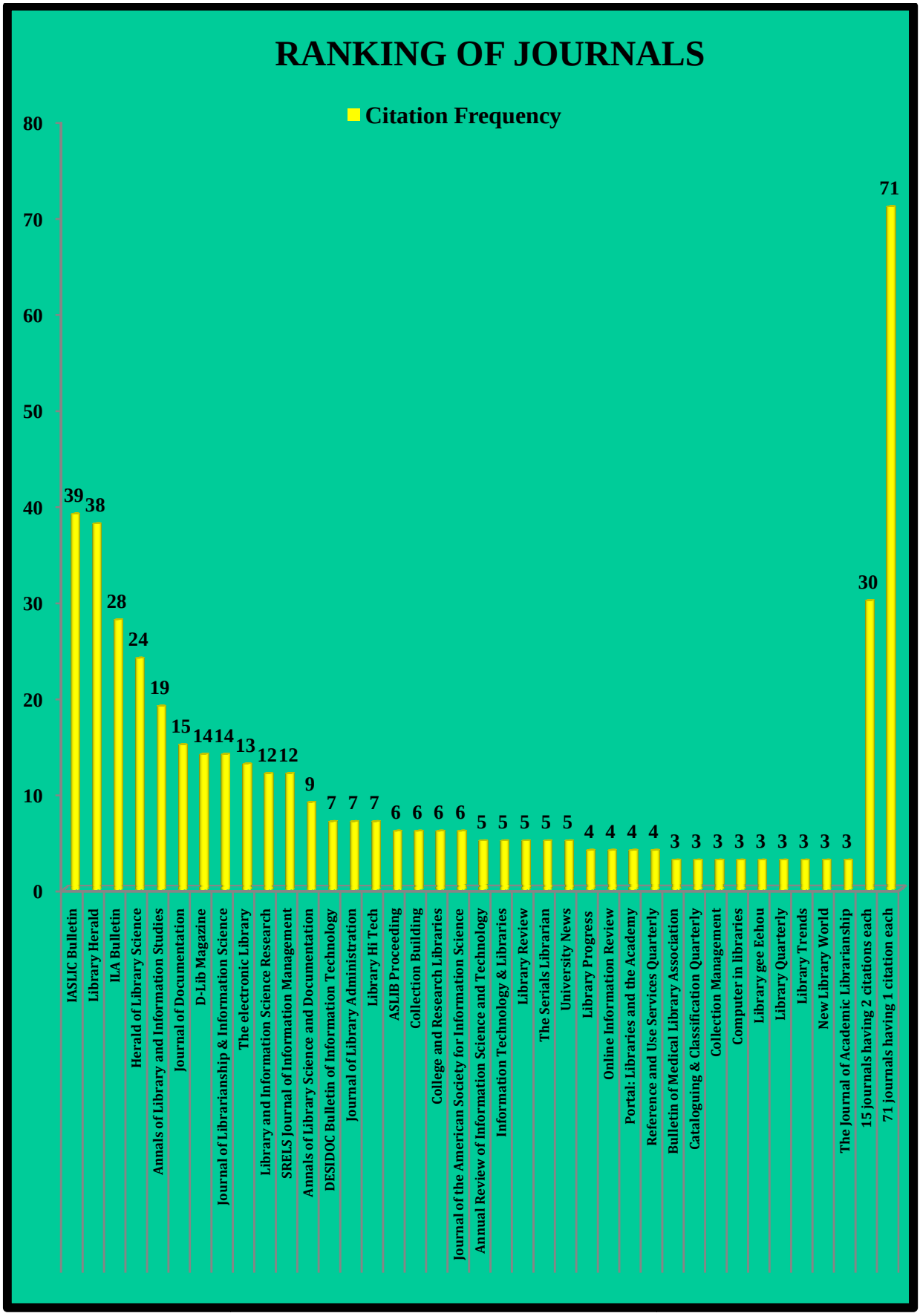
5.13 RANKING OF JOURNALS

Highly cited journals has higher impact factor which is a common parameter for measuring the relative importance of a journal. It is also useful in determining which journals are most resourceful for researchers. Citations in the dissertations are found across 451 from 123 Library and Information Science Journals and are listed in decreasing order of their frequency of citations in Table-12 with Graph-11 with clear visualization.

Table-12: Ranking of Journals

S/N	Rank	Name of Journal	Citation Frequency	National/ International	%
1	1	IASLIC Bulletin	39	National	8.64
2	2	Library Herald	38	National	8.42
3	3	ILA Bulletin	28	National	6.2
4	4	Herald of Library Science	24	National	5.32
5	5	Annals of Library and Information Studies	19	National	4.21
6	6	Journal of Documentation	15	International	3.32
7	7	D-Lib Magazine	14	International	3.10
8	7	Journal of Librarianship & Information Science	14	International	3.10
9	8	The electronic Library	13	International	2.88
10	9	Library and Information Science Research	12	International	2.66
11	9	SRELS Journal of Information Management	12	National	2.66
12	10	Annals of Library Science and Documentation	9	National	1.99
13	11	DESIDOC Bulletin of Information Technology	7	National	1.55
14	11	Journal of Library Administration	7	International	1.55
15	11	Library Hi Tech	7	International	1.55
16	12	ASLIB Proceeding	6	International	1.33
17	12	Collection Building	6	International	1.33
18	12	College and Research Libraries	6	International	1.33
19	12	Journal of the American Society for Information Science	6	International	1.33
20	13	Annual Review of Information Science and Technology	5	International	1.10
21	13	Information Technology & Libraries	5	International	1.10
22	13	Library Review	5	International	1.10
23	13	The Serials Librarian	5	International	1.10
24	13	University News	5	National	1.10
25	14	Library Progress	4	National	0.88
26	14	Online Information Review	4	International	0.88
27	14	Portal: Libraries and the Academy	4	International	0.88
28	14	Reference and Use Services	4	International	0.88

		Quarterly			
29	15	Bulletin of Medical Library Association	3	International	0.66
30	15	Cataloguing & Classification Quarterly	3	International	0.66
31	15	Collection Management	3	International	0.66
32	15	Computer in libraries	3	International	0.66
33	15	Library gee Eehou	3	National	0.66
34	15	Library Quarterly	3	International	0.66
35	15	Library Trends	3	International	0.66
36	15	New Library World	3	International	0.66
37	15	The Journal of Academic Librarianship	3	International	0.66
38	16	15 journals having 2 citations each	30	Both National and International	6.65
39	17	71 journals having 1 citation each	71	Both National and International	15.74
		Total	**451**		**99.82 or 100**



Graph-11: Ranking of Journals

While analysing the ranking of journals placed in Table-12 it was observed that, out of a total number of 451 citations from 123 journals as already discussed while, IASLIC Bulletin stands at the apex for having been maximum 39 (8.64%) citations and thus keeps 1st position in the ranking order, Library Herald is at the 2nd position in the ranking order for having 38 citations (8.42%) and ILA Bulletin in the 3rd position for having 28 citations (6.20%). The ranking order of other journals cited by the scholars have been depicted in the table which clearly shows that, Herald of Library Science has 24 (5.32%) citations while, Annals of Library and Information Studies 19 (4.21%) citations, Journal of Documentation 15 (3.32%) citations, D-Lib Magazine and Journal of Librarianship and Information Science each having 14 (3.10%) citations, The Electronic Library having 13 (2.88%) citations, Library and Information Science Research and SRELS Journals of Information Management having 12 (2.66%) citations each, Annals of Library Science and Documentation having 9 (1.99%) citations, DESIDOC Bulletin of Information Technology, Journal of Library Administration and Library Hi Tech each having 7 (1.55%) citations, ASLIB Proceeding, Collection Building, College & Research Libraries, Journal of American Society for Information Science having 6 (1.33%) citations each, Annual Review of Information Science and Technology, Information Technology and Libraries, Library Review, The Serials Librarians, University News having 5 citations (1.10%) each, Library Progress, Online Information Review, Portal: Libraries and the Academic, Reference and Use Services Quarterly having 4 citations (0.88%) each, Bulletin of Medical Library Association, Cataloguing & Classification Quarterly, Collection Management, Computer in libraries, Library gee Eehou, Library Quarterly, Library Trends, New Library World and The Journal of Academic Librarianship having 3 citations each (0.66%). The other 15 journals are having 2 citations each and 71 journals having 1 citation each thus forms 6.65% and 15.74% respectively. It is interesting to note that, the national journals have been cited by the scholars compared to international as per analysis. This also further reflects that, the national journals are also in the parallel footing of international journals.

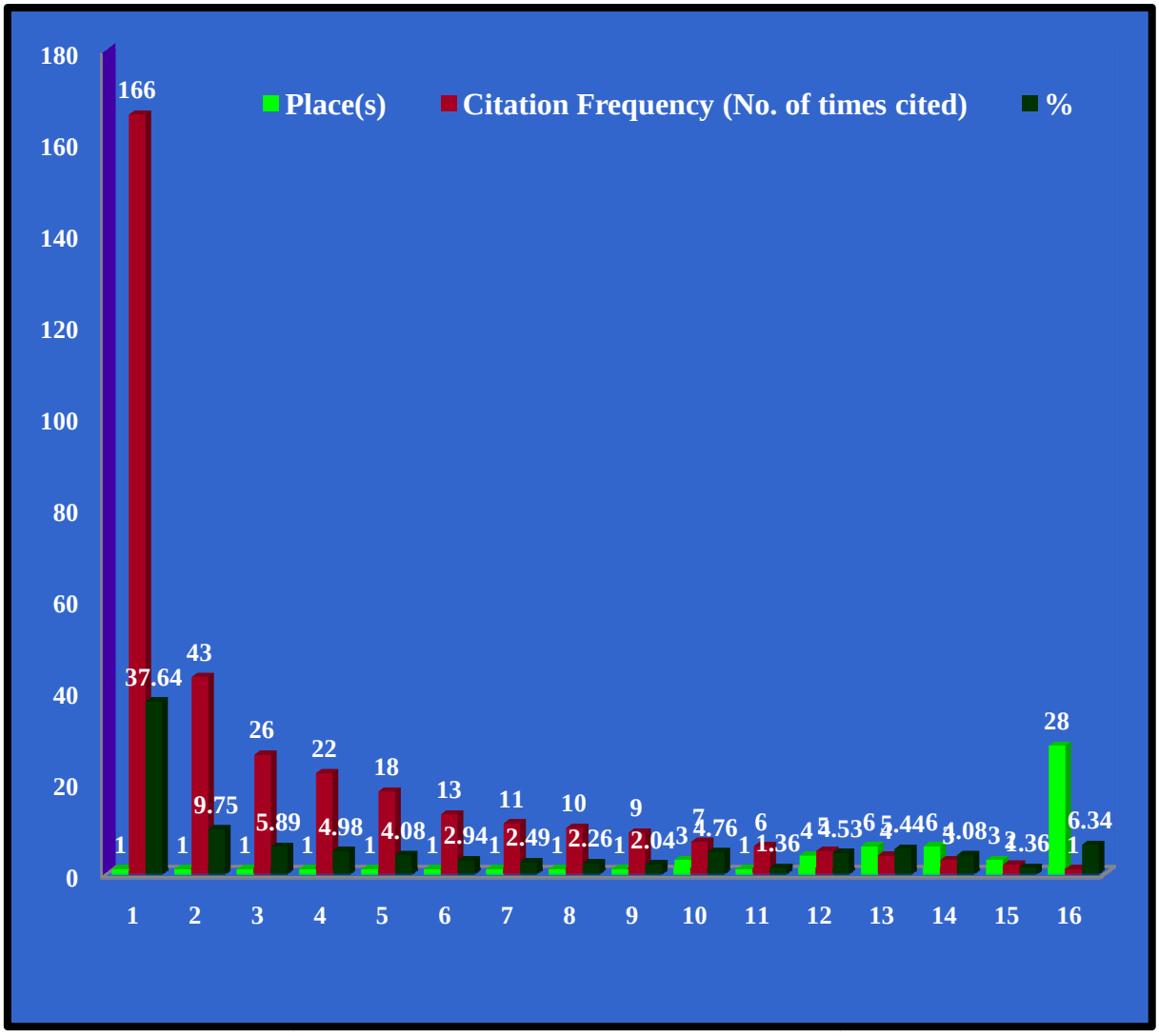
It is surprising to know that, 96 numbers of international journals and 27 numbers of national journals were cited as shown in Table-11. But while studying the ranking of journals placed in Table-12 it could be found out that the national journal status are more compared to international journal. This is due to the fact that the scholars have cited only one time, two times and maximum 15 times the international journals while they have cited more in national journals.

5.14 PLACE-WISE DISTRIBUTION OF ARTICLES

Place of publication in citation analysis equally plays a pivotal role to ascertain the quality of the research articles which may form any shape of documents. Therefore, to ascertain the places of various forms of documents, the scholar found the place i.e., the country and the place-wise distribution of articles cited from national and international journals by the Ph. D scholars is mentioned below in Table-13. Among the list of articles cited from various journals, a total of 441 citations from the total of 60 places were identified by the scholar from all the dissertations included under study. Most highly Citation of article according to place is listed in decreasing order of their citation frequency i.e., no. of times cited which supported with Graph-12 for lucid understanding.

Table-13: Place-Wise Distribution of Articles

S/N	Place(s)	Citation Frequency (No. of times cited)	%	Cumulative Frequencies	Cumulative %
1	1	166	37.64	166	37.64
2	1	43	9.75	209	47.39
3	1	26	5.89	235	53.28
4	1	22	4.98	257	58.27
5	1	18	4.08	275	62.35
6	1	13	2.94	288	65.30
7	1	11	2.49	299	67.80
8	1	10	2.26	309	70.06
9	1	9	2.04	318	72.10
10	3	7	4.76	339	76.87
11	1	6	1.36	345	78.23
12	4	5	4.53	365	82.76
13	6	4	5.44	389	88.20
14	6	3	4.08	407	92.29
15	3	2	1.36	413	93.65
16	28	1	6.34	441	100
Total	**60**	**441**	**99.94 or 100**		



Graph-12: Place-Wise Distribution of Articles

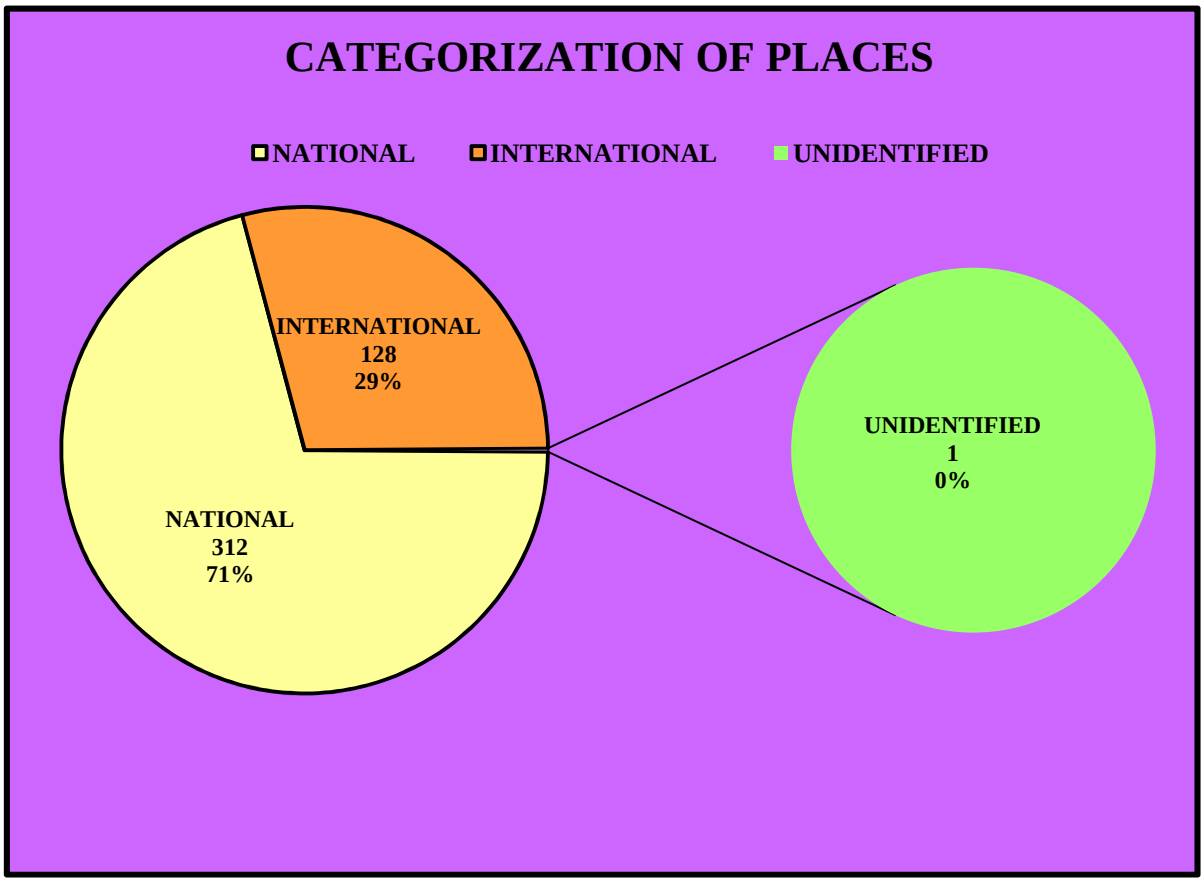
While analysing the data placed in Table-13, it is deduced that out of 441 citations from 60 places, 166 times followed by 43, 26, 22, 18, 13, 11, 10, 9 times one place has been cited by the scholars which constitute the percentage of 37.64, 9.75, 5.89, 4.98, 4.08, 2.94, 2.49, 2.26, 2.04 respectively. Further, the scholars in their dissertations have cited 3 different places 7 times (4.76%), 1 place 6 times (1.36%), 5 times (4.53%) 4 places, 4 times (5.44%) 6 different places , 3 times (4.08%) for 6 different places, 2 times (2.36%) 3 places and 1 (6.34%) places for 28 different places. This signifies that, most of the subject based journals emanate from one place.

5.15 CATEGORIZATION OF PLACES

Categorization of Place is studied among the cited articles by the scholars in their dissertations. Among the list of articles cited, a total of 441citations from 60 places were cited by the scholars. Categorization of Place has been classified into three types such as, National, International and Unidentified and has been listed in decreasing order of their citing frequency in Table-14 supported with Graph-13 for clear understanding.

Table-14: Categorization of Places

S/N	Type	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	National	312	70.74	312	70.74
2	International	128	29.02	440	99.77
3	Unidentified	1	0.22	441	100
	Total	**441**	**99.98 or 100**		



Graph-13: Categorization of Places

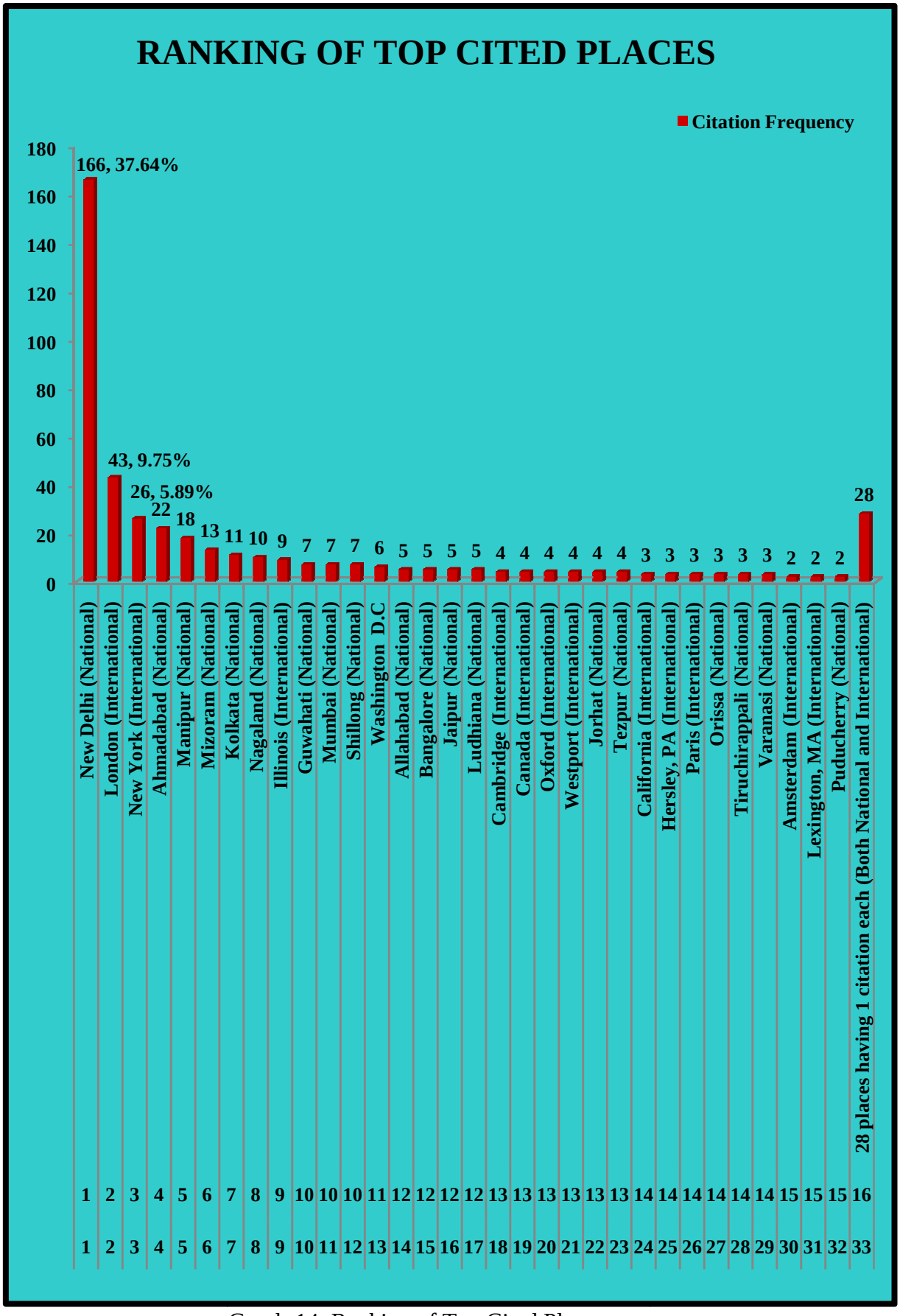
In all 15 M.Phil dissertations, a total number of 1116 citations were examined where the scholar identified 441citations from 60 different places in total that constitute national and international. The places those could not be identified have been mentioned as unidentified. Analysis of the Table-14 reflects that, there are 312 citations constitute national status i.e., 70.74% followed by 128 citations of having international status that constitute 29.02% and 1 citation (0.22%) as unidentified. This visualises that, the scholars are more prone to cite the journals and or books emanated from home rather than abroad. This also may be due to the fact that, the international journals are out of reach which may be due to multiple problems such as, internet connectivity, limited availability of international journals and international books and journals are costly compared to national publications.

5.16 RANKING OF TOP CITED PLACES

Top cited places based on the citations have been depicted below in Table-15 supplemented with Graph-14 where, the scholar has listed out all the 441 places and the table further reflects in the decreasing sequence of the places covering both National and International. Further, all 441 places reflects 15 ranking orders showing the citation frequency and percentage thereof.

Table-15: Ranking of Top Cited Places

S/N	Rank	Name of Place	Citation Frequency	National/ International	%
1	1	New Delhi	166	National	37.64
2	2	London	43	International	9.75
3	3	New York	26	International	5.89
4	4	Ahmadabad	22	National	4.98
5	5	Manipur	18	National	4.08
6	6	Mizoram	13	National	2.94
7	7	Kolkata	11	National	2.49
8	8	Nagaland	10	National	2.26
9	9	Illinois	9	International	2.04
10	10	Guwahati	7	National	1.58
11	10	Mumbai	7	National	1.58
12	10	Shillong	7	National	1.58
13	11	Washington D.C	6	International	1.36
14	12	Allahabad	5	National	1.13
15	12	Bangalore	5	National	1.13
16	12	Jaipur	5	National	1.13
17	12	Ludhiana	5	National	1.13
18	13	Cambridge	4	International	0.90
19	13	Canada	4	International	0.90
20	13	Oxford	4	International	0.90
21	13	Westport	4	International	0.90
22	13	Jorhat	4	National	0.90
23	13	Tezpur	4	National	0.90
24	14	California	3	International	0.68
25	14	Hersley, PA	3	International	0.68
26	14	Paris	3	International	0.68
27	14	Orissa	3	National	0.68
28	14	Tiruchirappali	3	National	0.68
29	14	Varanasi	3	National	0.68
30	15	Amsterdam	2	International	0.45
31	15	Lexington, MA	2	International	0.45
32	15	Puducherry	2	National	0.45
33	16	28 places having 1 citation each	28	Both National and International	6.34
		Total	**441**		**99.86 or 100**



Graph-14: Ranking of Top Cited Places

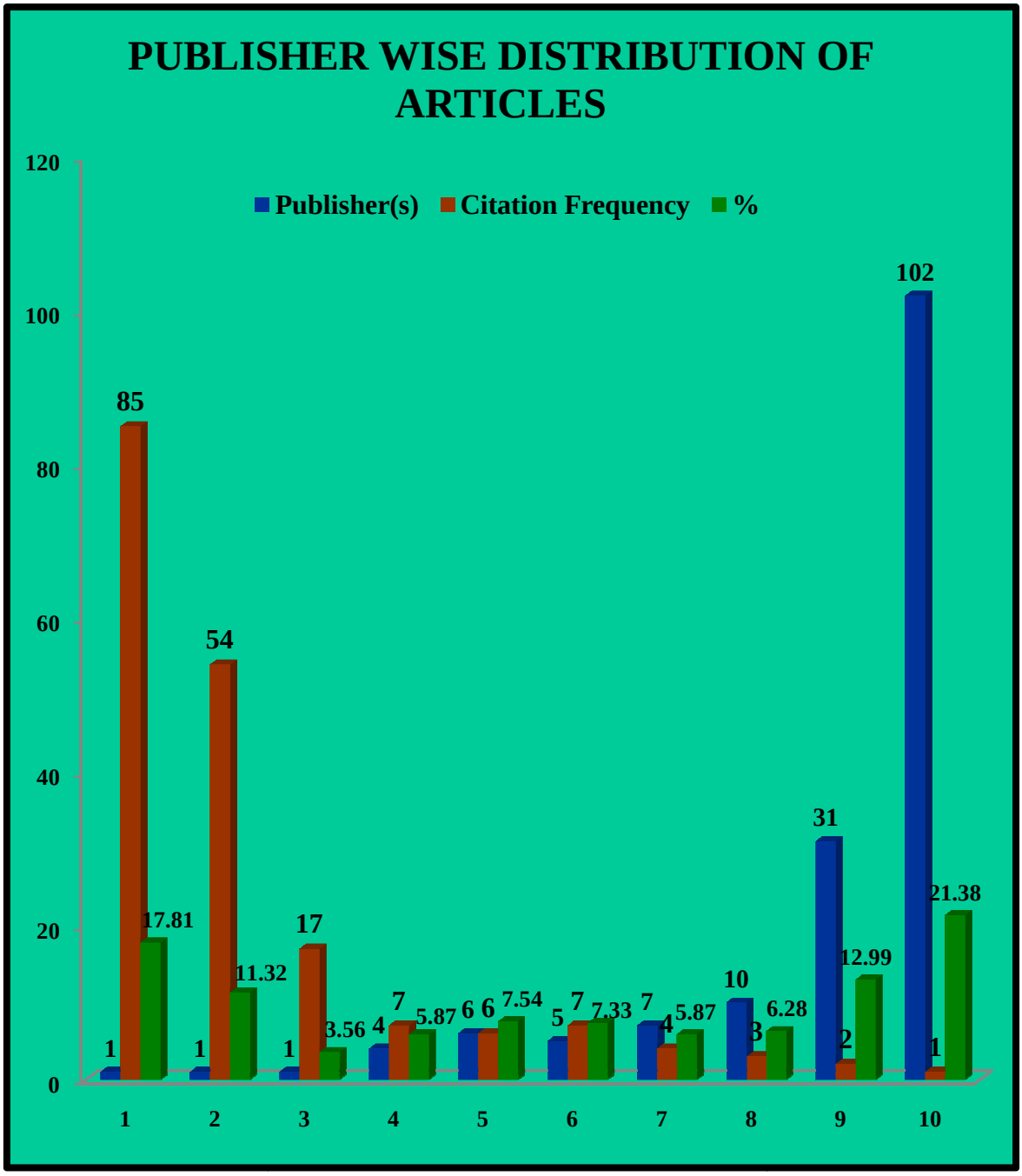
Analysis of all 441 places shown in Table-15 reflects that, New Delhi (National) has got maximum of 166 citations (37.64%) followed by London (International) having 43 citations (9.75%), New York (International) with 26 citations (5.89%), Ahmadabad (National) having 22 citations (4.98%), Manipur (National) 18 citations (4.08%), Mizoram (National) 13 citations (2.94%), Kolkata (National) 11 citations (2.49%), Nagaland (National) 10 citations (2.26%), Illinois (International) 9 citations (2.04%), Guwahati (National), Mumbai (National) and Shillong (National) 7 citations (1.58%) each, Washington D.C (International) 6 citations (1.36%), Allahabad (National), Bangalore (National), Jaipur (National) and Ludhiana (National) 5 citations (1.13%) each, Cambridge (International), Canada (International), Oxford (International), Westport (International), Jorhat (National) and Tezpur (National) 4 citations (0.90%) each, California (International), Hersley, PA (International), Paris (International), Orissa (National), Tiruchirappali (National) and Varanasi (National) 3 citations (0.68%) each, Amsterdam (International), Lexington, MA (International) and Puducherry (National) 2 citations (0.45%) each respectively constitute ranking order from 1 to 14 respectively. However, 28 places covering both national and international are having 1 citation each constituting thereby, 6.34%. The analysis further visualises that, the scholars while accessing library and internet come across wide range of information resources having value oriented research articles and authors throughout the globe contribute research output. It also visualises that, New Delhi happens to be centre of research publications for both books and journals.

5.17 PUBLISHER WISE DISTRIBUTION OF ARTICLES

Publishers-Wise Distribution of Articles of all the dissertations covered under the study has been placed in Table-16 supported with Graph-15 for clear understanding. The table reflects the number of times a publisher has been cited by the scholars. The table further enumerates the citation frequency in decreasing sequence showing their percentage and cumulative frequencies and percentage.

Table-16: Publisher-wise Distribution of Articles

S/N	Publisher(s)	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	1	85	17.81	85	17.81
2	1	54	11.32	139	29.14
3	1	17	3.56	156	32.70
4	4	7	5.87	184	38.57
5	6	6	7.54	220	46.12
6	5	7	7.33	255	53.45
7	7	4	5.87	283	59.32
8	10	3	6.28	313	65.61
9	31	2	12.99	375	78.61
10	102	1	21.38	477	100
Total	**158**	**477**	**99.95 or 100**		



Graph-15: Publisher-wise Distribution of Articles

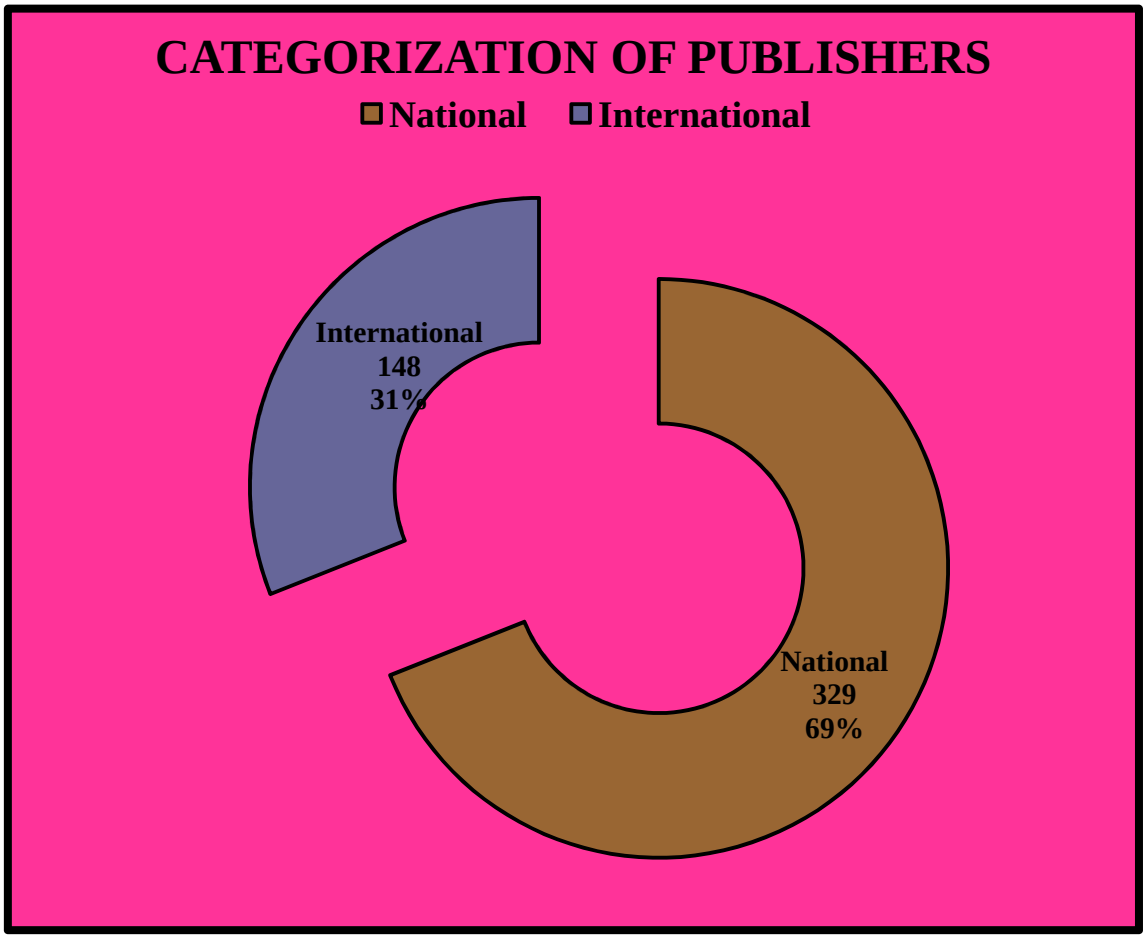
While analysing the Table-16 it reflects that, the scholars have cited 54 times, 40 times, 23 times, 22 times, 17 times from one publisher each constituting 11.32%, 8.38%, 4.82%, 4.61%, 3.56%, respectively out of a total number of 173 Publishers. Further the table shows that, 7 times 3 different publishers have been cited while, 6 times 6 publishers, 5 times 7 publishers, 4 times 8 publishers, 3 times 11 publishers, 2 times 31 number of publishers and 1 time 102 different publishers have been cited in the work constituting thereby 4.4%, 7.54%, 7.33%, 6.7%, 6.91%, 12.99%, 21.38% respectively. This shows the research publications of the journals and or books by the publishers both in national and international referred by the scholars in their dissertations.

5.18 CATEGORIZATION OF PUBLISHERS

Categorizations of Publishers are studied from among the cited articles by the scholars in their dissertations. Among the list of articles cited, a total of 477 citations from 158 publishers were cited by the scholars. Categorization of Publisher has been classified into two types such as, National and International and has been listed in decreasing order of their citing frequency in Table-17 supported with Graph 16 for clear understanding.

Table-17: Categorization of Publishers

S/N	Type	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	National	329	68.97	329	68.97
2	International	148	31.02	477	100
	Total	**477**	**99.99 or 100**		



Graph-16: Categorization of Publishers

In all 15 M.Phil dissertations, a total number of 1116 citations were examined where the scholar identified 477 citations from 158 different places in total that constitute both national and international. Analysis of the Table-17 reveals that, there are 329 citations that constitute national status i.e., 68.97% followed by 148 citations having international status that constitute 31.02%. This visualises that, the scholars are more prone to cite the journals and or books emanated from home rather than abroad. This also may be due to the fact that, the international books or journals are less in the library compared to national publications of books and or journals.

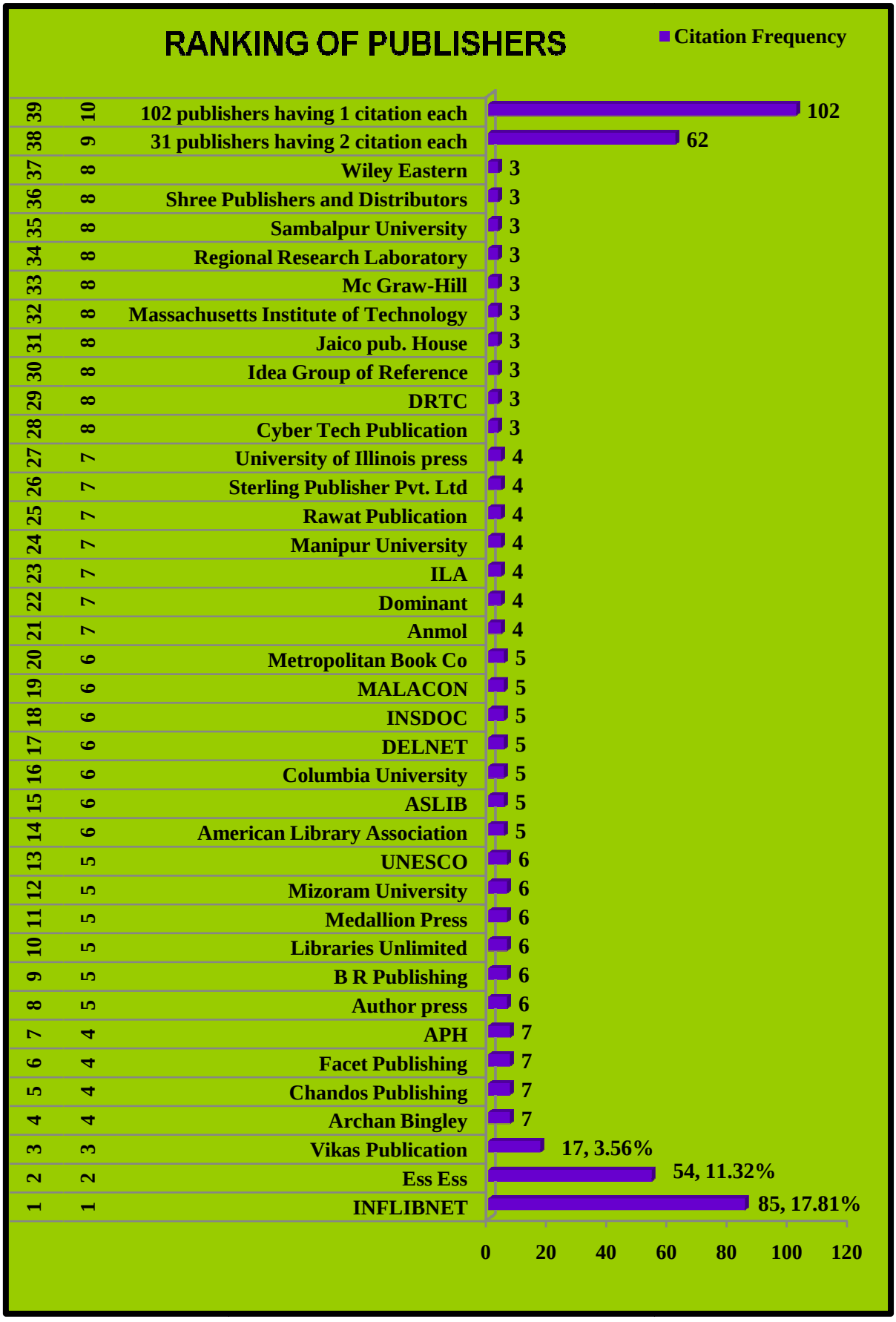
5.19 RANKING OF PUBLISHERS

The publishers use to publish value added research articles in their journals and books. Highly cited articles are a common parameter for measuring the relative importance of a publication which may be either journal or book or both. It is also determines the resourcefulness of the books or journals which add substantial value for researchers. Citations across the dissertations constitute 477 Library and Information Science books, Proceedings of the Seminars, Reports, Theses, Dissertation, and Articles on website, e-books etc. and the various forms of publications are listed in decreasing order of their frequency of citations in Table-18 showing the national/international status with Graph-17 with clear visualization.

Table-18: Ranking of Publishers

S/N	Rank	Name of Publisher	Citation Frequency	National/ International	%
1	1	INFLIBNET	85	National	17.81
2	2	Ess Ess	54	National	11.32
3	3	Vikas Publication	17	National	3.56
4	4	Archan Bingley	7	International	1.46
5	4	Chandos Publishing	7	National	1.46
6	4	Facet Publishing	7	International	1.46
7	4	APH	7	National	1.46
8	5	Author press	6	National	1.25
9	5	B R Publishing	6	National	1.25
10	5	Libraries Unlimited	6	International	1.25
11	5	Medallion Press	6	International	1.25
12	5	Mizoram University	6	National	1.25
13	5	UNESCO	6	International	1.25
14	6	American Library Association	5	International	1.04
15	6	ASLIB	5	International	1.04
16	6	Columbia University	5	International	1.04
17	6	DELNET	5	National	1.04

18	6	INSDOC	5	National	1.04
19	6	MALACON	5	National	1.04
20	6	Metropolitan Book Co	5	National	1.04
21	7	Anmol	4	National	0.83
22	7	Dominant	4	National	0.83
23	7	ILA	4	National	0.83
24	7	Manipur University	4	National	0.83
25	7	Rawat Publication	4	National	0.83
26	7	Sterling Publisher Pvt. Ltd	4	National	0.83
27	7	University of Illinois press	4	International	0.83
28	8	Cyber Tech Publication	3	National	0.62
29	8	DRTC	3	National	0.62
30	8	Idea Group of Reference	3		0.62
31	8	Jaico pub. House	3	National	0.62
32	8	Massachusetts institute of Technology	3	International	0.62
33	8	Mc Graw-Hill	3	International	0.62
34	8	Regional Research Laboratory	3	National	0.62
35	8	Sambalpur University	3	National	0.62
36	8	Shree Publishers and Distributors	3	National	0.62
37	8	Wiley Eastern	3	National	0.62
38	9	31 publishers having 2 citation each	62	Both National and International	12.99
39	10	102 publishers having 1 citation each	102	Both National and International	21.38
		Total	**477**		**99.69 or 100**



Graph-17: Ranking of Publishers

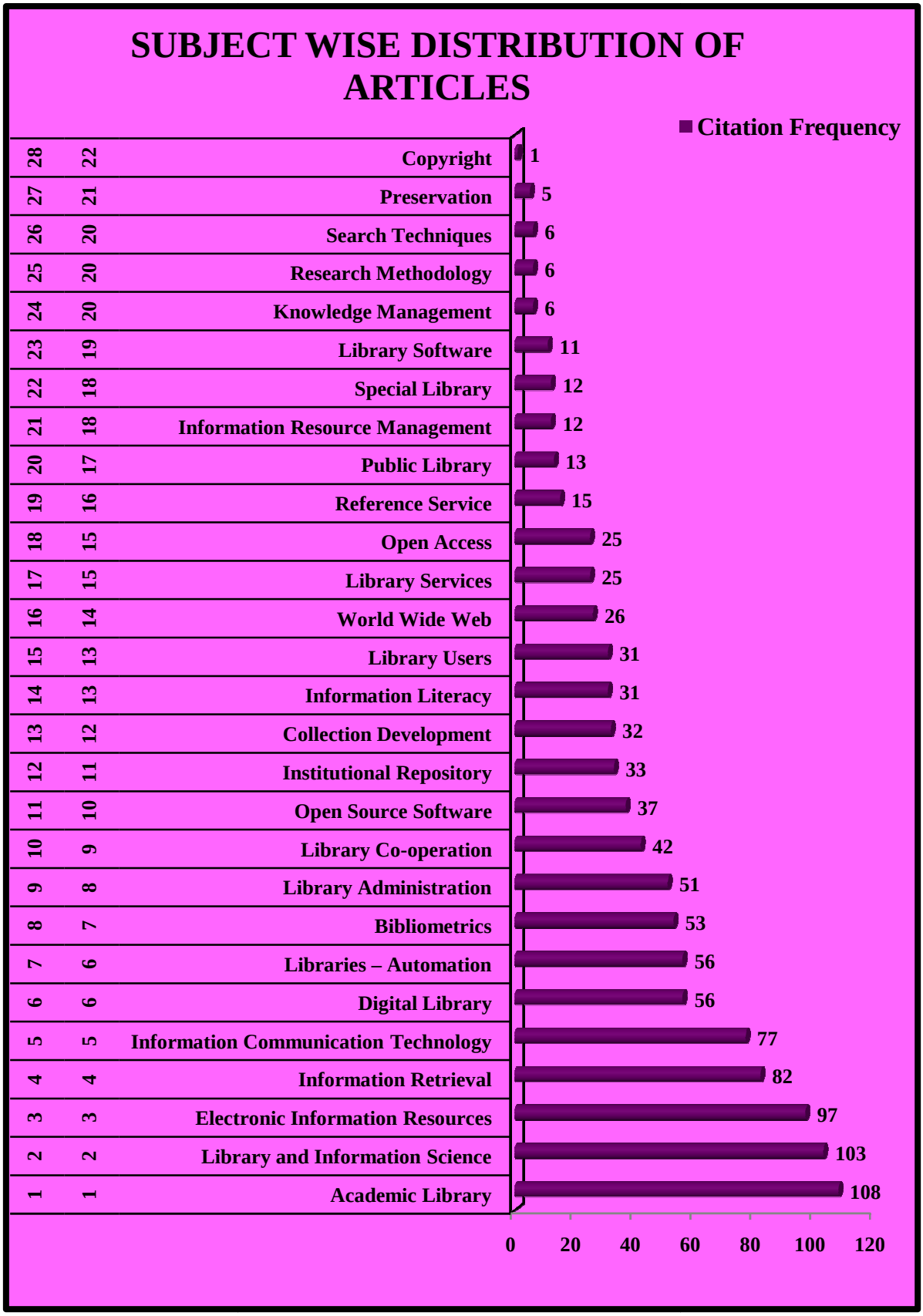
The scholar on analysis of the above Table-18 observed that out of the total 477 citations of books and other forms of documents excluding the journals articles, the scholars have cited INFLIBNET 85 citations (17.81%) followed by Ess Ess with 54 citations (11.32%), Vikas 17 (3.56%) citations, APH, Archan Bingley, Chandos and Facet 7 (1.46%) citations each, Author Press, B R Publishing, Libraries Unlimited, Medallion Press, Mizoram University and UNESCO with 6 (1.25%) citations each, American Library Association, ASLIB, Columbia University, DELNET, INSDOC, MALACON, and Metropolitan Book Co. has 5 (1.04%) citations each, Anmol, Dominant, ILA, Manipur University, and Rawat Publication, Sterling Publisher Pvt. Ltd., and University of Illinois Press has 4 (0.83%) citations each, Cyber Tech Publication, DRTC, Idea Group of Reference, Jaico Pub. House, Massachusetts Institute of Technology, McGraw-Hill, Regional Research Laboratory, Sambalpur University, Shree Publishers and Distributors and Wiley Eastern are having 3 (0.62%) citations each and 31different publishers from both national and international are having 2 citations each forming thereby 62 citations (12.99%) and 102 different publishers each having 1 citation forming thereby, 21.38%. It is interesting to note that in spite of having a wide range of resources especially books in the library, the scholars in library and information science do prefer to use the publications of INFLIBNET followed by Ess Ess and Vikas which otherwise can be mentioned that the three publishers bring out the high rated research books in the subject.

5.20 SUBJECT WISE DISTRIBUTION OF ARTICLES

Subject Wise Distribution of Articles is studied from among the cited articles by the scholars in their dissertations. Among the list of articles cited, a total of 1052 titles were cited by the scholars. The titles of the articles were classified in to different sub facets of the broad subject area of Library and Information Science. Library of Congress Subject Heading and Sears List of Subject Heading were used to determine the subject headings. A total number of 28 subject areas of Library and Information Science were determined which has been reflected below in decreasing order of their citing frequency in Table-19 supplemented with Graph-18 for clear understanding.

Table-19: Subject Wise Distribution of Articles

S/N	Rank	Subject	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	1	Academic Library	108	10.26	108	10.26
2	2	Library and Information Science	103	9.79	211	20.05
3	3	Electronic Information Resources	97	9.22	308	29.27
4	4	Information Retrieval	82	7.79	390	37.07
5	5	Information Communication Technology	77	7.31	467	44.39
6	6	Digital Library	56	5.32	523	49.71
7	6	Libraries – Automation	56	5.32	579	55.03
8	7	Bibliometrics	53	5.03	632	60.07
9	8	Library Administration	51	4.84	683	64.92
10	9	Library Co-operation	42	3.99	725	68.91
11	10	Open Source Software	37	3.51	762	72.43
12	11	Institutional Repository	33	3.13	795	75.57
13	12	Collection Development	32	3.04	827	78.61
14	13	Information Literacy	31	2.94	858	81.55
15	13	Library Users	31	2.94	889	84.50
16	14	World Wide Web	26	2.47	915	86.97
17	15	Library Services	25	2.37	940	89.35
18	15	Open Access	25	2.37	965	91.73
19	16	Reference Service	15	1.42	980	93.15
20	17	Public Library	13	1.23	993	94.39
21	18	Information Resource Management	12	1.14	1005	95.53
22	18	Special Library	12	1.14	1017	96.67
23	19	Library Software	11	1.04	1028	97.71
24	20	Knowledge Management	6	0.57	1034	98.28
25	20	Research Methodology	6	0.57	1040	98.85
26	20	Search Techniques	6	0.57	1046	99.42
27	21	Preservation	5	0.47	1051	99.90
28	22	Copyright	1	0.09	1052	100
		Total	**1052**	**99.88 or 100**		



Graph-18: Subject Wise Distribution of Articles

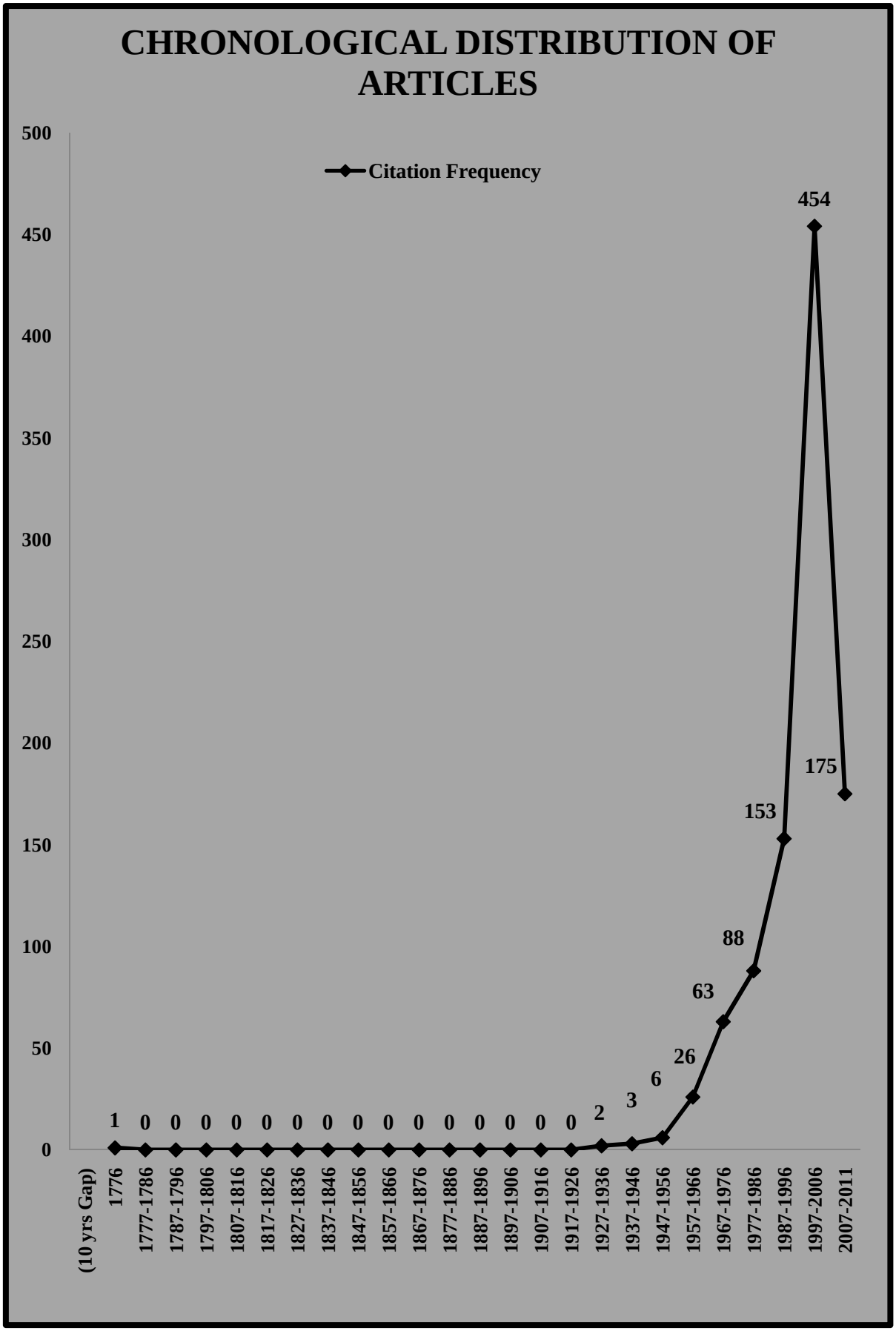
Analysis of the Table-19 shows that while, Academic Library is the highest 108 (10.26%) citations by the scholars in their dissertations in the subject-wise distribution, Library and Information Science has 103 (9.76%) citations and Electronic Information Resources has 97 (9.22%) citations and thus, it forms 1st, 2nd and 3rd in the ranking order respectively. The other subjects covered by the scholars in their dissertations include, Information Retrieval with 82 (7.79%) citations followed by, Information Communication Technology 77 (7.31%) citations, Digital Library and Library Automation 56 (5.32%) citations, Bibliometrics 53 (5.03%) citations, Library Administration 51 (4.84%) citations, Library Cooperation 42 (3.99%) citations, Open Source Software 37 (3.51%) citations, Institutional Repository 33 (3.12%) citations, Collection Development 32 (3.04%) citations, Library Users and Information Literacy 31 (2.94%) citations, World Wide Web 26 (2.47%) citations, Open Access and Library Services 25 (2.37%) citations, Reference Service 15 (1.42%) citations, Public Library 13 (1.23%) citations, Information Resource Management and Special Library 12 (1.14%) citations, Library Software 11 (1.04%) citations, Knowledge Management, Research Methodology and Search Techniques each having 6 (0.57%) citations, Preservation 5 (0.47%) citations and Copyright 1 (0.09%) citation. This also shows the research trends which, however, cannot be generalised in research.

5.21 CHRONOLOGICAL DISTRIBUTION OF ARTICLES

The chronological distributions of articles cited by the scholars in their dissertation work have been depicted below in Table-20 supplemented with Graph-19. This is also one of the major components of the study to determine the research value of a journal including the obsolescence of literature in a given field of study. The total periods commencing from 1776 to 2011 have been split into 25 groups with a gap of 10 years in between each showing the citation frequency and the percentage thereof including the cumulative frequencies and its percentage.

Table-20: Chronological Distribution of Articles

S/N	Year (10 yrs Gap)	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	1776	1	0.1	1	0.1
2	1777-1786	0	0	1	0.1
3	1787-1796	0	0	1	0.1
4	1797-1806	0	0	1	0.1
5	1807-1816	0	0	1	0.1
6	1817-1826	0	0	1	0.1
7	1827-1836	0	0	1	0.1
8	1837-1846	0	0	1	0.1
9	1847-1856	0	0	1	0.1
10	1857-1866	0	0	1	0.1
11	1867-1876	0	0	1	0.1
12	1877-1886	0	0	1	0.1
13	1887-1896	0	0	1	0.1
14	1897-1906	0	0	1	0.1
15	1907-1916	0	0	1	0.1
16	1917-1926	0	0	1	0.1
17	1927-1936	2	0.2	3	0.3
18	1937-1946	3	0.3	6	0.61
19	1947-1956	6	0.61	12	1.23
20	1957-1966	26	2.67	38	3.91
21	1967-1976	63	6.48	101	10.4
22	1977-1986	88	9.06	189	19.46
23	1987-1996	153	15.75	342	35.22
24	1997-2006	454	46.75	796	81.97
25	2007-2011	175	18.02	971	100
	Total	**971**	**99.94 or 100**		



Graph-19: Chronological Distribution of Articles

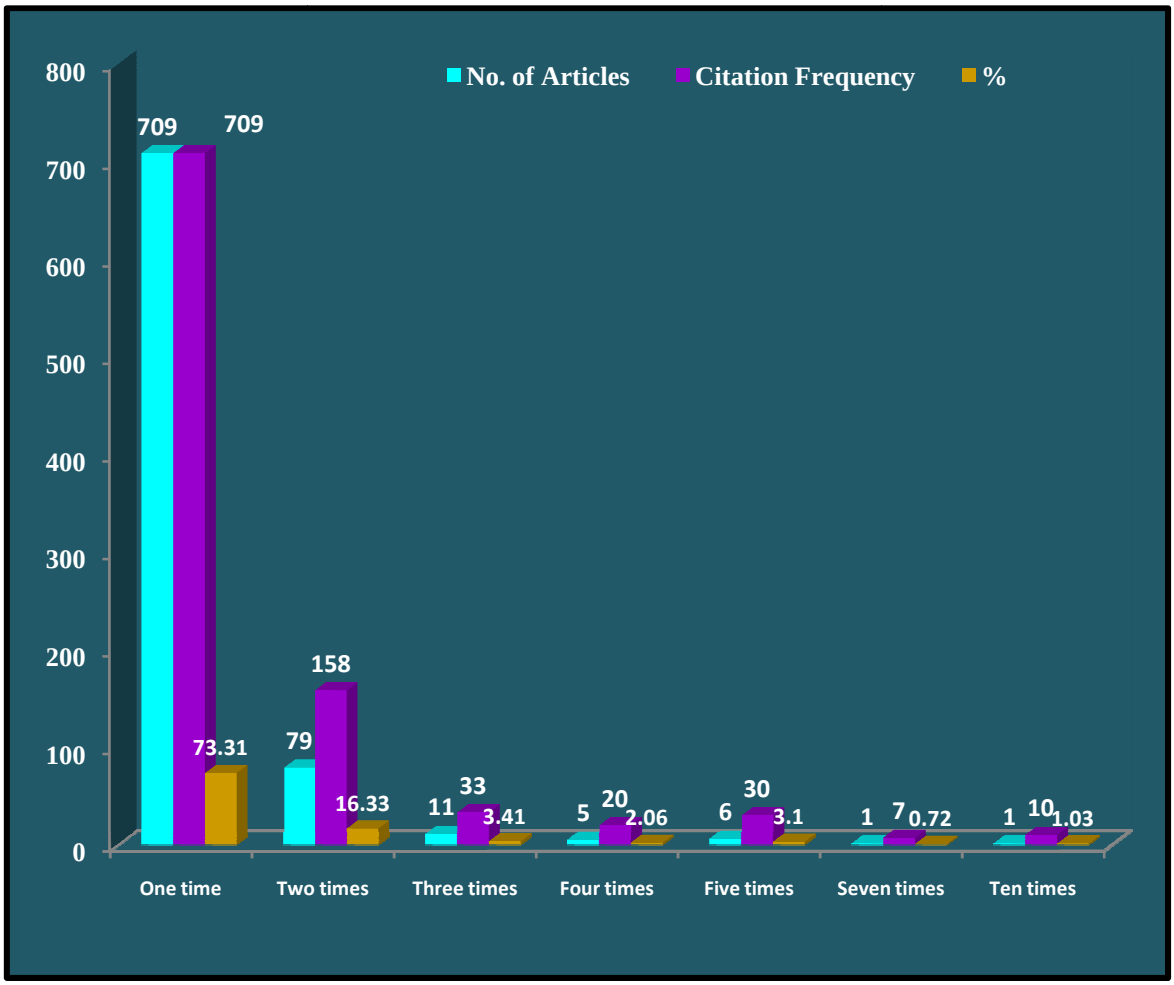
The analysis of the chronological distributions of the articles placed in Table-20 shows that, in between 1997-2006 there is a high citation rate i.e. 454 (46.75%) out of 971 followed by 175 citations (18.02%) in between 2007-2011 and 153 citations (15.75%) during 1987-1996 and thus keeps 1st, 2nd, 3rd respectively. It is surprising to know that the number of citation increased from 6 (0.61%) to 26 (2.67%) during 1957-1966and chronologically it went on exceeding the number of citation till 1986.Again, it could be pointed out that 1777 till 1926 that there is a gap of 150 years there is absolutely no citation, which may be due to the fact that either the research output during the period is negligible or the documents of any type are available in the library or may not be having any research value of the articles either in books or journal even if it is present. However, the library should take measures in withdrawing the documents available from 1777 till 1926 and the current year documents be placed for access to the users. It also can be deduced that the research importance of the articles increases in the light of present trends which is visible from the present study.

5.22 APPLICATION OF LOTKA'S LAW OF SCIENTIFIC PRODUCTIVITY

Lotka's law is the earliest and most widely-applied study in measuring the scientific productivity of an author. Lotka claims that a large proportion of the literature is produced by a small number of authors. Application of Lotka's Law of Scientific productivity of the study has been reflected in Table-21 supported with Graph-20 for clear understanding.

Table-21: Application of Lotka's Law of Scientific Productivity

S/N	Type of Author	No. of Articles	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	One time	709	709	73.31	709	73.31
2	Two times	79	158	16.33	867	89.65
3	Three times	11	33	3.41	900	93.07
4	Four times	5	20	2.06	920	95.13
5	Five times	6	30	3.10	950	98.24
6	Seven times	1	7	0.72	957	98.96
7	Ten times	1	10	1.03	967	100
	Total	**812**	**967**	**99.96 or 100**		



Graph-20: Lotka's Law of Scientific Productivity

Maximum numbers of authors contributed a single article 709 (73.31%). This is followed by authors who contributed two times 79 (16.33%), three times authors contributed 11 (3.41%) of the total articles, authors who contributed four times 5 (2.06%) articles, author who contributed five times 6 (3.10%) articles and the authors who contributed seven and ten times remains the same in number that is 1 (0.72%) and (1.03%). The total citation frequency i.e. 967 are from 812 number of articles has been spelled in the type of author i.e. one time two times, three times etc. and up to 10 times. Lotka's Law of Scientific Productivity (authors publishing in a certain discipline) where the Law describes the frequency of publication by authors in a given field. It states that " . . . the number (of authors) making n contributions is about $1/n^2$ of those making one; and the proportion of all contributors, that make a single contribution, is about 60 percent". Moreover the frequency distributions of the author productivity match the generalized Lotka's Law.

Table-21 represents author productivity data for Lotka's law. Of the 967 unique author names, 709 (73.31%) produced one article, 79 (16.33%) produced two articles, 11 (3.41%) produced three articles, 5 (2.06%) produced four articles, 6 (3.10%) produced five articles, 1 (0.72%) produced Seven articles and 1 (1.03%) produced 10 articles.

5.23 APPLICATION OF BRADFORD'S LAW OF SCATTERING

Taking Bradford's Law of Scattering into account that predicts the increasing productivity of Journals from one zone to the next (in expression 1: n: n^2), the total numbers of citations can be divided into three equal zones (Hertzel, 2010, p.560-573). It was found that, approximation the first zone containing 6 journals which are considered as Bradford's core journals. The second quantum of citations forming the second zone contained in approximately next 18 journals and the last quantum of citations contained in next 99 journals. Hence, the distribution partially complies with Bradford's Law. The zone wise distribution of journals is depicted in Table-22 and Table 22-A, supported with Graph-21 for clear visualization.

Table-22: Application of Bradford's Law of Scattering

S/N	Zone	Name of Journal	Citation Frequency	%	log	% as log value
1	1	IASLIC Bulletin	39	8.64	1.59106461	0.936513742
2	1	Library Herald	38	8.42	1.5797836	0.925312091
3	1	ILA Bulletin	28	6.2	1.44715803	0.792391689
4	1	Herald of Library Science	24	5.32	1.44715803	0.725911632
5	1	Annals of Library and Information Studies	19	4.21	1.2787536	0.624282096
6	1	Journal of Documentation	15	3.32	1.17609126	0.521138084
7	2	D-Lib Magazine	14	3.10	1.14612804	0.519827994
8	2	Journal of Librarianship & Information Science	14	3.10	1.14612804	0.519827994
9	2	The electronic Library	13	2.88	1.11394335	0.459392488
10	2	Library and Information Science Research	12	2.66	1.07918125	0.424881637
11	2	SRELS Journal of Information Management	12	2.66	1.07918125	0.424881637
12	2	Annals of Library Science and Documentation	9	1.99	0.95424251	0.298853076
13	2	DESIDOC Bulletin of Information Technology	7	1.55	0.84509804	0.190331698
14	2	Journal of Library Administration	7	1.55	0.84509804	0.190331698
15	2	Library Hi Tech	7	1.55	0.84509804	0.190331698
16	2	ASLIB Proceeding	6	1.33	0.77815125	0.123851641
17	2	Collection Building	6	1.33	0.77815125	0.123851641
18	2	College and Research Libraries	6	1.33	0.77815125	0.123851641
19	2	Journal of the	6	1.33	0.77815125	0.123851641

		American Society for Information Science				
20	2	Annual Review of Information Science and Technology	5	1.10	0.69897	0.045322979
21	2	Information Technology & Libraries	5	1.10	0.69897	0.045322979
22	2	Library Review	5	1.10	0.69897	0.045322979
23	2	The Serials Librarian	5	1.10	0.69897	0.045322979
24	2	University News	5	1.10	0.69897	0.045322979
25	3	Library Progress	4	0.88	0.60205999	-0.05551733
26	3	Online Information Review	4	0.88	0.60205999	-0.05551733
27	3	Portal: Libraries and the Academy	4	0.88	0.60205999	-0.05551733
28	3	Reference and Use Services Quarterly	4	0.88	0.60205999	-0.05551733
29	3	Bulletin of Medical Library Association	3	0.66	0.47712125	-0.18045606
30	3	Cataloguing & Classification Quarterly	3	0.66	0.47712125	-0.18045606
31	3	Collection Management	3	0.66	0.47712125	-0.18045606
32	3	Computer in libraries	3	0.66	0.47712125	-0.18045606
33	3	Library gee Eehou	3	0.66	0.47712125	-0.18045606
34	3	Library Quarterly	3	0.66	0.47712125	-0.18045606
35	3	Library Trends	3	0.66	0.47712125	-0.18045606
36	3	New Library World	3	0.66	0.47712125	-0.18045606
37	3	The Journal of Academic Librarianship	3	0.66	0.47712125	-0.18045606
38	3	15 journals having 2 citations each	30	6.65	1.47712125	0.822821645
39	3	71 journals having 1 citation each	71	15.74	1.85125835	1.197004728
		Total	**451**	**99.82 or 100**		

The distribution of journals according to the Bradford's predicted zones (on an approximation) are: Zone-1: 6 journals (163 citations), Zone-2: 18 journals (144 citations), Zone-3: 99 journals (144 citations).

Table-22A: The distribution of journals according to the Bradford's predicted zones

S/N	Zone	No. of Journals	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	1	6	163	36.14	163	36.14
2	2	18	144	31.92	307	68.07
3	3	99	144	31.92	451	100
	Total	**123**	**451**	**99.98 or 100**		

The analysis of Table-22 and Table-22A reflects that the distribution of articles in Zone-1 consists of 6 journals which constitute 36.14% out of 123 journals and has the highest citations i.e. 163 among the other zones. Zone-2 consists of 18 journals i.e.31.92% having 144 citations and Zone-3 consists of 99 journals i.e. 31.92% having 144 citations. According to Bradford, the zones, thus identified will form an approximately geometric series in the form of 1: n: n^2. But it is found that the relationship of each zone in the present study is 6: 18: 99 = 6: 6x3: 6x4^2 = 6: 18: 96 = 1: 3: 2^4

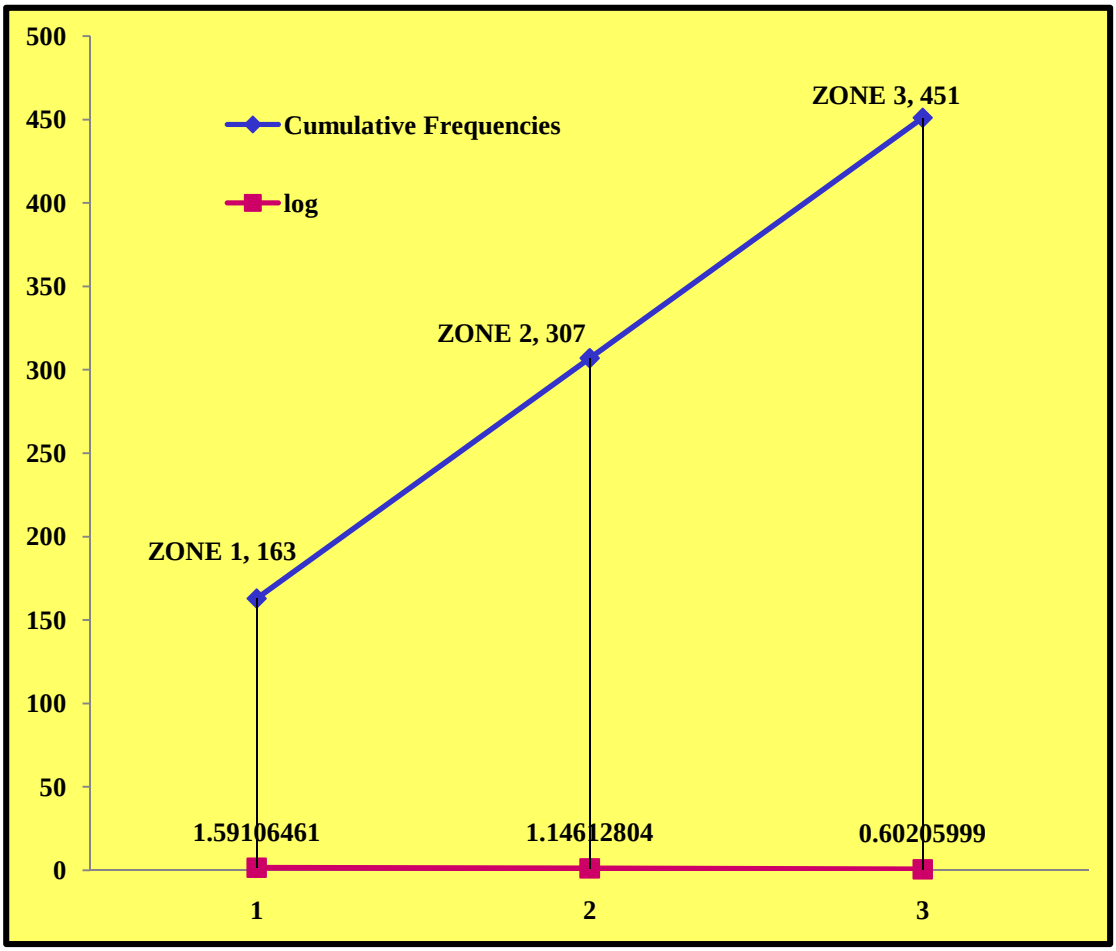
When 6 = n, then 1: n: n^4

This does not fit into Bradford's distribution.

Graphical Formulation

The Graph-21 is a logarithmic plot of cumulative number of journal titles and the cumulative number of citations. If the distribution confirms Bradford's law, it would automatically display the characteristics of three clear distinct regions such as:

- ⇛ Rapid rise for the first few points
- ⇛ A major portion of linear relation between two variables and
- ⇛ A 'droop' at the end of the distribution indicating the incompleteness of the bibliography.



Graph-21: The distribution of journals according to the Bradford's predicted zones

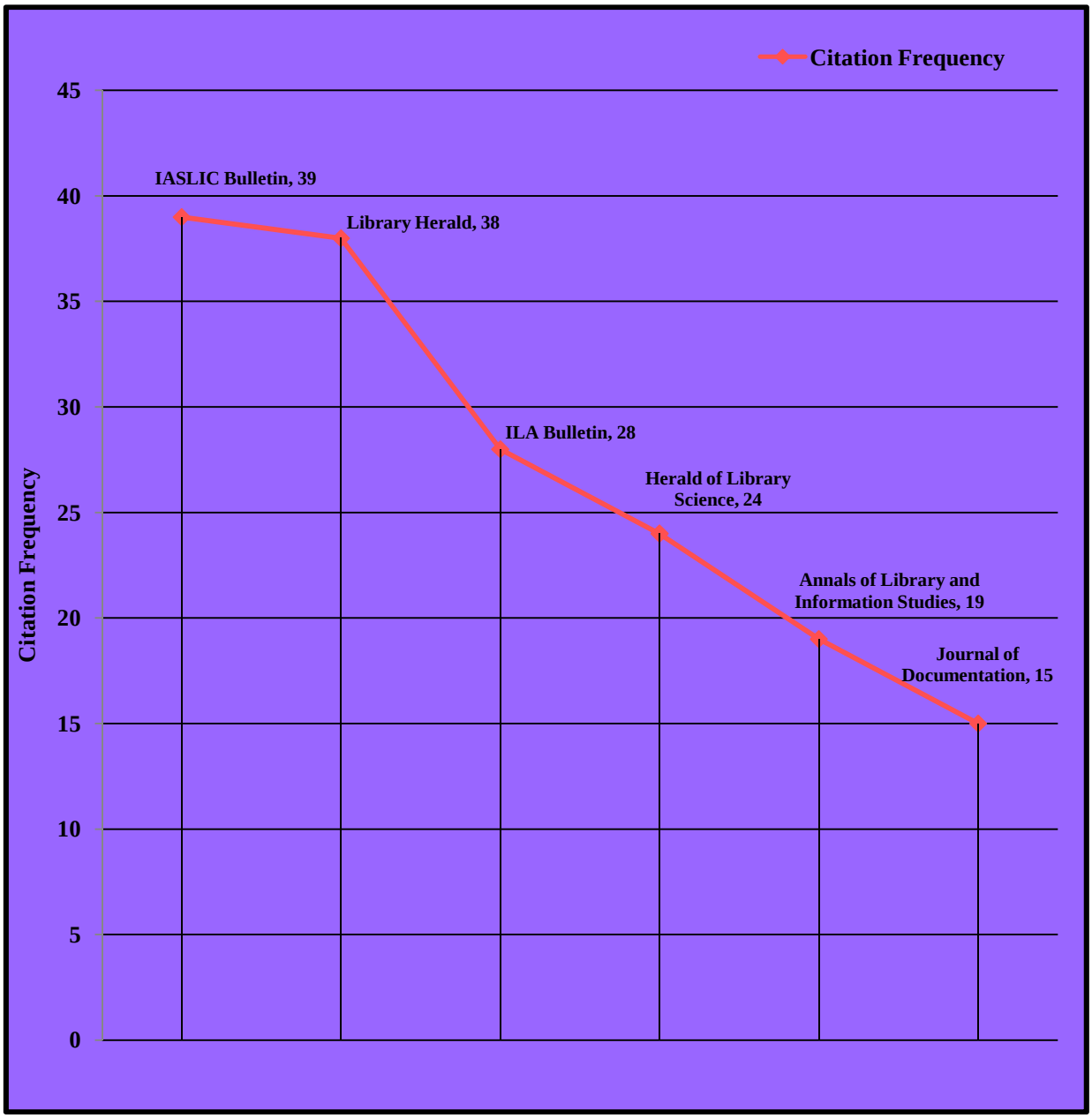
The graph visualises a steep rise of initially as shown in the table 22 and 22A and thereafter, an almost steady straight line is observed. The Bradford's 'groos droop' is partially present. This could be due to the fact that the citations covered in the study are less. The graphical presentation of Bradford's zone is thus valid.

5.23.1 ZONE-1 (NUCLEUS ZONE) DISTRIBUTION OF ARTICLES

Zone-1 distributions of articles are studied among the cited articles from national and international journals. There are 6 journals included in zone-1 which considered as Bradford's core journals constituting 163 (36.14%) citations in total and are listed in decreasing order of their frequency of citations in Table-23 with Graph-22 with clear visualization. The table also shows the percentage, cumulative frequencies and percentage along with log and percentage as log value.

Table-23: Zone-1 (Nucleus Zone) Distribution of Articles

S/N	Name of Journal	Citation Frequency	%	Cumulative Frequencies	Cumulative %	Log	% as Log value
1	IASLIC Bulletin	39	8.64	39	8.64	1.59106461	0.936513742
2	Library Herald	38	8.42	77	17.07	1.5797836	0.925312091
3	ILA Bulletin	28	6.20	105	23.28	1.44715803	0.792391689
4	Herald of Library Science	24	5.32	129	28.60	1.44715803	0.725911632
5	Annals of Library and Information Studies	19	4.21	148	32.81	1.2787536	0.624282096
6	Journal of Documentation	15	3.32	163	36.14	1.17609126	0.521138084



Graph-22: Zone-1 (Nucleus Zone) Distribution of Articles

Analysis of Table-23 reflects that IASLIC Bulletin stands at the apex because of 39 citations (8.64%) out of 123 journals followed by 38 times (8.42%), 28 times (6.20%), 24 times (5.32%), 19 times (4.21%), 15 times each for 1 journal. This shows the significance of the research articles of the journals.

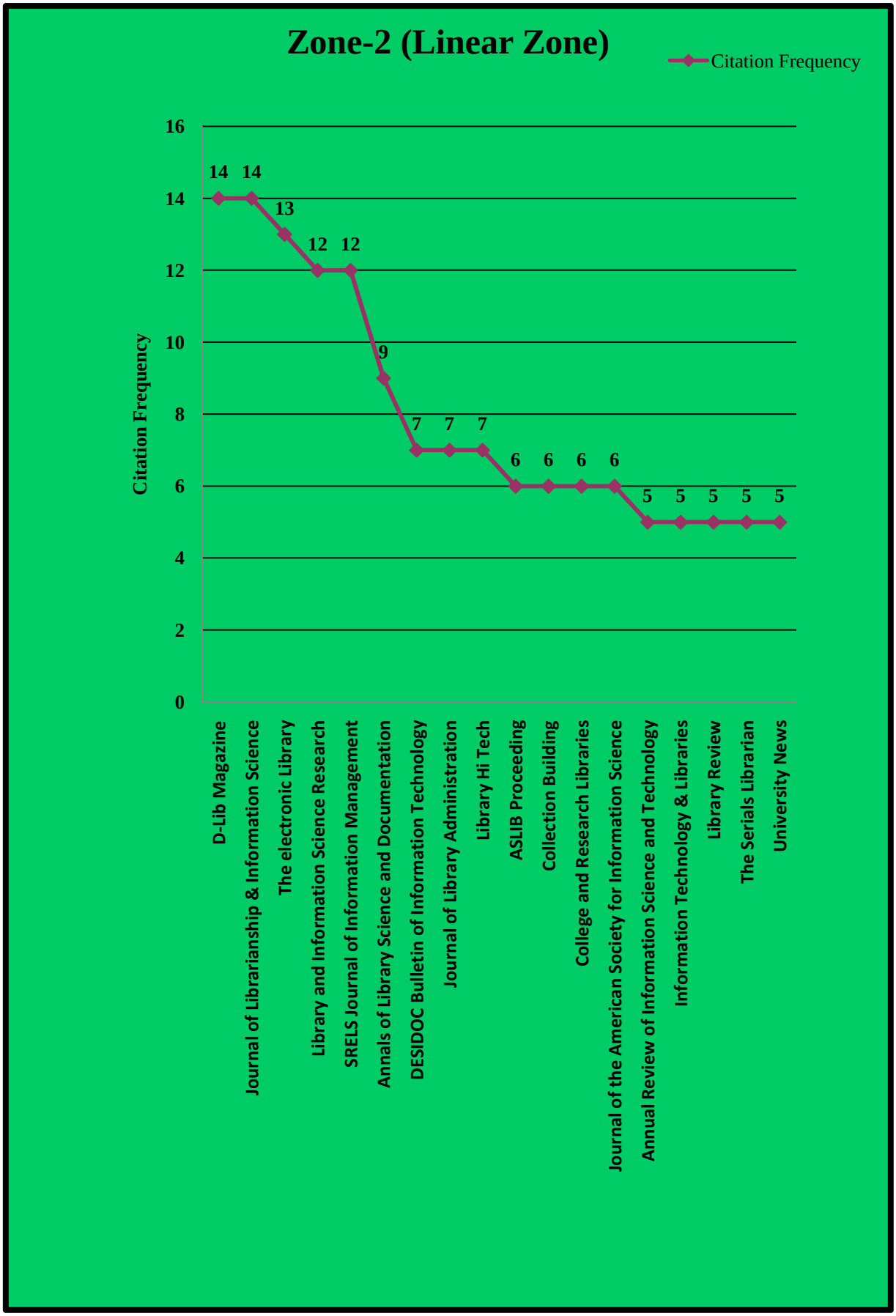
5.23.2 ZONE-2 (LINEAR ZONE) DISTRIBUTION OF ARTICLES

Zone-2 distributions of articles are studied among the cited articles from national and international journals. There are 18 journals included in zone-2 constituting 144 (31.92%) citations in total and are listed in decreasing order of their frequency of citations in Table 24 with Graph-23 with clear visualization. The table also shows the percentage, cumulative frequencies and percentage along with log and percentage as log value.

Table-24: Zone-2 (Linear Zone) Distribution of Articles

S/N	Name of Journal	Citation Frequency	%	Cumulative Frequencies	Cumulative %	Log	% as Log value
1	D-Lib Magazine	14	3.10	14	3.10	1.14612804	0.519827994
2	Journal of Librarianship & Information Science	14	3.10	28	6.20	1.14612804	0.519827994
3	The electronic Library	13	2.88	41	9.09	1.11394335	0.459392488
4	Library and Information Science Research	12	2.66	53	11.75	1.07918125	0.424881637
5	SRELS Journal of Information Management	12	2.66	65	14.41	1.07918125	0.424881637
6	Annals of Library Science and Documentation	9	1.99	74	16.40	0.95424251	0.298853076
7	DESIDOC Bulletin of Information Technology	7	1.55	81	17.96	0.84509804	0.190331698
8	Journal of Library Administration	7	1.55	88	19.51	0.84509804	0.190331698
9	Library Hi Tech	7	1.55	95	21.06	0.84509804	0.190331698
10	ASLIB Proceeding	6	1.33	101	22.39	0.77815125	0.123851641
11	Collection Building	6	1.33	107	23.72	0.77815125	0.123851641
12	College and Research Libraries	6	1.33	113	25.05	0.77815125	0.123851641
13	Journal of the American Society for	6	1.33	119	26.38	0.77815125	0.123851641

	Information Science						
14	Annual Review of Information Science and Technology	5	1.10	124	27.49	0.69897	0.045322979
15	Information Technology & Libraries	5	1.10	129	28.60	0.69897	0.045322979
16	Library Review	5	1.10	134	29.71	0.69897	0.045322979
17	The Serials Librarian	5	1.10	139	30.82	0.69897	0.045322979
18	University News	5	1.10	144	31.92	0.69897	0.045322979



Graph-23: Zone-2 (Linear Zone) Distribution of Articles

Analysis of Table-24 reflects that D-Lib Magazine and Journal of Librarianship and Information Science each having 14 (3.10%) citations, The Electronic Library having 13 (2.88%) citations, Library and Information Science Research and SRELS Journals of Information Management having 12 (2.66%) citations each, Annals of Library Science and Documentation having 9 (1.99%) citations, DESIDOC Bulletin of Information Technology, Journal of Library Administration and Library Hi Tech each having 7 (1.55%) citations, ASLIB Proceeding, Collection Building, College & Research Libraries, Journal of American Society for Information Science having 6 (1.33%) citations each, Annual Review of Information Science and Technology, Information Technology and Libraries, Library Review, The Serials Librarians and University News having 5 citations (1.10%) each. This shows the significance of the research articles of the journals.

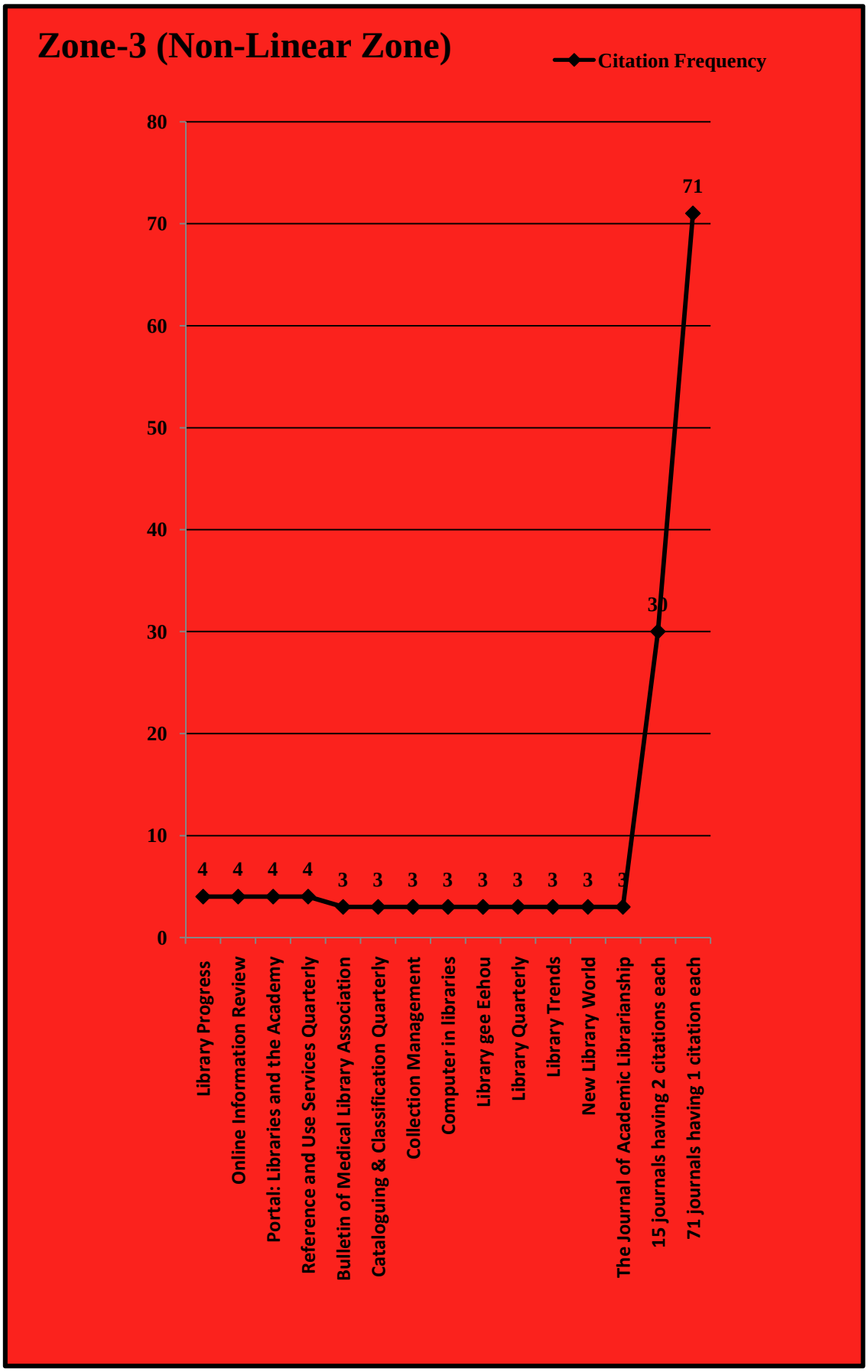
5.23.3 ZONE-3 (NON-LINEAR ZONE) DISTRIBUTION OF ARTICLES

Zone-3 distributions of articles are studied among the cited articles from national and international journals. There are 99 journals included in zone-3 constituting 144 (31.92%) citations in total and are listed in decreasing order of their frequency of citations in Table 25 with Graph-24 with clear visualization. The table also shows the percentage, cumulative frequencies and percentage along with log and percentage as log value.

Table-25: Zone-3 (Non-Linear Zone) Distribution of Articles

S/N	Name of Journal	Citation Frequency	%	Cumulative Frequencies	Cumulative %	Log	% as Log value
1	Library Progress	4	0.88	4	0.88	0.60205999	-0.05551733
2	Online Information Review	4	0.88	8	1.77	0.60205999	-0.05551733
3	Portal: Libraries and the Academy	4	0.88	12	2.66	0.60205999	-0.05551733
4	Reference and Use Services Quarterly	4	0.88	16	3.54	0.60205999	-0.05551733
5	Bulletin of Medical Library Association	3	0.66	19	4.21	0.47712125	-0.18045606
6	Cataloguing & Classification	3	0.66	22	4.87	0.47712125	-0.18045606

	Quarterly						
7	Collection Management	3	0.66	25	5.54	0.47712125	-0.18045606
8	Computer in libraries	3	0.66	28	6.20	0.47712125	-0.18045606
9	Library gee Eehou	3	0.66	31	6.87	0.47712125	-0.18045606
10	Library Quarterly	3	0.66	34	7.53	0.47712125	-0.18045606
11	Library Trends	3	0.66	37	8.20	0.47712125	-0.18045606
12	New Library World	3	0.66	40	8.86	0.47712125	-0.18045606
13	The Journal of Academic Librariansh ip	3	0.66	43	9.53	0.47712125	-0.18045606
14	15 journals having 2 citations each	30	6.65	73	16.18	1.47712125	0.822821645
	71 journals having 1 citation each	71	15.74	144	31.92	1.85125835	1.197004728



Graph-24: Zone-3 (Non-Linear Zone) Distribution of Articles

Analysis of Table-25 reflects that Library Progress, Online Information Review, Portal: Libraries and the Academic, Reference and Use Services Quarterly having 4 citations (0.88%) each, Bulletin of Medical Library Association, Cataloguing & Classification Quarterly, Collection Management, Computer in libraries, Library gee Eehou, Library Quarterly, Library Trends, New Library World and The Journal of Academic Librarianship having 3 citations each (0.66%). The other 15 journals are having 2 citations each and 71 journals having 1 citation each thus forms 6.65% and 15.74% respectively. This shows the significance of the research articles of the journals.

5.24 FINDINGS

The scholar deduced the following findings based on the analysis of different tables:

- The journals are the most preferred form of document compared to books. However, other forms of documents also have a significant impact in providing useful information in the field of research as deduced from Table-2.
- With regard to authorship pattern placed in Table-3, single author has a significant value which comes to 67.63% compared to joint authors and three authors which form 22.44% and 4.6% respectively.
- While deducing the inference on analysis of the cited author distribution in Table-4, Krishan Kumar stands at the apex as the author has been cited 10 times followed by S.R. Ranganathan 7 times and Gopal Krishnan, Amritpal Kaur, C.C. Kuhlthau, P.S.G.Kumar, R.G. Prasher and I.K. Ravichandra Rao 5 times each respectively. Further, the analysis of the others i.e. joint, triple, more than three etc. placed in Table-4A, it was found that the joint authors are more i.e. 217 in total followed by triple authors and more than three authors who have been cited 45 and 32 times respectively.
- While discussing about the degree of collaboration i.e. single vs. multiple authors placed in 5.5, 313 represents the total number of multiple authors like, joint authors, triple authors, more than three authors and organisation as author in the given field of study and 654 represents single author. Again while making an analysis of the degree of collaboration i.e. single vs. multiple authors, it was observed that, the degree of collaboration in the discipline is calculated as 0.47 and this shows the prevalence solo research in the field.
- The citation of website by the scholar in their dissertation as placed in Table-5 reveals after analysis that, organisation sites stands at the apex because of 81 citations (42.63%) out of 190 in total followed by commercial sites 33 (17.36%) and academic sites 26 (13.68%) which constitute 1st, 2nd, 3rd in ranking order. This shows that organisations provide useful, authentic, reliable and distilled information pertaining to research.
- With regard to website citation frequencies in Table-6, one time citation of the website constitutes 89.47% which has a significant value compared to

citations of websites two times and four times which constitute 8.42% and 2.1% respectively.

- With regard to editorship pattern discussed in Table-7, single editor has a significant value by constituting 73.68% compared to two editors and more than three editors which constitutes 15.78% and 10.52% respectively.
- Analysis of data placed in Table-8, with regard to editorialship cited in the edited volume reflects that the scholars have cited the articles of different editors of the cited volumes by only one editor which comes to 40 (70.07%), followed by more than three editors i.e. 8 (14.81%) and two editors which forms 4 (7.4%) and in the ranking order, one editor, more than three editors and two editors comes 1st, 2nd and 3rd respectively. However, this further shows that the editor prefers to be solo than to be a team by taking the responsibility for editing the documents.
- The ranking order of editor in various edited volumes in table 9 reveals after analysis that Murthy, T.A.V is cited maximum i.e. 15 times (27.77%) followed by Chaoba, K, 6 times (11.11%) and Binwal, J.C. et. al., Kumar, K. Manoj, 4 times each (7.40%) and Jagdish Arora, Mishra, R.N, Jagdish Arora et.al., 2 times each (3.70%) and thus, it ranks 1st, 2nd, 3rd, and 4th respectively. This shows the research value of the editors in cited volumes.
- Analysis of data placed in Table-10, with regard to cited articles from journals, the highly cited rate is 39 times i.e. (8.64%) followed by 38 times, 28 times, 24 times, 19 times, 15 times, for each one journal. Further the scholars have cited 9 times for 1 journal i.e. 1.99, 7 times for 3 journals constituting thereby, 4.65%, 6 times for 4 journals (5.32%), 5 times for 5 journals etc. The scholars also have cited 1 time for 71 journals which comes to 15.74% which shows the importance of the research articles of the journals.
- Table-11 after analysis reveals with regard to categorization of journals that, there are 96 international (78%) journals, national journals comes to 27 (22%). This is primarily due to the availability of international journals through consortia in the libraries.
- Analysis of ranking of journals placed in Table-12 discovers that, IASLIC Bulletin stands at the apex for having been maximum 39 (8.64%) citations and thus keeps 1st position in the ranking order; Library Herald is at the 2nd position in the ranking order for having 38 citations (8.42%) and ILA Bulletin in the 3rd position for having 28 citations (6.20%). It could be found out that the national journal status is more compared to international journal. This is due to the fact that the scholars have cited only one time, two times and maximum 15 times the international journals while they have cited more in national journals.
- While deducing the inference on analysis of place wise distribution of articles placed in Table-13 it could be inferred that, 166 citation frequencies stands at the apex followed by 43, 26, 22, 18, 13, 11, 10, 9 times citation for one place in the dissertations covered under study that 37.64%, 9.75%,

5.89%, 4.98%, 4.08%, 2.94%, 2.49%, 2.26% and 2.04% respectively. Further, the scholars in their dissertations also have cited 3 different places 7 times (4.76%), 1 place 6 times (1.36%), 5 times (4.53%) 4 places, 4 times (5.44%) 6 different places , 3 times (4.08%) for 6 different places, 2 times (2.36%) 3 places and 1 (6.34%) places for 28 different places. This signifies that, most of the subject based journals emanate from one place.

- On analysis of categorization of places discussed in Table-14 it could be deduced that, there are 312 citations which constitute national status i.e., 70.74% followed by 128 citations having international status that constitute 29.02% and 1 citation (0.22%) as unidentified. This visualises that, the scholars are more prone to cite the journals and or books emanated from home rather than abroad.
- Ranking of place placed in Table-15 it could be visualised that, New Delhi (National) has got maximum of 166 citations (37.64%) followed by London (International) having 43 citations (9.75%), New York (International) with 26 citations (5.89%), which constitute 1st, 2nd, 3rd in ranking order.
- While deducing the inference on analysis of publisher wise distribution of articles in Table-16, the scholars have cited 54 times, 40 times, 23 times, 22 times, 17 times from one publisher each constituting 11.32%, 8.38%, 4.82%, 4.61%, 3.56%, respectively out of a total number of 173 Publishers. Further the table shows that, 7 times 3 different publishers have been cited while, 6 times 6 publishers, 5 times 7 publishers, 4 times 8 publishers, 3 times 11 publishers, 2 times 31 number of publishers and 1 time 102 different publishers have been cited in the work constituting thereby 4.4%, 7.54%, 7.33%, 6.7%, 6.91%, 12.99%, 21.38% respectively. This shows the research publications of the journals and or books by the publishers both in national and international referred by the scholars in their dissertations.
- Categorization of publishers placed in Table-17 it could be found after analysis that, there are 329 citations that constitute national status i.e., 68.97% followed by 148 citations having international status that constitute 31.02%. This visualises that, the scholars are more prone to cite the journals and or books emanated from home rather than abroad. This also may be due to the fact that, the international books or journals are less in the library compared to national publications of books and or journals.
- With regard to ranking of publisher placed in Table-18, it revealed that, the scholars have cited INFLIBNET 85 citations (17.81%) followed by Ess Ess with 54 citations (11.32%), Vikas 17 (3.56%) citations which constitute 1st, 2nd, 3rd in ranking order.
- While deducing the inference on analysis of subject wise distribution of articles discussed in Table-19 it disclosed that, Academic Library is having 108 (10.26%) citations by the scholars in their dissertation work has the highest value in the subject-wise distribution followed by Library and Information Science 103 (9.76%) citations, Electronic Information

Resources 97 (9.22%) citations and thus, it forms 1st, 2nd and 3rd in the ranking order respectively.

- ❖ With regard to chronological distribution of articles placed in Table- 20 in between 1997-2006 it was found that, there is a high citation rate i.e. 454 (46.75%) out of 971 followed by 175 citations (18.02%) in between 2007-2011 and 153 citations (15.75%) during 1987-1996 and thus keeps 1st, 2nd, 3rd respectively. It also can be deduced that the research importance of the articles increases in the light of present trends which is visible from the present study.
- ❖ With regard to application of Lotka's law mentioned in Table-21 it could be inferred that, 709 (73.31%) authors produced one article each followed by 79 (16.33%) authors who produced two articles each, 11 (3.41%) authors produced three articles each, 5 (2.06%) authors produced four articles each, 6 (3.10%) authors who contributed for five articles, 1 (0.72%) produced Seven articles and 1 (1.03%) produced 10 articles where the frequency distributions of the author productivity match the generalized Lotka's Law.
- ❖ With regard to application of Bradford's law, the distribution of journals placed in Table-22 according to the Bradford's predicted zones (on an approximation) are: Zone-1: 6 journals (163 citations), Zone-2: 18 journals (144 citations), Zone-3: 99 journals (144 citations). Taking Bradford's Law of Scattering into account that predicts the increasing productivity of Journals from one zone to the next (in expression 1: n: n^2), the distribution partially complies with Bradford's Law. When 6 = *n*, then 1: *n*: n^4. This does not fit into Bradford's distribution.

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CHAPTER – 6

SUGGESTIONS AND CONCLUSION

6.1 SUGGESTIONS

Based on the findings, the scholar has put forward the following suggestions:

- Since most of the researches were obtained by the scholars from the university library, the user behaviour could be revealed. The users still are having lacking of information which they can obtain from other electronic sources and database other than UGC-INFONET Digital Library Consortium. Therefore the library requires obtaining specially the statistical databases and other electronic resources to incorporate the data for research.
- Citation analysis happens to be a practical tool to determine the need-based collections of the user and accordingly the library requires developing the user-based collection development in print form and substantial electronic resources to support research.
- Even if the present study is confined to a specific discipline still than the users need could be revealed in higher degree of research with regard to collection of documents and the study can be extended in other subjects to strengthen the library need-based resources.
- Other bibliometric techniques and applications of mathematical formula in analysing the validity of bibliometric laws has not been carried out so far, hence future scholars may consider taking up the test.
- Bibliographical errors when citing a document such as spelling mistakes, wrong year of publication, wrong titles etc are commonly found during citation study. Negligence of these errors is liable to give way to misinterpretation of data. As citation is an important device in evaluation of a journal or authors impact factor, therefore care should be taken when citing references.
- Further, the library requires in developing the e-journals having high impact factor for sustainability of research value.
- The library requires developing professionally skilled man power to handle the electronic documents and disseminate through internet so as to facilitate the researcher to use at any point of time.

6.2. CONCLUSION

The culmination of one's research contribution to the academic world as a research student is accomplished via the dissertation. As a result, dissertations were analyzed because they serve as the best representation of the research interests. The bibliographical study of dissertations submitted by M.Phil scholars, Department of Library and Information Science, Mizoram University is carried out to better understand the needs of the students in terms of information resources, their behaviour in selection of reference materials and their level of exposure to information and communication technologies such as the use of web based information systems.

The Citation Analysis extends the kowledge about citing behaviour and the characteristics of citations of the scholars. Although the function of citation

analysis is much emphasized as a tool for assessing quality a literature or author, citation analysis has its own shortcomings. Critics have highlighted on various grounds the unreliability of using citation analysis as a parameter for judging the value of scholarly works. On the other hand, proponents of citation analysis assumed that these problems are comparatively diminutive.

Citation data are much useful in information retrieval. Citation studies help researchers to certain extent in finding precise information at the least amount of time. It assists in identifying the areas of research studies, the scope of researches which have been accomplished in a specific field and where research is still necessitated.

The citation analysis of M.Phil scholar, Department of Library and Information Science, Mizoram University serves as a cutting edge in studying the trends of information pattern within its subject field. The citation analysis statistics gives us an idea of how and from where information resources are gathered, and provides an insight to the characteristics of the sources of the citations. It has become a viable approach to determine the literature used by the scholar not only in the field of Library and Information Science but also determine the citation behaviour of the scholars of other disciplines. Further, citation study cannot be confined to any one discipline rather, its' domain can be exdtended to many disciplines. However, there are common problems such as (a) Self citations, (b) Authors using initials mixed with full names, (c) Field variations of citation amounts or purposes, (d) Fluctuation of influence and (e) Human errors. In general, all of the basic Bibliometric techniques work can be applied well with many types of information entities such as, authors, journals, organizations, departments, universities

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Note: APA Style Manual 6th ed. has been adopted for preparation of bibliography.

APPENDIX – I

LIST OF M.PHIL DISSERTATION

S/N	Scholar Name	Title	Supervisor	Year
1	Khundrakpam Premoda Devi	Modernization of College Libraries in Manipur: An Assessment	Prof. P.K Rath	2008
2	Jyotika Borthakur	Information Use Patterns by Scientists of North-East Institute of Science & Technology, Jorhat	Dr. R. N. Mishra	2008
3	Pradeep Kumar	Information Seeking Behaviour of Post Graduate Students and Research Scholars of Social Science, Banaras Hindu University: A Survey	Dr. S. N. Singh	2008
4	Julie Lalthlanthangi	Information Literacy competency Development for Users and Library Professionals with Special Reference to Central University Libraries of North-East Region	Prof. R. K. Ngurtinkhuma	2009
5	Rashmi Rekha Gohain	Use, Evaluation and Management of Electronic Resources at Central Library, Tezpur University: A Study	Dr. R. N. Mishra	2009
6	Eddie Vanlalruata	A study of the Application of Open Source Software in Libraries	Prof. P.K Rath	2009
7	B.Lalhlimpuii	Library and Information Services provided by Mizoram University Central Library, Aizawl and North Eastern Hill University Central Library, Shillong: A Comparative Study	Dr. R. N. Mishra	2009
8	Lalsangzeli	A study of Library Automation in Hrangbana College and Aizawl Theological College of Mizoram	Dr. R. N. Mishra	2010
9	Rosa Laltlanmawii	An evaluation of Use of E-resources in Indian Institute of Technology Library, Guwahati	Dr. R. N. Mishra	2010
10	Nirmali Chakraborty	Institutional Repository using Dspace in North Eastern Hill University	Prof. R. K. Ngurtinkhuma	2010
11	Malsawmdawnga Chawngthu	Collection Development and Utilization of Mizoram State Library: A critical Study	Dr. S. N. Singh	2012
12	Tabasum Begum	Collection Development and Services in Jamia Millia Islamia Library, New Delhi: A case Study	Prof. R. K. Ngurtinkhuma	2012
13	Vanlalneia	Use of Information Sources by Faculty Members of Govt. Hrangbana College and Govt. Zirtiri Residential Science College	Prof. R. K. Ngurtinkhuma	2012
14	Zohmingthangi Ralte	Citation Analysis of Post-Graduate Dissertations in Library and Information Science, Mizoram University	Dr. R. N. Mishra	2012

15	Saidingpuii	Impact of UGC-Infonet Digital Library Consortium on Social Science and SEMIS Faculty Members and Research Scholars of Mizoram University	Prof. P.K Rath	2012

APPENDIX – II

SELECTED DOCUMENTS

LIST OF ONE AND TWO AUTHOR(s) WITH THEIR CITATION FREQUENCY

ONE AUTHOR	C.F	TWO AUTHORS	C.F
Abhas, S.M.	1	Abdul Hayee Sameni, Md and Mezbah - UI-Islam, Md	1
Accannor, K	1	Adolfo, Rodríguez and Suelí, Angelica	1
Achouba Singh, P	1	Akasawa, M. and Ueda, S	1
Adika, G	1	Akhonlu, Marangmei and Ruhichand, Th	1
Adiseshaiah, Malcom S	1	Allen, Thomas J. and Gerstberger, Peter G	1
Agboola, Idayat Odunola	1	Amusa, O.I. and Adekunmisi, S.R	1
Agee, Jim	1	Anil, K Dhiman & Yashoda, Rani	1
Aggarwal, U.K	1	Anjadi, Mallikarjun & Koganurmath, Muttayya	1
Agila, V	1	Arvinda, P & Reddy, V.P.	2
Aharony, Noa	2	Ashcroft, L. and Watts, C.	1
Ajala, Olugbenga Isaac	1	Ashcroft, Linda and Langdon, Colin	1
Akeroyd, John	1	Babu, B. Ramesh & Gopalakrishnana, S	1
Aldrich, Ella V.	1	Balakrishnan, S. and Paliwal, P.K.	1
Ali, Amjad	1	Balasubramanian and Geetha, X	1
Ali, Naushad	1	Barman, Rajani Kanta and Singh, Sanjoy Kumar	1
Allen, G.G	1	Bavakutty, M & Verghese, Rekha Rani	2
Allen, Thomas D	1	Belkin & Croft.	1
Altman, Micah	1	Bharati, M.S.Z. and Zaidi, S Mustafa.	1
Ammini, V.K.	1	Bhatia, Nehru and Vohra, Ranjana	1
Anderson, d.	1	Bhatt, J and Joshi, N	1
Anderson, Florence	1	Bhatt, R K & Madhusudhan, M.	2
Andretta, Susie	2	Bhatt, R.K. and Singh, K.P	1
Andrew M, Laurent	1	Biradar, B.S and Sampathkumar, B.T	1
Ankem, K	1	Biswas, Bidhan Chandra & Ghose, Bhabani Kumar	1
Anuradha, P	1	Blessinger, Kelly & Hrycaj, Paul.	1
Appleton, L.	1	Buttlar, L. & Wynar, L. R.	1
Arms, William. Y	1	Campbell, David E. and Shlechter, Theodor M.	1
Arora, Jagdish	1	Carmode, G and Krishnamurthy, B	1
Arte, A	1	Cassell, K.A. and Futas, E	1
Ashcroft, L.	1	Chakravarty, R. and Singh, S.	2
Ashraf, Tariq	1	Chandel, A.S. and Sumer, F.R.	1
Aswal, R.S	1	Chen, Ching-Chih and Heron, P.	2
Bailey, C.W.	1	Chen, K. and Hsiang, J.	1
Balas, Janet L	1	Chopra, H.S. and Singh, Gurmeet	1
Balasubramonian, P.	1	Chopra, Y.L. and Mukherjee, Bhaskar.	1
Banerjee, S.K	1	Chua, Alton Y.K. Goh, Dion H	1
Barman, H.K	1	Chubin, D.E & Moitra, S.D	1
Barooah, P.K.	2	Cohen, L.B. and Calsada, M.M.	1
Baruah, A.	1	Counts, Scott and Fisher, Karen E	1
Baruah, Bobby Goswami	1	Courtney, L. Young and Karen, R. Diaz	1

Barwick, Joanna	1	Crawford, J. and Daye, A.	1
Bates, M	1	Davis, Philip M. and Connolly, Matthew J.L	1
Battleson, B	1	Deka, Prasanta Kumar and Singh, Sanjay Kumar	1
Baughman, James	1	Dervin, B and Nilan,M	1
Bavakully, B	1	Despande, N.J. and Panage, B.M	1
Bavakutty, M.	1	Devi, Th Purnima and Phuritsabam, Bobby	1
Bawden, D	2	Devi, Thiyam Satyabati and Murthy, T.A.V	1
Baxter Magolda , Marcia B	1	Dillon, I.F and Hahn, K.L	1
Bell, D	1	Drummond, Rebecca C., and Mary H. Munroe.	1
Benjes-Small, Candice M	1	Ercegovac, Zorana and Yamasaki, Erika	1
Bevakutty, M	1	Egghe, L. & Rousseau, R.	1
Bharou, D.P	1	Faibisoff, Sylira and Ely, Donald P	1
Bhat, R.K.	1	Fortier, John D. & Potter, Calvin. J	1
Bhatia, Rajesh K.A	1	Foster, N.F.; Gibbons, S	1
Bhattacharjee, R.	1	Garvey, W.E. and Griffith, B.C	1
Bhattacharya, G	1	Gaunt, Jessica and Morgan, Nigel	1
Bhusan, A.	3	Gayasuddin, Sharma D.K & Mani, V.	1
Bimola, Ksh	1	Gayatri, D and Sridher Kumar, M.	1
Bookstein, A.	1	Gilliman, P. and Peniston, Silvinia.	1
Borse, T R	2	Glaser, B.G. and Strauss, A.L	1
Boss, R.W.	1	Gross, Melissa and Lothari, Don	1
Brancomb, Harvies	1	Gross, P.L.K. & Gross, E.M	1
Bretthauer, David	1	Guha, Tamal Kumar and Arora, Jagdish	1
Brittain, J	2	Gupta, Sangita and Gurdev	1
Brophy, Peter	1	Guruprasad, R and Nikam, Khaiser	1
Bryson, (T O)	1	Haridasan, Sudharma and Khan, Majid	1
Buck, Stefanie	1	Hery ,Mike & Morgan, Steve	1
Buckland, M	1	Hong, Lee and Teh, Kang	1
Cameron, Parkins	1	Hood, W., & Wilson, C	1
Caplan, Priscilla	1	Houghton, Bernard and Convey, John	1
Case, Donald o	1	Husain, Shabahat and Ansari, Mehtab Alam	1
Casserly, Mary Frances	1	Iqbal, Monawwer & Khan, Azhar Shah	1
Celik, H	1	Iqbal, Jafar and Ali, P.M. Naushad	1
Chakravarthy, B.M	1	Jadhav, M.N. and Bamane, N.J	1
Chakravarti, N.C	1	Jain, M.K. and Jain, Nirmal	1
Chan, L.M	1	Jana, Sibsankar and Bhattacharya, Udayan	1
Chan, Liza	2	Jayaprakash, A. and Sunil, Adupa	1
Chandel, A.S.	1	Jefferson, George and Smith, CK	1
Chandel, Sunil Singh	4	Joyce and Bryan, Lathan Linda	1
Chandraiah, I	1	Kaliammal, A., & Thamaraiselvi, G.	1
Chandrakar, R.	1	Kasowitz-Scheer, Abbey and Pasqualoni, Michael	1
Charton, G.	1	Kaula, P.N. and Singh, S.N	1
Chattopadhay, B.K.	1	Kaur, Amritpal & Aggarwal, Sangeeta	1
Chen, Ching-Chich	1	Kaur, Amritpal and Nandan, Naresh	1
Choudhury, N. B	2	Kaur, B. and Verma, R	2
Chowdhury, G.C	1	Kaur, Sarbinder and Satija	1
Chudnov, Daniel	1	Ken Kempner , William G. Tierney	1

Clausen, H	1	Khaisir, N and Pramodini, B	1
Coar, Ken	1	Khan ,H.A. & Ijari ,S.R	1
Condon, Th	1	Khan, Mohammad Haroon and Makhdumi, Gayas	1
Corrado, Edward M.	1	Khode, Subash and Dhar, Upinder	1
Coulter, Pricilla	1	Kling, R and Mckim, G	1
Coyle, Karen	1	Kochar, R.S. and Sudershan, K.N	1
Crawford, Susan	1	Koley, Sasanta & Sen, B.K.	1
Crow, R.	2	Koopman, Ann and Kipnis, Dan	1
Cullen, Rowena	1	Kumar, Girja and Jaysawal, P.K	1
Cybulsk, Jacob L.	1	Kumar, Krishan and Sharma, Jaideep	1
Dadzie, P.S.	1	Kumar, P. and Arora, O.P	1
Dahl, Mark	1	Kumbar B.D and Hadagali, G.S	1
Dale, Reides	1	L., Shanta Meitei and Th., Purnima Devi	1
Danuta, A. Nitecki	1	Lahiri, R and Khomdon Singh, Th	1
Das, Anup Kumar	2	Lahiri, R. and Choudhury, GG	1
Das, Bhabananda	1	Lancaster, F W and Sandore, B.	2
Das, Nabajyoti	1	Lange, Janice, and Richard J. Wood.	1
Das, S.R.	1	Lee, Stuart D. & Boyle, Frances	1
Date, C.J.	1	Lohar, M.S. and Roopashree, T.N	1
Davarpanah, Mohammad Reza	1	Lugg, R. and Fischer, R	1
Davinson , Donald	1	M Nyanboga, Constantine and Kemparaju, T.D	1
Dawra, Manisha	1	Madalli, Devika P and Manju	1
Debons, A	1	Maheswarappa, B.S. and Tadasad, P.G.	1
Deka, Sanjib Kr	1	Majid, S. and Tan, A.T.	1
Demas, S.	1	Majumdar, S and Singh, Rajesh	1
Derry, Richard L.	1	Malhotra, Rajiv and Patel, Jay	1
Dervin, B	1	Manjunath, B. and Patil, Shoba	1
Dev Nath, W.S	1	Marquis, Donald G. and Allen, Thomas, J	1
Devaraja, G	1	Martin, Allan and Madigan, Dan	1
Devi, S.P.Usha	1	Mathew, K.S. and Sheeja, N.K	1
Devraj	1	McGlamery, S. and Cottman, S	1
Devrajan, G	1	Mgaywa, R.M. and Chakrabarty, Swapna	1
Dewey, J	1	Mishra, R.N. and Gohain, Rashmi rekha	1
Dhar, Megna	1	Moghaddam, G and Talawar	1
Dhiman, Anil K.	3	Mondoux, Julie and Shiri, Ali.	1
Dorman, David	1	Montgomery, C. H. and D. W. King	1
Downs, Robert B	1	Mujoo-Munshi, Usha, and Kant, Manuj	1
Durisin, Patrica.	1	Mukherjee, Bhaskar and Kumar, Prashant	1
Dutta, S.C.	1	Murthy, M.N. and Cholin. V.S	1
Edwards, Eli	1	N., Vasanth & Mudhol, Mahesh V.	1
Edwin	1	N.S., Mahendra and Kanaujia, Laleta	1
Ellis, D	3	Nalimov, V.V. and Muchenko, Z.M	1
Enger, K.Brock	1	Nandi, Amitava & Bandyopadhyay, Amit Kumar	1
Epstein, Susan B	1	Naushad Ali, P.M. and Hasan, E	1
Eqbal, M	1	Nazim, Mohammad and Devi, Maya	1
Ethelene, Whitmire	1	Nazim, Mohd and Saraf, Sanjib	1
Evans, G.E.	2	Neelameghan, A and Prasad, K.N	1

Evans, Robert W	1	Nichols, Jane & Mellinger, Margaret	1
Falk, H	1	O'Conner, Daniel & Voos, Henry	1
Fan, K.W	1	Parekh, Harsha and Sheth, Tara	1
Fano, R.M	1	Parker, C.C.& Turley, R.V.	1
Farradame, J	1	Patil, D.B. and Parameshwara. S	1
Fecko, M. B	2	Pradhan, Debasish and Tripathi, Tridid	1
Ferguson, Anthony W	1	Prasad, H.N., and Tripathi, M.	1
Flavia, Eleonora Iuspa	1	Prakash, K., Premchand and Gohel, Umesh	1
Florence, Patrict	1	Purnima, Meitei Land Shanta, Devi	1
Folster, M. B.	1	Radheshyam, Ch and Birana, Ch	1
Ford, Geoffrey	1	Rahine, Julie L. and Brown, Linda A.	1
Fortune, Dion	1	Rajalakshmi, D. and Desmuk, G.R.	1
Fox, E. A	1	Rajasek, Haran K. & Rahman, Nair R	1
Frohman, A	1	Rajkumar, P.V. & Gopalkrishnan, S.	1
Ganesh, M	1	Ramasesh, C P, Venkatesh Y.	1
Garcia, A.F	1	Randall, William and Goodrich, FLO	1
Garfield, Eugene	2	Rao, N.L. and Prassanna, M.K	1
Garg, B.S	2	Ravichandra Rao, I.K. and Abideen P, Sainul	1
Garry, M.C	1	Raza, M. Masoom and Eqbal, Monawwer	1
Gate, Jeam Key	1	Raza, N and Upadhyay, A.K	1
Gautam, J.N	2	Reddy, S.H. and Karisidappa. C.	1
Genoni, Paul	1	Robert, D. Stuart. & Barbara, B Moran	1
Gessford, John Evans	1	Rowelly, J.E and Turner, C.M.D	1
Getz, Malcolm	1	Saran, Sharma Jagdish and Grover, D.R	1
Ghanch, D.A.	1	Saravanana, P and Mary, A Lawrence	1
Ghosh, A	1	Sarika, L and Sangeeta, K	1
Ghosh, Maitrayee	2	Satyabati Devi, PremChand and Chauhan, Suresh K	2
Gibbons, S.	1	Saxena, Shyamala and Roy, P.K.	1
Gohain, Rashmi Rekha	2	Seghal, R L and Behi, D K	1
Goldberg, Alexander L	1	Sethi, A.R. and Sharma, S.K	1
Goldhor, Herbert	1	Shannon, C. and Heron, P	1
Gonzalez-Barahona, Jesus M	2	Shannon, C. and Weaver	1
Gopal, Krishan	5	Sharma, Chatan and Sharma, Ritu	1
Gorman, P.	1	Sharma, P.C. and Arora, Inder Prakash	1
Goswami, Anjana	2	Shokeen, Ashu, and Kaushik, Sanjay K	1
Gourakishor, L	1	Singh, P.K.Nazim and Singh, SN.	1
Graham, P	1	Singh, Neena & Dominic, J	1
Graham, S.R.	1	Singh, S.P. & Sharma, A.K.	2
Grant, J	1	Singh, Surendra. And Singh, Sonal	1
Gravery, William D	1	Sinha, Manoj Kumar and Bhattacharjee, Jayant	1
Grocin, Blaise	1	Slater, M. and Fisher, P	1
Guenther, K.	1	Songam, S.L. and Prakash, K.	1
Guha, B.	2	Sponsler, Ed and Van de Velde, Eric F	1
Guha, Bimalendu	1	Sridevi, J. and Vyas, Shalini	1
Gupta, Anuradha	1	Srivastava, S.N. and Verma, S.C	1
Gupta, O.P	1	Stanger, N. and McGregor, G.	1

Gupta, R.C.	1	Stenstrom, Patrica and McBride, R. B	1
Gupta,SP	1	Steve, Oberg and Lauren, Noel	1
Guttsman, W.L	1	Suleta, Th and Shyam, Th	1
Hadagli, Parkash B	1	Swain, Dillip K. and Panda, K.C.	1
Hagen, John	1	Tansley, R. and Harnad, S.	1
Hancock, Vicky E	1	Tanuja, Ch and Madhuri, Th	2
Harari, O	1	Tariang, Bibika Laloo and Lahkar, N	1
Harinarayana, N.S	2	Taylor, A and Farrell, S.	1
Harnad, S	1	Tenopir, C and King, D.W	2
Harris, I.W	1	Thapa, N. and Sahoo	1
Harvana, L.J.	1	Upadhyay, N and Chakraborty, H.K	1
Harvey, J.M.	1	Varatharajan, N and Chandrashekara, M	1
Havelock, Ronald G	1	Vasantha, N and Mudhol, Mahesh V	1
Hawks, CP	1	Veeranjaneyulu, K. and Singh, Sonal	1
Haycock, L.A	1	Verma, Maya & Thakur, Kshama	1
Hazarika, Tilak	1	Vickery, B.C. and Vickery, A.	1
Henty, Margaret	1	Vijayakumar, J.K. and Das, Manju	1
Hewitzon, A	1	Vishala, B.K. and Bhandi, M.K	1
Hingwe, K.S	2	Weingart, S.J and Anderson, J.A	1
Hiremath, Uma	1	Westrienen, Gerard Van and Lynch, Clifford A	1
Horton, Forest Woody	1	White, Gary W. and Crawford, Gregory A	1
Howard C., Bybee	1	Whittemore, B and Yovits, M	1
Hughes, Carol Ann	1	Wilson, L.R. and Tauber, M.F	2
Humes, Barbara	1	Wonsik, Shim and McClure, Charles R	1
Humphrey, David	1	Yovits, M. and Foulk, C	1
Igbinosa, Isaac Ossa	1		
Indor, Mohan Goswami	1		
Ingwer sen, P	2		
Irene, Munster	1		
Isaac, K.A.	2		
Jaavan,V.K.J	1		
Jaganayak, S.S.	1		
James, H. Hyde	1		
Jan, Rosy	1		
Jardan, Peter	1		
Jeevan, V.K	1		
Jochi George, P	1		
Johnson, R.	1		
Johnson, Richard K	1		
Jones, Catherine	1		
Jordan, Peter	1		
Jose, Sanjo	1		
Joshi, Govind	2		
Joteen, R.K	2		
Kamila, Kanchan	2		
Kannappanavar, B.V	1		
Kant, Manju.	1		
Kanungo, Neena Talwar	3		

Kapoor, A.C	1
Kapoor, A.L	1
Kaul, H.K	2
Kaula, P.N	1
Kaur, Amritpal	5
Kaur, Davinder	1
Kaur, H.K	1
Kavanagh, Paul	1
Kawatra, P.S	2
Kaye, L.	1
Kebede, G	1
Kelly, G	1
Kennedy, P	1
Kesarwani, S.K	1
Kessler, M.M	1
Key, Gates Jean	1
Khan, M. Shamsul Islam	1
Khanna, J.K	1
Kidd, Eric	1
Kimber, R.T.	1
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Marcella, Rita, Baxter, Graeme, Davies, Sylvie & Toomstra, Dick	1
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Passi, K., Lane, L., Madria, S. and Mohania, M.	1
Prem, Chand, Arora, Jagdish, Moses, M. Naga and Pradhan, Dinesh Ranjan	1
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Smith, MacKen, Barton, M, Bass, M, Branschofsky, M, McClelland, G and Stuve, D	1
Walmika, R.H. et al	1
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ALA	1	INFLIBNET	3
American Psychological Association	1	Librarian ATC Library	1
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BMG Informatics	1	New Encyclopaedia Britannica	1
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Academy of Management Journal	1
Acquisition Librarian	1
American Behavioural Scientist	1
American Libraries	1
American Psychologists	1
Annual Review of Information Science and Technology	5
Ariadne	1
ARL Newsletter	1
ASLIB Proceeding	6
Bulletin of Medical Library Association	3
Bulletin of the American society for information science	1
Campus-Wide Information Systems	1
Cataloguing & Classification Quarterly	3
Collection Building	6
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College and Research Libraries	6
Communications of the ACM	1
Computer in libraries	3
D-Lib Magazine	14
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Electronic library and information systems	1
Encyclopaedia of Library & Information Science	1
Higher Education	2
IASSIST Quarterly	1
IFLA Journal	1
iMP Magazine	1
Information and Technology and Libraries	1
Information culture y sociedad	1
Information Processing & Management	2
Information Research	2
Information Services and Use	1
Information Society	1
Information Storage and Retrieval	1
Information Technology	2
Information Technology & Libraries	5
Interlending & Document Supply	2
International Journal of Electronic Commerce	1
International Library Review	1
International Social Science Journal	1
J Med Libr Assoc	1
J. Am. Soc. Inf. Sci	1
JAHC	1
Journal of Applied Psychology	1

Journal of Broad Casting	1
Journal of College Student Development	1
Journal of Documentation	15
Journal of Education for Library Information Science	1
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Journal of Higher Education	1
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Journal of Informetrics	1
Journal of Librarianship & Information Science	14
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Journal of the American Society for Information Science	6
Library and Information Science research: an international journal	12
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Library Philosophy and Practice	2
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Library Resources & Technical Services	2
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http://www.acls.uidaho.edu/info_literact/modules/module1/1_0.htm
http://www.earlham.edu/~peters/fos.overview.htm
http://www.earlham.edu/~peters/fos/bethesda.htm
http://www.gzrsc.edu.in/index.php?id=his
http://www.ideals.illinois.edu/bitstream/handle/2142/5548/librarytrendsv2i4D_opt.pdf?sequence=1
http://www.ideals.illinois.edu/bitstream/handle/2142/7186/librarytrendsv30i1d_opt.pdf?sequence=1.
http://www.lib.nic.edu/1998/i/980129.html
http://www.lib.umich.edu/
http://www.lib.washington.edu/ScholComm/issues/ir.html
http://www.mzu.edu.in/pachhunga%20university%20college.html
www.cs.cmu.edu/~softagents//papers/icse2003.pdf
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www.philau.edu/library/.../Annual%20Report%202009-2010-Oct%20edits. Pdf
www.webpages.uidaho.edu
http://dpi.wi.gov/standards/pdf/infotech.pdf
http://hbc.mizoram.gov.in/index.php?option=com_content&view=article&id=24:rules-a-regulations&catid=15:prospectus&Itemid=39
http://hbc.mizoram.gov.in/index.php?option=com_content&view=article&id=25:course-offered&catid=15:prospectus&Itemid=40
http://hbc.mizoram.gov.in/index.php?option=com_content&view=article&id=26:college-fees&catid=15:prospectus&Itemid=41
http://hbc.mizoram.gov.in/index.php?option=com_content&view=article&id=4&Itemid=4
http://hbc.mizoram.gov.in/index.php?option=com_content&view=frontpage&Itemid=1
http://www.nclis.gov/libinter/infolitconf & meet/ papers/ moore-fullpaper.pdf
www.apcce.gov.in/autolibrary.aspx
www.loc.gov›Acquisitions›OverseasOperations-Cached-Similar.gov
www.nclis.gov/libinter/infolitconf & meet/papers/rader-fullpaper.pdf.
http://jmi.nic.in/abouttheuniversity.htm
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http://niscair.res.in/
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http://rrrlf.nic.in/rrlfl.htm
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http://www.education.nic.in/higedu.asp
http://www.manipur.nic.in/DST/ITpolicy-manipur2003-pdf
http://www.rrljorhat.res.in/RRL/L&D/20 Departments/20 RRl/20 Jorhat
http://www.shashionline.in/university-central-universities-in-india/
http://www.tezu.ernet.in/
http://www.tripurauniversity.in
http://www.amazon.co.uk/gp/like/sign-in/sign-in.html
http://InformationR.net/ir/11-1/paper242.html
http://InformationR.net/ir/11-3/paper254.html
http://www.groklaw.net/article.php?story=20031231092027900
www.ebookmaap.net
http://202.54.99.7/ejournal/view_usage_stat_lab_sum.php?
http://doi: 10.1002/asi.4630350608
http://Doi:10.1023/A:1017919924342
http://eu.conecta.it/paper/General_idea_open_source.html
http://eu.conecta.it/paper/Open_source_software_licenc.html
http://Hyperlinkreferencenotvalid.sites/renovation/index.php
http://oa.mpg.de/openaccess-berlin/berlindeclaration.html
http://www.gslis.mcgill.ca/marginal/mar10-2/opensource.htm

LIST OF WEBSITE TWICE CITED

http://fedoraproject.org/wiki/Overview
http://www.dspace.org/
www.emeraldinsigh.com/0737-8831.htm
www.emeraldinsight.com
www.inflibnet.ac.in
www.nehu.ac.in
http://www.gzrsc.edu.in/index.php?nlink=Report%20on%20the%20activities%20of%20Career%20counselling%20and%20Placement%20cell....&&id=notice
http://hbc.mizoram.gov.in/

LIST OF WEBSITE FOUR TIMES CITED

http://www.library.iitb.ac.in/~mnj/gsdl/cgi-bin/library

ABSTRACT

ON

CITATION ANALYSIS OF M.PHIL DISSERTATIONS IN LIBRARY AND INFORMATION SCIENCE, MIZORAM UNIVERSITY DURING 2007-2011

A Dissertation submitted in partial fulfilment of the requirement for the Degree of Master of Philosophy in Library and Information Science

Submitted by

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1. INTRODUCTION

Citation analysis is a generic term for a set of well-known techniques that has worthy implications in Bibliometric studies of scholarly communication and has become a pragmatic approach to ascertain the use of library resources. Further it is a viable platform for the library to built user-centric collections. The study has become imminent in view of proliferation of resources in multiple forms due to increasing needs of the user communities, substantial increase in the cost of documents and the constraints of limited financial resources. These make necessary for the librarians to design and develop need-based information systems and services to meet the information needs and requirements of the users. Kumar and Reddy discussed citation analysis that a new technique used to measure quantitatively the value of document through arranging the citations in some kind of rank or order. It can be used for subject which is a helpful tool for the library management in selecting and weeding the materials in the face of ever expanding information environment. They further added that citation analysis refers to references in one text to another text with information on where that text can be found. Before Eugene Garfield developed a method in 1955 for citation indexing for science literature Shephard's citations had been used in the legal profession since 1873 and was created by Frank Shephard, who listed each legal case heard by the Illinois Supreme Court that cited previous cases. This citation index grew to cover almost all jurisdictions and became a vital tool in the field of law for case verification. Any lawyer or law librarian still knows what it means to shephardize a case. The first recorded citation analysis was done by Gross and Gross in 1927, when looking at citation patterns to determine the journals to be subscribed to and back volumes to be acquired for the library of Pomona college, using citation count to rank the periodicals in Chemistry.

In view of the above discussions, citation analysis is used for the study of the properties and behaviours of recorded knowledge. Meho observes that citation analysis is a branch of information science in which researchers studies the way articles in a scholarly field are accessed and referenced by others. It has been used for the intention of scholarly analysis and evaluate in several fields of human endeavour.

Derivation of Bibliometrics

Cole and Eales use Statistical analysis in their study of The History of Comparative Anatomy Part I in 1917 and the study is considered to be the first bibliometric study. Researchers claim W.Wyndham Hulme to be the first to use the expression by changing the name to Statistical Bibliography in 1922 and the one to describe the use and non-use of information. It is also used by Pritchard when he writes Computers, Statistical Bibliography and Abstracting services. Dr. S.R Ranganathan in 1948 gave the name Librametry to statistical calculus for handling the library work and services or observations and evaluating of an existing or proposed library services and resources. The word Bibliometrics first appeared in print form in 1969 in Alan Pritchard's article Statistical Bibliography or Bibliometrics in the December issue of Journal of Documentation. He described it as the application of mathematics and statistical methods to books and other media of communication. In a later, article, Pritchard described Bibliometrics as

the metrology of information transfer process and its purpose is analysis and control of the process. Other related terms coming up were, Scientometrics, coined by Vassily V.Nalimov and Mulchenko in 1969, Informetrics, first proposed by Professor Otto in 1979 in London, Webometrics, introduced by Almind and Ingwersen in 1997, and Cybermetrics, probably be attributed to Isidro Aguillo, the editor of the e-journal Cybermetrics founded in 1997. During mid 1990s a range of new terms had emerged in this field coined by various scientists. They are Netometrics, Webometry, Internetometrics, Webometerics, and Web Bibliometry.

Bibliometrics Indicators

Bibliometrics uses the three main types of indicators as noted below.

- ➔ Publication count
- ➔ Citations and Impact Factor
- ➔ Co-citation , Co-word analysis and Bibliographic coupling

Types of Bibliometrics

Bibliometrics can be divided into two areas as follows:

- ➔ Productive count (Descriptive)
- ➔ Literature usage count (Evaluative)

Laws of Bibliometrics

Three regularities occur in Bibliometrics namely Lotka's Law of Scientific Productivity, Bradford's Law of Scattering and Zipf's Law of Word Occurrence. Lotka's Law of Scientific Productivity (authors publishing in a certain discipline) where the Law describes the frequency of publication by authors in a given field. It states that " . . . the number (of authors) making n contributions is about $1/n^2$ of those making one; and the proportion of all contributors, that make a single contribution, is about 60 percent".

Bradford's Law of Scattering (Distribution of Publications), serves as a general guideline to librarians in determining the number of core journals in any given field. It states that journals in a single field can be divided into three parts, each containing the same number of articles:

- ➔ First zone, where a core of journals on the subject, relatively few in number, that produces approximately one-third of all the articles,
- ➔ Second zone, containing the same number of articles as the first, but a greater number of journals, and
- ➔ Third zone which contains the same number of articles as the second, but still covers greater number of journals. The mathematical relationship of the number of journals in the core to the first zone is a constant n and to the second zone the relationship is n^2. Bradford expressed this relationship as $1:n:n^2$.

Zipf's Law of Word Occurrence (Ranking of Word Frequency) is often used to predict the frequency of words within a text. The Law states that in a relatively lengthy text, if you "list the words occurring within that text in order of decreasing frequency, the rank of a word on that list multiplied by its frequency will equal a constant. The equation for this relationship is: $r \times f = k$ where r is the rank of the word, f is the frequency, and k is the constant.

2. SIGNIFICANCE AND SCOPE OF THE STUDY

Substantial numbers of citation studies have been carried out both in global and national level in the field of social science in general and Library and Information science in particular, and the results of such studies have been tested with bibliometric laws. This is a sporadic attempt of the scholar to carry out Bibliometrics study in higher degree of study i.e., in M.Phil level of the Department of Library & Information Science, Mizoram University and as such, this is the first of its kind. It is almost remanded of its virgin field of research by studying the implication of the two laws, i.e., Lotka's Law and Bradford's Law. The present work is confined to a total number of 15 M.Phil dissertations having more than 1100 citations submitted to the Department of Library & Information Science, Mizoram University from 2007-2011. The M.Phil dissertations for the year 2012 are still in progress and hence, could not be accommodated in the study.

The study finds its significance in the following areas pertaining to,

- ➔ Forms of documents used by the scholars to prepare their Theses/Dissertations.
- ➔ Relevance of the literature while shaping to dissertation and
- ➔ Importance of web sites visited by the scholars for preparing Dissertations.

3. REVIEW OF LITERATURE

In the present area of systematic inquiry, the scholar made an extensive survey of available literature. Further, proper care has been taken by the scholar to scrutinize the published literature in the area of study those have been discussed in the dissertation.

4. RESEARCH DESIGN

Statement of Problem

Citation analysis of dissertations and ranking of journals are useful in determining information sources that are vital for students, research scholars, faculties and the library as well in a given subject area. It also helps the library in judicious budget planning for collection development. This is intermittent attempt by the scholar to come up with a solution to the ever increasing literature.

It is the requirement of the university and the University central library to assess the use of information resources by the students in their dissertation preparation and make changes to the collection development wherever appropriate. It is necessary to see whether the students are able to comprehend their subject area in the ever changing library trends. The present research topic will also be used to find out which authors and publications are best utilized by the students in writing their dissertations.

The problems associated with the study are mentioned below:

- ➔ Bibliographies appended at the end of all 15 M.Phil dissertations need application of specific style manual for a scientific approach to the users and some of the dissertations are lacking of arrangement of bibliographies in a uniform standard causing thereby, serious constraints in scientific communications among the users.

- ➔ The dissertations under discussion also lack of adequate bibliographic details of literature source causing thereby to derive the list of core literature central to the field of research.
- ➔ Further, the dissertations do not have clear indications about the year of publication of either published literature or the electronic sources used by the scholars causing thereby, serious problems to find out the obsolescence of literature.

In order to meet the above problems, the research topic entitled Citation Analysis of M.Phil Dissertations in Library and Information Science, Mizoram University during 2007-2011 is formulated.

Objectives of the study

The aims of the present study are to,

- ➔ Find out the core list of important documents required to fulfill the needs of the students in Library and Information Science.
- ➔ Prepare ranking list of documents which may be supportive for collection development of the library under study.
- ➔ Recognize the core literature and/or group of authors concerned in the field of Library and Information Science
- ➔ Ascertain the obsolescence of literature
- ➔ Study the implication of Bradford's Law of Scattering and Lotka's Law of Productivity in LIS.

Research Methodology

Data relating to the present study were collected from a total number of 15 M.Phil dissertations accepted by the Department of Library and Information Science, Mizoram University from 2007-2011. The bibliographical references cited at the end of each dissertation were taken as the source of data for the study. The present study contains a total number of 1116 citations which is the total population of the study. The scholar has taken adequate measure in photocopying all references (bibliographies) appended at the end of each dissertation and each bibliography were scientifically analysed with regard to the forms of documents such as, Books, Journals, Reports, Conference Proceedings, and Newspapers etc., used by the scholars, authorship pattern, place of occurrence, and place of publication of the documents. The data so obtained were tabulated for each component for analysis which apart from other inferences revealed the authors central to the publication, most preferred form of documents, core literature on the subject, obsolescence of literature etc. Further, the data were tested to confirm the Lotka's Law of Productivity and Bradford's Law of Scattering of Journals. The scholar also used excels spreadsheet and log tables while analysing the data to draw inferences.

Chapterization

The present study is divided into 6 (Six) chapters. While, the first chapter of the study deals with Introduction, the second chapter is deliberated on Purpose of Citation Analysis, Need of Citation Analysis etc, and the third chapter of the study is described on Information Studies, Information Sources etc. The fourth chapter of the present study focuses on Bibliometrics Laws- Conceptual

View and basic laws of Bibliometrics. While, the fifth chapter deals with analysis and findings, the sixth chapter deals with suggestion and conclusion. The chapters follow with a comprehensive list of bibliography arranged according APA style manual.

5. ANALYSIS AND FINDINGS

➔ Form-Wise Distribution of Cited Documents

Multiple forms of documents support the researchers, students to elicit information in the field of their research and or study. With the availability wide information sources, the scholars have a wide range of options for choosing the right and authentic sources of information from prints to e-books, e-journal and the Web. Most cited forms of documents by the scholars in LIS of the university under study in M.Phil dissertations are given below in Table-1. Almost all the tables have been supported with Graphs in the main dissertation for clear vision.

Table-1: Bibliographic Form-Wise Distribution of Citations in LIS

S/N	Cited Forms of documents	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	Books	311	29.56	311	29.56
2	Book Articles	16	1.52	327	31.08
3	Book Articles on Web	3	0.28	330	31.36
4	Proceedings of the Seminar	107	10.17	437	41.53
5	Proceedings of the Seminar on Web	5	0.47	442	42.01
6	Journal and Magazine Articles	417	39.63	859	81.65
7	e-Journals	132	12.54	991	94.2
8	Theses or Dissertations	21	1.99	1012	96.19
9	Reports	11	1.04	1023	97.24
10	Unidentified	29	2.75	1052	100
	Total	**1052**	**99.95 or 100**		

While analyzing the forms of documents placed in Table-1, it revealed that all 15 M.Phil dissertations reflect the use of documents where, the highest number of citations i.e. 417 (39.63%) are from Journals and Magazine Article followed by 311 (29.56%) citations from books. The e-Journals referred by the scholars come to 132 (12.54%). Thus, in order of ranking, Journals and Magazine Article, Books and e-Journals are ranked with 1st, 2nd and 3rd respectively. However, other forms of documents equally contributed significantly for information as used by the scholars. The analysis further viewed that, the scholars are more prone to Journal and Magazine Articles due to their latest contents in different field of research and this the most preferred shape of documents.

➔ **Authorship Pattern**

Authors contribute potentially in the domain of research through articles which are available in both print and electronic form and the scholars get a free hand to access the same in multiple means. The authors may be single, joint, triple etc. The citations of all 15 dissertations were evaluated in order to ascertain the authorship pattern which comes to a total number of 967 authors out of 1116 citations. All authors irrespective of the types of documents were categorized into single, joint, triple, more than three and organisation authors. The authorship patterns of the citations by the scholars made in their dissertations are placed in Table-2 indicating the cumulative frequencies including the percentage thereof.

Table-2: Authorship Pattern

S/N	Author(s)	# of Authors	%	Cumulative Frequencies	Cumulative %
1	Single	654	67.63	654	67.63
2	Joint	217	22.44	871	90.07
3	Triple	45	4.65	916	94.72
4	More than three	32	3.3	948	98.03
5	Organisation	19	1.96	967	100
	Total	**967**	**99.98 or 100**		

While making an analysis of the authorship pattern placed in Table-2 of the study it was revealed that the contribution of articles by single author are significant which comes to 654 out of 967 thus coming to 67.63% compared to the articles contributed by joint authors which comes to 217 (22.44%) followed by 45 numbers having three authors which constitutes 4.6%. This further revealed that among the 5 group of the authors, single author, joint authors, triple authors ranks First, Second and Third position respectively while, more than 3 authors and organisation as author are insignificant. This may be due to the fact that the organisation is lacking of creation of institutional repository and available of electronic resources thereof.

➔ **Authors Distribution**

Authorship pattern are studied among the cited LIS articles by the M.Phil scholars in their dissertations. Among the list of articles cited, a total of 654 single authors were cited by the M.Phil scholars in their dissertation work. The single author position has been shown in the Table-3 showing their percentage.

Table-3: Cited Authors Distribution

S/N	Rank	Authors Cited	Citation Frequency	%
1	1	Kumar, Krishan	10	1.52
2	2	Ranganathan, S.R	7	1.07
3	3	Gopal, Krishan	5	0.76
4	3	Kaur, Amritpal	5	0.76

5	3	Kuhlthau, C.C	5	0.76
6	3	Kumar, P.S.G	5	0.76
7	3	Prasher, R.G	5	0.76
8	3	Ravichandra Rao, I.K	5	0.76
9	4	Candel, Sunil Singh	4	0.61
10	4	Kumar Girja	4	0.61
11	4	Sahai, Shri Nath	4	0.61
12	4	Sehgal, R.L	4	0.61
13	4	Wilson, T.D	4	0.61
14	5	Bhusan, A	3	0.45
15	5	Dhiman, Anil K.	3	0.45
16	5	Ellis, D	3	0.45
17	5	Kanungo, Neena Talwar	3	0.45
18	5	Laloo, Bikika Tariang	3	0.45
19	5	Line, M.B.	3	0.45
20	5	Madhusudhan, Margam	3	0.45
21	5	Mittal, R.L	3	0.45
22	5	Mokhtar, Intan Azura	3	0.45
23	5	Sharma, A.K	3	0.45
24	6	58 authors having 2 citations each	116	17.73
25	7	441authors having 1 citation each	441	67.43
		Total	**654**	**99.86 or 100**

While analyzing the cited author distribution placed in Table-3 reveals that there are a total number of 654 single authors and the ranking order has been mention in detail up to 5 where Kumar, Krishan is cited maximum i.e. 10 times (1.52%) followed by Ranganathan, S.R, 7 times (1.07%) and Gopal, Krishan, Kaur, Amritpal, Kuhlthau, C.C, Kumar, P.S.G, Prasher, R.G and Ravichandra Rao, I.K 5 times each (0.76%) and thus it ranks 1st, 2nd and 3rd respectively. Further, the authors who have been cited up to 3 times are reflected in the table as well as the following graph to make it more visible. Further the table reflects that 58 authors having 2 citations each constitute 116 citation frequency (17.73%) followed by 441 authors having 1 citations each with a citation frequency of 441 (67.43%). The author citation depends upon the research output of the authors where the scholars access concerning to their research work. It may be deduced that the scholars access the literature provided a scope is there. Due to limited scope and constraints in internet access along with the availability of E-Journals the scholars highly get access to the research output of the authors.

➔ **Degree of Collaboration: Single Vs. Multiple Authors**

To determine the degree of collaboration in quantitative terms, the formula given by Subramanayam was used. The formula for being:

$$C = \frac{N_m}{N_s}$$

where,

C = Degree of collaboration in discipline,

N_m = number of multi-authored papers, and

N_s = number of single authored papers.

Hence, the degree of collaboration of citations made in the M.Phil dissertations is,

$$C = \frac{313}{654} = 0.47$$

Where, 313 represents the total number of multiple authors like, joint authors, triple authors, more than three authors and organisation as authors in the given study and 654 represents the single authors.

Again while making an analysis of the degree of collaboration i.e. single vs. multiple authors which constitute joint, triple, more than three, and organisation, it was observed that the degree of collaboration in the discipline is calculated as 0.47 and this shows the prevalence solo research in the field.

➔ **Citations of Website**

Websites facilitates a good length of information to scholars for research. Most of the organisation, authors publishers place the research output through electronic means either through open source or price or social networking sites which allow a researcher to come across the electronic resources concerning to their research area. The scholars also equally accessed various websites available through organisation, commercial, academic, educational etc to elicit the information for their research work. The data relating to the websites visited by the scholar and citations of the same in their dissertations has been placed in Table-4 which reflects the domain name, citation frequency and the percentage along with cumulative frequencies and percentage.

Table-4: Citations of Website

S/N	Domain name	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	Organisation	81	42.63	81	42.63
2	Commercial	33	17.36	114	60
3	Academic	26	13.68	140	73.68
4	Educational	25	13.15	165	86.84
6	Government	13	6.84	178	93.68

7	Unidentified	8	4.21	186	97.89
8	Network	4	2.10	190	100
	Total	**190**	**99.96 or 100**		

Analysis of the Table-4 reflects that organisation sites stands at the apex because of 81 citations (42.63%) out of 190 in total followed by commercial sites 33 (17.36%) and academic sites 26 (13.68%) which constitute 1st, 2nd, 3rd in ranking order. It is further deduced from the analysis that the other websites such as educational, government sites equally contribute a plethora of information in various fields of study which is mostly relevant for research purpose. The research scholars get access to such websites to substantiate information requirement for their research work. This further reveals that the scholars are quite used to computer literacy and network literacy to elicit information in various field of research from multiple websites.

➔ Editorship Pattern

All the 1116 citations from 15 M.Phil dissertations covered under study also constitute the documents edited by different authors, organisers etc. and as such, there are 19 documents which were having the editors. Data relating to the number of editors such as, one editor, two editors, and more than 3 editors irrespective of the types of documents were placed in Table-5.

Table-5: Editorship Pattern

S/N	Citation Status	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	One editor	14	73.68	14	73.68
2	Two editors	3	15.78	17	89.47
3	More than three	2	10.52	19	100
	Total	**19**	**99.98 or 100**		

While analysing the data placed of the editorship pattern placed in Table-5, it was revealed that the contribution of articles by single editor is significant which comes to 14 out of 19 thus coming to 73.68% followed by 3 numbers having two editors which constitute 15.78% and more than 3 editors having 2 numbers of citations i.e. 10.52%. This shows that the editors are preferred to be solo than the team. This is more prevalent in festschrift volume, seminar proceedings etc.

➔ Categorization of Journals

Categorizations of journals are studied from among the cited articles by the scholars of all dissertations covered under study. Among the list of articles cited, a total of 451 citations from 123 journals were cited by the scholars. The categorization of journal has been classified into two types such as, National and International and has been listed in decreasing order of their citing frequency in Table-6.

Table-6: Categorization of Journals

S/N	Type	No. of Journals	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	International	96 (78%)	246	54.54	246	54.54
2	National	27 (22%)	205	45.45	451	100
	Total	**123**	**451**	**99.99 or 100**		

In all 15 M.Phil dissertations, a total number of 1116 citations were examined where the scholar identified 451 citations from 123 different journals in total that comprises both national and international. Analysis of the Table-6 reflects that while, there are 96 international (78%) journals, national journals comes to 27 (22%). Further, out of 451 citations in total from both the types of journals, 246 citations (54.54%) are having international status while, 205 citations are having national status which constitute 45.45%. This visualises that, the scholars are more prone to cite the journals emanated from outside rather home. This is primarily due to the availability of international journals through consortia in the libraries. However, sporadic attempts are required to be initiated by the library to use more e-resources available through consortia to get the return value.

➔ Ranking of Journals

Highly cited journals has higher impact factor which is a common parameter for measuring the relative importance of a journal. It is also useful in determining which journals are most resourceful for researchers. Citations in the dissertations are found across 451 from 123 Library and Information Science Journals and are listed in decreasing order of their frequency of citations in Table-7.

Table-7: Ranking of Journals

S/N	Rank	Name of Journal	Citation Frequency	National/ International	%
1	1	IASLIC Bulletin	39	National	8.64
2	2	Library Herald	38	National	8.42
3	3	ILA Bulletin	28	National	6.2
4	4	Herald of Library Science	24	National	5.32
5	5	Annals of Library and Information Studies	19	National	4.21
6	6	Journal of Documentation	15	International	3.32
7	7	D-Lib Magazine	14	International	3.10
8	7	Journal of Librarianship & Information Science	14	International	3.10
9	8	The electronic Library	13	International	2.88
10	9	Library and Information Science Research	12	International	2.66

11	9	SRELS Journal of Information Management	12	National	2.66
12	10	Annals of Library Science and Documentation	9	National	1.99
13	11	DESIDOC Bulletin of Information Technology	7	National	1.55
14	11	Journal of Library Administration	7	International	1.55
15	11	Library Hi Tech	7	International	1.55
16	12	ASLIB Proceeding	6	International	1.33
17	12	Collection Building	6	International	1.33
18	12	College and Research Libraries	6	International	1.33
19	12	Journal of the American Society for Information Science	6	International	1.33
20	13	Annual Review of Information Science and Technology	5	International	1.10
21	13	Information Technology & Libraries	5	International	1.10
22	13	Library Review	5	International	1.10
23	13	The Serials Librarian	5	International	1.10
24	13	University News	5	National	1.10
25	14	Library Progress	4	National	0.88
26	14	Online Information Review	4	International	0.88
27	14	Portal: Libraries and the Academy	4	International	0.88
28	14	Reference and Use Services Quarterly	4	International	0.88
29	15	Bulletin of Medical Library Association	3	International	0.66
30	15	Cataloguing & Classification Quarterly	3	International	0.66
31	15	Collection Management	3	International	0.66
32	15	Computer in libraries	3	International	0.66
33	15	Library gee Eehou	3	National	0.66
34	15	Library Quarterly	3	International	0.66
35	15	Library Trends	3	International	0.66
36	15	New Library World	3	International	0.66
37	15	The Journal of Academic Librarianship	3	International	0.66
38	16	15 journals having 2 citations each	30	Both National and International	6.65
39	17	71 journals having 1 citation each	71	Both National and International	15.74
		Total	**451**	**99.82 or 100**	

While analysing the ranking of journals placed in Table-7 it was observed that, out of a total number of 451 citations from 123 journals as already discussed while, IASLIC Bulletin stands at the apex for having been maximum 39 (8.64%) citations and thus keeps 1st position in the ranking order, Library Herald is at the 2nd position in the ranking order for having 38 citations (8.42%) and ILA Bulletin in the 3rd position for having 28 citations (6.20%). The ranking order of other journals cited by the scholars have been depicted in the table which clearly shows that, Herald of Library Science has 24 (5.32%) citations while, Annals of Library and Information Studies 19 (4.21%) citations, Journal of Documentation 15 (3.32%) citations, D-Lib Magazine and Journal of Librarianship and Information Science each having 14 (3.10%) citations, The Electronic Library having 13 (2.88%) citations, Library and Information Science Research and SRELS Journals of Information Management having 12 (2.66%) citations each, Annals of Library Science and Documentation having 9 (1.99%) citations, DESIDOC Bulletin of Information Technology, Journal of Library Administration and Library Hi Tech each having 7 (1.55%) citations, ASLIB Proceeding, Collection Building, College & Research Libraries, Journal of American Society for Information Science having 6 (1.33%) citations each, Annual Review of Information Science and Technology, Information Technology and Libraries, Library Review, The Serials Librarians, University News having 5 citations (1.10%) each, Library Progress, Online Information Review, Portal: Libraries and the Academic, Reference and Use Services Quarterly having 4 citations (0.88%) each, Bulletin of Medical Library Association, Cataloguing & Classification Quarterly, Collection Management, Computer in libraries, Library gee Eehou, Library Quarterly, Library Trends, New Library World and The Journal of Academic Librarianship having 3 citations each (0.66%). The other 15 journals are having 2 citations each and 71 journals having 1 citation each thus forms 6.65% and 15.74% respectively. It is interesting to note that, the national journals have been cited by the scholars compared to international as per analysis. This also further reflects that, the national journals are also in the parallel footing of international journals.

➔ Ranking of Top Cited Places

Top cited places based on the citations have been depicted below in Table- 8 where, the scholar has listed out all the 441 places and the table further reflects in the decreasing sequence of the places covering both National and International. Further, all 441 places reflects 15 ranking orders showing the citation frequency and percentage thereof.

Table-8: Ranking of Top Cited Places

S/N	Rank	Name of Place	Citation Frequency	National/ International	%
1	1	New Delhi	166	National	37.64
2	2	London	43	International	9.75
3	3	New York	26	International	5.89
4	4	Ahmadabad	22	National	4.98
5	5	Manipur	18	National	4.08

6	6	Mizoram	13	National	2.94
7	7	Kolkata	11	National	2.49
8	8	Nagaland	10	National	2.26
9	9	Illinois	9	International	2.04
10	10	Guwahati	7	National	1.58
11	10	Mumbai	7	National	1.58
12	10	Shillong	7	National	1.58
13	11	Washington D.C	6	International	1.36
14	12	Allahabad	5	National	1.13
15	12	Bangalore	5	National	1.13
16	12	Jaipur	5	National	1.13
17	12	Ludhiana	5	National	1.13
18	13	Cambridge	4	International	0.90
19	13	Canada	4	International	0.90
20	13	Oxford	4	International	0.90
21	13	Westport	4	International	0.90
22	13	Jorhat	4	National	0.90
23	13	Tezpur	4	National	0.90
24	14	California	3	International	0.68
25	14	Hersley, PA	3	International	0.68
26	14	Paris	3	International	0.68
27	14	Orissa	3	National	0.68
28	14	Tiruchirappali	3	National	0.68
29	14	Varanasi	3	National	0.68
30	15	Amsterdam	2	International	0.45
31	15	Lexington, MA	2	International	0.45
32	15	Puducherry	2	National	0.45
33	16	28 places having 1 citation each	28	Both National and International	6.34
		Total	**441**		**99.86 or 100**

Analysis of all 441 places shown in Table-8 reflects that, New Delhi (National) has got maximum of 166 citations (37.64%) followed by London (International) having 43 citations (9.75%), New York (International) with 26 citations (5.89%), Ahmadabad (National) having 22 citations (4.98%), Manipur (National) 18 citations (4.08%), Mizoram (National) 13 citations (2.94%), Kolkata (National) 11 citations (2.49%), Nagaland (National) 10 citations (2.26%), Illinois (International) 9 citations (2.04%), Guwahati (National), Mumbai (National) and Shillong (National) 7 citations (1.58%) each, Washington D.C (International) 6 citations (1.36%), Allahabad (National), Bangalore (National), Jaipur (National) and Ludhiana (National) 5 citations (1.13%) each, Cambridge (International), Canada (International), Oxford (International), Westport (International), Jorhat (National) and Tezpur (National) 4 citations (0.90%) each, California (International), Hersley, PA (International), Paris (International), Orissa

(National), Tiruchirappali (National) and Varanasi (National) 3 citations (0.68%) each, Amsterdam (International), Lexington, MA (International) and Puducherry (National) 2 citations (0.45%) each respectively constitute ranking order from 1 to 14 respectively. However, 28 places covering both national and international are having 1 citation each constituting thereby, 6.34%. The analysis further visualises that, the scholars while accessing library and internet come across wide range of information resources having value oriented research articles and authors throughout the globe contribute research output. It also visualises that, New Delhi happens to be centre of research publications for both books and journals.

➔ Ranking of Publishers

The publishers use to publish value added research articles in their journals and books. Highly cited articles are a common parameter for measuring the relative importance of a publication which may be either journal or book or both. It is also determines the resourcefulness of the books or journals which add substantial value for researchers. Citations across the dissertations constitute 477 Library and Information Science books, Proceedings of the Seminars, Reports, Theses, Dissertation, and Articles on website, e-books etc. and the various forms of publications are listed in decreasing order of their frequency of citations in Table-9.

Table-9: Ranking of Publishers

S/N	Rank	Name of Publisher	Citation Frequency	National/ International	%
1	1	INFLIBNET	85	National	17.81
2	2	Ess Ess	54	National	11.32
3	3	Vikas Publication	17	National	3.56
4	4	Archan Bingley	7	International	1.46
5	4	Chandos Publishing	7	National	1.46
6	4	Facet Publishing	7	International	1.46
7	4	APH	7	National	1.46
8	5	Author press	6	National	1.25
9	5	B R Publishing	6	National	1.25
10	5	Libraries Unlimited	6	International	1.25
11	5	Medallion Press	6	International	1.25
12	5	Mizoram University	6	National	1.25
13	5	UNESCO	6	International	1.25
14	6	American Library Association	5	International	1.04
15	6	ASLIB	5	International	1.04
16	6	Columbia University	5	International	1.04
17	6	DELNET	5	National	1.04
18	6	INSDOC	5	National	1.04
19	6	MALACON	5	National	1.04
20	6	Metropolitan Book Co	5	National	1.04

21	7	Anmol	4	National	0.83
22	7	Dominant	4	National	0.83
23	7	ILA	4	National	0.83
24	7	Manipur University	4	National	0.83
25	7	Rawat Publication	4	National	0.83
26	7	Sterling Publisher Pvt. Ltd	4	National	0.83
27	7	University of Illinois press	4	International	0.83
28	8	Cyber Tech Publication	3	National	0.62
29	8	DRTC	3	National	0.62
30	8	Idea Group of Reference	3		0.62
31	8	Jaico pub. House	3	National	0.62
32	8	Massachusetts institute of Technology	3	International	0.62
33	8	Mc Graw-Hill	3	International	0.62
34	8	Regional Research Laboratory	3	National	0.62
35	8	Sambalpur University	3	National	0.62
36	8	Shree Publishers and Distributors	3	National	0.62
37	8	Wiley Eastern	3	National	0.62
38	9	31 publishers having 2 citation each	62	Both National and International	12.99
39	10	102 publishers having 1 citation each	102	Both National and International	21.38
		Total	**477**		**99.69 or 100**

The scholar on analysis of the above Table-9 observed that out of the total 477 citations of books and other forms of documents excluding the journals articles, the scholars have cited INFLIBNET 85 citations (17.81%) followed by Ess Ess with 54 citations (11.32%), Vikas 17 (3.56%) citations, APH, Archan Bingley, Chandos and Facet 7 (1.46%) citations each, Author Press, B R Publishing, Libraries Unlimited, Medallion Press, Mizoram University and UNESCO with 6 (1.25%) citations each, American Library Association, ASLIB, Columbia University, DELNET, INSDOC, MALACON, and Metropolitan Book Co. has 5 (1.04%) citations each, Anmol, Dominant, ILA, Manipur University, and Rawat Publication, Sterling Publisher Pvt. Ltd., and University of Illinois Press has 4 (0.83%) citations each, Cyber Tech Publication, DRTC, Idea Group of Reference, Jaico Pub. House, Massachusetts Institute of Technology, McGraw-Hill, Regional Research Laboratory, Sambalpur University, Shree Publishers and Distributors and Wiley Eastern are having 3 (0.62%) citations each and 31different publishers from both national and international are having 2 citations each forming thereby 62 citations (12.99%) and 102 different publishers each having 1 citation forming thereby, 21.38%. It is

interesting to note that in spite of having a wide range of resources especially books in the library, the scholars in library and information science do prefer to use the publications of INFLIBNET followed by Ess Ess and Vikas which otherwise can be mentioned that the three publishers bring out the high rated research books in the subject.

➔ Subject Wise Distribution of Articles

Subject Wise Distribution of Articles is studied from among the cited articles by the scholars in their dissertations. Among the list of articles cited, a total of 1052 titles were cited by the scholars. The titles of the articles were classified in to different sub facets of the broad subject area of Library and Information Science. Library of Congress Subject Heading and Sears List of Subject Heading were used to determine the subject headings. A total number of 28 subject areas of Library and Information Science were determined which has been reflected below in decreasing order of their citing frequency in Table-10.

Table-10: Subject Wise Distribution of Articles

S/N	Rank	Subject	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	1	Academic Library	108	10.26	108	10.26
2	2	Library and Information Science	103	9.79	211	20.05
3	3	Electronic Information Resources	97	9.22	308	29.27
4	4	Information Retrieval	82	7.79	390	37.07
5	5	Information and Communication Technology	77	7.31	467	44.39
6	6	Digital Library	56	5.32	523	49.71
7	6	Libraries – Automation	56	5.32	579	55.03
8	7	Bibliometrics	53	5.03	632	60.07
9	8	Library Administration	51	4.84	683	64.92
10	9	Library Co-operation	42	3.99	725	68.91
11	10	Open Source Software	37	3.51	762	72.43
12	11	Institutional Repository	33	3.13	795	75.57
13	12	Collection Development	32	3.04	827	78.61
14	13	Information Literacy	31	2.94	858	81.55
15	13	Library Users	31	2.94	889	84.50
16	14	World Wide Web	26	2.47	915	86.97
17	15	Library Services	25	2.37	940	89.35
18	15	Open Access	25	2.37	965	91.73
19	16	Reference Service	15	1.42	980	93.15
20	17	Public Library	13	1.23	993	94.39
21	18	Information Resource Management	12	1.14	1005	95.53

22	18	Special Library	12	1.14	1017	96.67
23	19	Library Software	11	1.04	1028	97.71
24	20	Knowledge Management	6	0.57	1034	98.28
25	20	Research Methodology	6	0.57	1040	98.85
26	20	Search Techniques	6	0.57	1046	99.42
27	21	Preservation	5	0.47	1051	99.90
28	22	Copyright	1	0.09	1052	100
		Total	**1052**	**99.88 or 100**		

Analysis of the Table-10 shows that while, Academic Library is the highest 108 (10.26%) citations by the scholars in their dissertations in the subject-wise distribution, Library and Information Science has 103 (9.76%) citations and Electronic Information Resources has 97 (9.22%) citations and thus, it forms 1st, 2nd and 3rd in the ranking order respectively. The other subjects covered by the scholars in their dissertations include, Information Retrieval with 82 (7.79%) citations followed by, Information Communication Technology 77 (7.31%) citations, Digital Library and Library Automation 56 (5.32%) citations, Bibliometrics 53 (5.03%) citations, Library Administration 51 (4.84%) citations, Library Cooperation 42 (3.99%) citations, Open Source Software 37 (3.51%) citations, Institutional Repository 33 (3.12%) citations, Collection Development 32 (3.04%) citations, Library Users and Information Literacy 31 (2.94%) citations, World Wide Web 26 (2.47%) citations, Open Access and Library Services 25 (2.37%) citations, Reference Service 15 (1.42%) citations, Public Library 13 (1.23%) citations, Information Resource Management and Special Library 12 (1.14%) citations, Library Software 11 (1.04%) citations, Knowledge Management, Research Methodology and Search Techniques each having 6 (0.57%) citations, Preservation 5 (0.47%) citations and Copyright 1 (0.09%) citation. This also shows the research trends which, however, cannot be generalised in research.

➔ Chronological Distribution of Articles

The chronological distributions of articles cited by the scholars in their dissertation work have been depicted below in Table-11. This is also one of the major components of the study to determine the research value of a journal including the obsolescence of literature in a given field of study. The total periods commencing from 1776 to 2011 have been split into 25 groups with a gap of 10 years in between each showing the citation frequency and the percentage thereof including the cumulative frequencies and its percentage.

Table-11: Chronological Distribution of Articles

S/N	Year (10 yrs Gap)	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	1776	1	0.1	1	0.1
2	1777-1786	0	0	1	0.1
3	1787-1796	0	0	1	0.1
4	1797-1806	0	0	1	0.1

5	1807-1816	0	0	1	0.1
6	1817-1826	0	0	1	0.1
7	1827-1836	0	0	1	0.1
8	1837-1846	0	0	1	0.1
9	1847-1856	0	0	1	0.1
10	1857-1866	0	0	1	0.1
11	1867-1876	0	0	1	0.1
12	1877-1886	0	0	1	0.1
13	1887-1896	0	0	1	0.1
14	1897-1906	0	0	1	0.1
15	1907-1916	0	0	1	0.1
16	1917-1926	0	0	1	0.1
17	1927-1936	2	0.2	3	0.3
18	1937-1946	3	0.3	6	0.61
19	1947-1956	6	0.61	12	1.23
20	1957-1966	26	2.67	38	3.91
21	1967-1976	63	6.48	101	10.4
22	1977-1986	88	9.06	189	19.46
23	1987-1996	153	15.75	342	35.22
24	1997-2006	454	46.75	796	81.97
25	2007-2011	175	18.02	971	100
	Total	**971**	**99.94 or 100**		

The analysis of the chronological distributions of the articles placed in Table-11 shows that, in between 1997-2006 there is a high citation rate i.e. 454 (46.75%) out of 971 followed by 175 citations (18.02%) in between 2007-2011 and 153 citations (15.75%) during 1987-1996 and thus keeps 1st, 2nd, 3rd respectively. It is surprising to know that the number of citation increased from 6 (0.61%) to 26 (2.67%) during 1957-1966and chronologically it went on exceeding the number of citation till 1986.Again, it could be pointed out that 1777 till 1926 that there is a gap of 150 years there is absolutely no citation, which may be due to the fact that either the research output during the period is negligible or the documents of any type are available in the library or may not be having any research value of the articles either in books or journal even if it is present. However, the library should take measures in withdrawing the documents available from 1777 till 1926 and the current year documents be placed for access to the users. It also can be deduced that the research importance of the articles increases in the light of present trends which is visible from the present study.

➔ Application of Lotka's Law of Scientific Productivity

Lotka's law is the earliest and most widely-applied study in measuring the scientific productivity of an author. Lotka claims that a large proportion of the literature is produced by a small number of authors. Application of Lotka's Law of Scientific productivity of the study has been reflected in Table-12.

Table-12: Application of Lotka's Law of Scientific Productivity

S/N	Type of Author	No. of Articles	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	One time	709	709	73.31	709	73.31
2	Two times	79	158	16.33	867	89.65
3	Three times	11	33	3.41	900	93.07
4	Four times	5	20	2.06	920	95.13
5	Five times	6	30	3.10	950	98.24
6	Seven times	1	7	0.72	957	98.96
7	Ten times	1	10	1.03	967	100
	Total	**812**	**967**	**99.96 or 100**		

Maximum numbers of authors contributed a single article 709 (73.31%). This is followed by authors who contributed two times 79 (16.33%), three times authors contributed 11 (3.41%) of the total articles, authors who contributed four times 5 (2.06%) articles, author who contributed five times 6 (3.10%) articles and the authors who contributed seven and ten times remains the same in number that is 1 (0.72%) and (1.03%). The total citation frequency i.e. 967 are from 812 number of articles has been spelled in the type of author i.e. one time two times, three times etc. and up to 10 times. Lotka's Law of Scientific Productivity (authors publishing in a certain discipline) where the Law describes the frequency of publication by authors in a given field. It states that " . . . the number (of authors) making *n* contributions is about $1/n^2$ of those making one; and the proportion of all contributors, that make a single contribution, is about 60 percent". Moreover the frequency distributions of the author productivity match the generalized Lotka's Law.

Table-12 represents author productivity data for Lotka's law. Of the 967 unique author names, 709 (73.31%) produced one article, 79 (16.33%) produced two articles, 11 (3.41%) produced three articles, 5 (2.06%) produced four articles, 6 (3.10%) produced five articles, 1 (0.72%) produced Seven articles and 1 (1.03%) produced 10 articles.

➔ Application of Bradford's Law of Scattering

Taking Bradford's Law of Scattering into account that predicts the increasing productivity of Journals from one zone to the next (in expression 1: n: n^2), the total numbers of citations can be divided into three equal zones (Hertzel, 2010, p.560-573). It was found that, approximation the first zone containing 6 journals which are considered as Bradford's core journals. The second quantum of citations forming the second zone contained in approximately next 18 journals and the last quantum of citations contained in next 99 journals. Hence, the distribution partially complies with Bradford's Law. The zone wise distribution of journals is depicted in Table-13 and Table 13-A.

Table-13: Application of Bradford's Law of Scattering

S/N	Zone	Name of Journal	Citation Frequency	%	log	% as log value
1	1	IASLIC Bulletin	39	8.64	1.59106461	0.936513742
2	1	Library Herald	38	8.42	1.5797836	0.925312091
3	1	ILA Bulletin	28	6.2	1.44715803	0.792391689
4	1	Herald of Library Science	24	5.32	1.44715803	0.725911632
5	1	Annals of Library and Information Studies	19	4.21	1.2787536	0.624282096
6	1	Journal of Documentation	15	3.32	1.17609126	0.521138084
7	2	D-Lib Magazine	14	3.10	1.14612804	0.519827994
8	2	Journal of Librarianship & Information Science	14	3.10	1.14612804	0.519827994
9	2	The electronic Library	13	2.88	1.11394335	0.459392488
10	2	Library and Information Science Research	12	2.66	1.07918125	0.424881637
11	2	SRELS Journal of Information Management	12	2.66	1.07918125	0.424881637
12	2	Annals of Library Science and Documentation	9	1.99	0.95424251	0.298853076
13	2	DESIDOC Bulletin of Information Technology	7	1.55	0.84509804	0.190331698
14	2	Journal of Library Administration	7	1.55	0.84509804	0.190331698
15	2	Library Hi Tech	7	1.55	0.84509804	0.190331698
16	2	ASLIB Proceeding	6	1.33	0.77815125	0.123851641
17	2	Collection Building	6	1.33	0.77815125	0.123851641
18	2	College and Research Libraries	6	1.33	0.77815125	0.123851641
19	2	Journal of the American Society for Information Science	6	1.33	0.77815125	0.123851641
20	2	Annual Review of Information Science and Technology	5	1.10	0.69897	0.045322979
21	2	Information Technology & Libraries	5	1.10	0.69897	0.045322979
22	2	Library Review	5	1.10	0.69897	0.045322979

23	2	The Serials Librarian	5	1.10	0.69897	0.045322979
24	2	University News	5	1.10	0.69897	0.045322979
25	3	Library Progress	4	0.88	0.60205999	-0.05551733
26	3	Online Information Review	4	0.88	0.60205999	-0.05551733
27	3	Portal: Libraries and the Academy	4	0.88	0.60205999	-0.05551733
28	3	Reference and Use Services Quarterly	4	0.88	0.60205999	-0.05551733
29	3	Bulletin of Medical Library Association	3	0.66	0.47712125	-0.18045606
30	3	Cataloguing & Classification Quarterly	3	0.66	0.47712125	-0.18045606
31	3	Collection Management	3	0.66	0.47712125	-0.18045606
32	3	Computer in libraries	3	0.66	0.47712125	-0.18045606
33	3	Library gee Eehou	3	0.66	0.47712125	-0.18045606
34	3	Library Quarterly	3	0.66	0.47712125	-0.18045606
35	3	Library Trends	3	0.66	0.47712125	-0.18045606
36	3	New Library World	3	0.66	0.47712125	-0.18045606
37	3	The Journal of Academic Librarianship	3	0.66	0.47712125	-0.18045606
38	3	15 journals having 2 citations each	30	6.65	1.47712125	0.822821645
39	3	71 journals having 1 citation each	71	15.74	1.85125835	1.197004728
		Total	**451**	**99.82 or 100**		

The distribution of journals according to the Bradford's predicted zones (on an approximation) are: Zone-1: 6 journals (163 citations), Zone-2: 18 journals (144 citations), Zone-3: 99 journals (144 citations).

Table-13A: The distribution of journals according to the Bradford's predicted zones

S/N	Zone	No. of Journals	Citation Frequency	%	Cumulative Frequencies	Cumulative %
1	1	6	163	36.14	163	36.14
2	2	18	144	31.92	307	68.07
3	3	99	144	31.92	451	100
	Total	**123**	**451**	**99.98 or 100**		

The analysis of Table-13 and Table-13A reflects that the distribution of articles in Zone-1 consists of 6 journals which constitute 36.14% out of 123 journals and has the highest citations i.e. 163 among the other zones. Zone-2 consists of 18 journals i.e.31.92% having 144 citations and Zone-3 consists of 99 journals i.e. 31.92% having 144 citations.

According to Bradford, the zones, thus identified will form an approximately geometric series in the form of 1: n: n^2. But it is found that the relationship of each zone in the present study is 6: 18: 99 = 6: 6x3: 6x4^2 = 6: 18: 96 = 1: 3: 2^4

When 6 = n, then 1: n: n^4

This does not fit into Bradford's distribution.

6. FINDINGS

The scholar deduced the following findings based on the analysis of different tables:

- ➔ The journals are the most preferred form of document compared to books. However, other forms of documents also have a significant impact in providing useful information in the field of research as deduced from Table-1.
- ➔ With regard to authorship pattern placed in Table-2, single author has a significant value which comes to 67.63% compared to joint authors and three authors which form 22.44% and 4.6% respectively.
- ➔ While deducing the inference on analysis of the cited author distribution in Table-3, Krishan Kumar stands at the apex as the author has been cited 10 times followed by S.R. Ranganathan 7 times and Gopal Krishnan, Amritpal Kaur, C.C. Kuhlthau, P.S.G.Kumar, R.G. Prasher and I.K. Ravichandra Rao 5 times each respectively
- ➔ While discussing about the degree of collaboration i.e. single vs. multiple authors placed in 5.5, 313 represents the total number of multiple authors like, joint authors, triple authors, more than three authors and organization as author in the given field of study and 654 represents single author. Again while making an analysis of the degree of collaboration i.e. single vs. multiple authors, it was observed that, the degree of collaboration in the discipline is calculated as 0.47 and this shows the prevalence solo research in the field.
- ➔ The citation of website by the scholar in their dissertation as placed in Table-4 reveals after analysis that, organization sites stands at the apex because of 81 citations (42.63%) out of 190 in total followed by commercial sites 33 (17.36%) and academic sites 26 (13.68%) which constitute 1st, 2nd, 3rd in ranking order. This shows that organizations provide useful, authentic, reliable and distilled information pertaining to research.
- ➔ With regard to editorship pattern discussed in Table-5, single editor has a significant value by constituting 73.68% compared to two editors and more than three editors which constitutes 15.78% and 10.52% respectively.
- ➔ Table-6 after analysis reveals with regard to categorization of journals that, there are 96 international (78%) journals, national journals comes to 27 (22%). This is primarily due to the availability of international journals through consortia in the libraries.
- ➔ Analysis of ranking of journals placed in Table-7 discovers that, IASLIC Bulletin stands at the apex for having been maximum 39 (8.64%) citations and thus keeps 1st position in the ranking order; Library Herald is at the 2nd position in the ranking order for having 38 citations (8.42%) and ILA Bulletin in the 3rd position for having 28 citations (6.20%). It

could be found out that the national journal status is more compared to international journal. This is due to the fact that the scholars have cited only one time, two times and maximum 15 times the international journals while they have cited more in national journals.

- ➔ Ranking of place placed in Table-8 it could be visualized that, New Delhi (National) has got maximum of 166 citations (37.64%) followed by London (International) having 43 citations (9.75%), New York (International) with 26 citations (5.89%), which constitute 1^{st}, 2^{nd}, 3^{rd} in ranking order.
- ➔ With regard to ranking of publisher placed in Table-9, it revealed that, the scholars have cited INFLIBNET 85 citations (17.81%) followed by Ess Ess with 54 citations (11.32%), Vikas 17 (3.56%) citations which constitute 1^{st}, 2^{nd}, 3^{rd} in ranking order.
- ➔ While deducing the inference on analysis of subject wise distribution of articles discussed in Table-10 it disclosed that, Academic Library is having 108 (10.26%) citations by the scholars in their dissertation work has the highest value in the subject-wise distribution followed by Library and Information Science 103 (9.76%) citations, Electronic Information Resources 97 (9.22%) citations and thus, it forms 1^{st}, 2^{nd} and 3^{rd} in the ranking order respectively.
- ➔ With regard to chronological distribution of articles placed in Table- 11 in between 1997-2006 it was found that, there is a high citation rate i.e. 454 (46.75%) out of 971 followed by 175 citations (18.02%) in between 2007-2011 and 153 citations (15.75%) during 1987-1996 and thus keeps 1^{st}, 2^{nd}, 3^{rd} respectively. It also can be deduced that the research importance of the articles increases in the light of present trends which is visible from the present study.
- ➔ With regard to application of Lotka's law mentioned in Table-12 it could be inferred that, 709 (73.31%) authors produced one article each followed by 79 (16.33%) authors who produced two articles each, 11 (3.41%) authors produced three articles each, 5 (2.06%) authors produced four articles each, 6 (3.10%) authors who contributed for five articles, 1 (0.72%) produced Seven articles and 1 (1.03%) produced 10 articles where the frequency distributions of the author productivity match the generalized Lotka's Law.
- ➔ With regard to application of Bradford's law, the distribution of journals placed in Table-13 according to the Bradford's predicted zones (on an approximation) are: Zone-1: 6 journals (163 citations), Zone-2: 18 journals (144 citations), Zone-3: 99 journals (144 citations). Taking Bradford's Law of Scattering into account that predicts the increasing productivity of Journals from one zone to the next (in expression 1: n: n^2), the distribution partially complies with Bradford's Law. When 6 = *n*, then 1: *n*: n^4. This does not fit into Bradford's distribution.

7. SUGGESTIONS

Based on the findings, the scholar has put forward the following suggestions:

- ➔ Since most of the researches were obtained by the scholars from the university library, the user behavior could be revealed. The users still are having lacking of information which they can obtain from other electronic sources and database other than UGC-INFONET Digital Library Consortium. Therefore the library requires obtaining specially the statistical databases and other electronic resources to incorporate the data for research.
- ➔ Citation analysis happens to be a practical tool to determine the need-based collections of the user and accordingly the library requires developing the user-based collection development in print form and substantial electronic resources to support research.
- ➔ Even if the present study is confined to a specific discipline still than the users need could be revealed in higher degree of research with regard to collection of documents and the study can be extended in other subjects to strengthen the library need-based resources.
- ➔ Other bibliometric techniques and applications of mathematical formula in analyzing the validity of bibliometric laws has not been carried out so far, hence future scholars may consider taking up the test.
- ➔ Bibliographical errors when citing a document such as spelling mistakes, wrong year of publication, wrong titles etc are commonly found during citation study. Negligence of these errors is liable to give way to misinterpretation of data. As citation is an important device in evaluation of a journal or authors impact factor, therefore care should be taken when citing references.
- ➔ Further, the library requires in developing the e-journals having high impact factor for sustainability of research value.
- ➔ The library requires developing professionally skilled man power to handle the electronic documents and disseminate through internet so as to facilitate the researcher to use at any point of time.