BIBLIOMETRIC STUDY OF PUBLICATIONS IN CONFERENCE PROCEEDINGS OF CALIBER CONVENTIONS DURING 2008-2015

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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2017

CHAPTER - 1

INTRODUCTION

CHAPTER - 2

BIBLIOMETRICS: CONCEPTS

CHAPTER - 3

CALIBER CONVENTIONS: AN OVERVIEW

CHAPTER - 4

ANALYSIS OF CALIBER CONVENTIONS

CHAPTER - 5

CONCLUSION AND SUGGESTIONS

D E C L A R A T I O N

I, **Oliver Lalthlengliana**, hereby declare that the subject matter of this dissertation is the record of work done by me, and the contents of this dissertation did not form basis of the award of any previous degree to me or to the best of my knowledge to anybody else, and that the dissertation has not been submitted by me for any research degree in any other University/ Institute.

This is being submitted to the Mizoram University for the degree of Master of Philosophy in Library and Information Science.

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C E R T I F I C A T E

This is to certify that the dissertation entitled **"BIBLIOMETRIC STUDY OF PUBLICATIONS IN CONFERENCE PROCEEDINGS OF CALIBER CONVENTIONS DURING 2008-2015"** submitted by **OLIVER LALTHLENGLIANA** for the award of the Degree of Master of Philosophy in Library & Information Science is carried out under my supervision. This is the candidate's original work and is worthy of examination.

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ACKNOWLEDGEMENT

Ken Blanchard once said, “None of us is smart as all of us.” This quote reminds me of all the help people offer me during my research. The following dissertation is a work of an individual but it could have never seen day light without the guidance and efforts of lot of kits and kin.

First of all I thank the almighty God for his countless blessings that I received throughout my M. Phil. years.

The most influential person in bringing out this dissertation is my supervisor **Dr. Akhandanand Shukla**, Assistant Professor, Department of Library and Information Science, Mizoram University. It would be most inappropriate to complete my works without his wise guidance and supervision.

I extend my heartfelt gratitude to Department of Library and Information Science, Mizoram University for giving an opportunity to undergo this research. I would like to thank all my teachers at the department, fellow scholars and members of the non-teaching staff for their help and pleasant company.

I sincerely thank my parents **Rev. J. H. Zahluna** and **P. C. Zaliankhumi** for providing me the best effort they can, so that I can finish my work.

Place: Tanhril, Aizawl (Oliver Lalthlengliana)

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TABLE OF CONTENT

1.1 Introduction

The modern society is gradually transforming into a Knowledge Society and Information and Communication Technology (ICT) is the chief factor for this change. Information Communication Technology has become an important part of every aspect of life. Advancement in ICT has brought a multi dimensional change in Libraries and Librarianship. Many libraries around the world employed ICT facilities to improve its service. Computers are introduced in libraries around the world to perform task which was earlier executed manually by human being, this process is called "Library Automation". Library automation promotes efficiency in library services. In the mean time Library automation call for skills in handling the new method of carrying out the task at hand so it is important to make the work force of the libraries aware of these technologies and give them knowledge on working with them so that they can cope with this serious transition. Imparting this knowledge can be carried out through formal education and informal education. There are several institutions across the country where students are enrolled to learn lessons on modern technology and several organizations and universities organised workshops and seminars at state, national and international level to impart knowledge on library automation.

Conventions on Automation of Libraries in Education and Research (CALIBER), is such a convention in India which is organised bi-annually by the INFLIBNET centre. This convention had helped many library work force and LIS professionals to be acquainted with the modern technologies and help them implement such advance service in their libraries. CALIBER convention is organised under a specified theme which pertain to development of information services and embraces the modern technology in information dissemination. Meanwhile, outcome of any such seminars or conference can be drawn from mere assumption, but it is very important to indentify the impact of these seminars or conference with a critical scientific measurement. Bibliometric study of the CALIBER convention proceedings will assist in identification of the impact of the convention, the study stressed on its authorship pattern, geographical distribution of the authors, citation analysis, etc. Will bring numerous facts into the limelight and unveil a realistic concept on the acceptance of this convention.

1.2 Bibliometrics

The first signs of Bibliometric Studies can be traced back to 1917 in a study entitled 'The History of Comparative Anatomy: A Statistical Analysis' by Cole and Eale. In 1923, Hulme used the term 'Statistical Bibliography' to describe the study of use and non-use of information. In 1938, the term 'Statistical Bibliography' appeared again in Heckle's paper 'The Periodical Literature of Bio-Chemistry.' In 1948, Dr. S. R. Ranganathan comes up with the term "librametry" to connote the use of statistics to evaluate an existing or proposed library service and resources. Alan Pritchard's article 'Statistical bibliography or bibliometrics' (1969) was the first time where the term 'Bibliometrics' appeared, this article was published in December issue of *Journal of Documentation*. The term 'bibliometric' struck Alan Pritchard's thought with a view to replace the term 'Statistical Bibliography' with a better terminology.

Several intellectuals frame different definition for bibliometrics. Alan Pritchard defined bibliometrics as, "the application of mathematical and statistical methods to books and other media of communication." According to Fairthorne, "it is the quantitative treatment of properties of recorded discourse and behavior appertaining to it." Raising (1962) defined it as, "the assembling and interpretation of statistics relating to books and periodicals… to demonstrate the historical movements, to determine national and universal research, use of books and journal and to ascertain in many local situations the general use of books and journals."

Bibliometrics quantitatively analyse the properties and behaviour of recorded knowledge. Library Science does not depend on vivid assumptions and opinions derived out of thinking and experience. The theories and concept involved in Library Science depends on both qualitative and quantitative research and object analysis. In this very juncture, Bibliometrics plays a vital hand by providing a gateway for quantitative research in the fields of Library and Information Science. Bibliometry involved citation analysis, study of impact factor, publication counts, etc.

1.2.1 Types of Bibliometrics

Bibliometrics can be divided into two areas as:

A. Productivity Count (descriptive)
    a) Geographic (Countries)
    b) Time period (Era)
    c) Disciplines (Subjects)
B. Literature Usage Count (Evaluative)
    a) Reference
    b) Citation

1.2.2 Laws of Bibliometrics

The main areas in bibliometric research is concerns the application of Bibliometric Laws. The three mostly commonly used laws in bibliometric are: Lotka's Law of Scientific Productivity, Bradfords Law of Scattering, and Zipf's Law of Word Occurrence.

Lotka's Law of Scientific Productivity describes the counting names and the number of publications. A general formula for the relation between the frequency 'y' of persons making 'x' contribution as "$x^n y$=constant" finding the value of the constant when n=2. He observed that the number of one person's making 2 contributions is about one-fourth of those making one; 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 percent.

Bradford's Law of Scattering states that if scientific journals are arranged in order of decreasing productivity of articles on a given subject, they may be divided into a 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 $1:n:n^2$.... (Hertzel, 2003).

Zipf's Law of Word Occurrence states that in a long textual matter, if words are arrange in their decreasing order of frequency, then the rank of any given word of the text will be

inversely proportional to the frequency of occurrence of the word. In other words, if 'r' is the rank of a word and 'f' is its frequency, then mathematically Zipf's law can be stated as r.1/f, or r.f=c where 'c' is a constant (Jena, 2012, p.51).

1.3 Significance of Study

International CALIBER Conventions are very famous and one of the prestigious conference series conducted once in a two year period. Contributions are published in the form of conference proceedings. Only peer-reviewed articles are published in the proceedings. Research articles published in the form of journal has gained momentum in terms of scholarly communication and bibliometric researches whereas research articles published in the form of conference proceedings still lagging behind. There are numbers of conference proceedings available but very less from LIS fields have been analysed through bibliometric methods. Bibliometric analysis not only facilitates the scholar to have an in depth study of the articles but also open avenues for other types of publications. The study helped to know the distribution of articles published in the form of conference proceedings and geographical distribution of articles around the world which has shown the acceptability of Indian LIS literature at world level. Further study helped to know the degree of collaboration among authors and prevalent authorship patterns found in conference proceedings. Further, the study also helps to predict the trends of cited documents in conference proceedings.

1.4 Scope of Study

The present study was confined to assess the research contributions of LIS professionals published as full text in conference proceedings of CALIBER Convention organised by INFLIBNET Centre, Gandhinagar. The study has been conducted for last 5 CALIBER Conventions held during years from 2008-2015. The number of CALIBER Conventions covered under study is given in table 1. There are 319 published articles belongs to last 5 CALIBER Conventions held during 2008-2015.

Table 1: List of Published Articles in CALIBER Conventions

SN	CALIBER Convention Details	Number of Articles
1	6th International CALIBER 2008, February 28 - March 1, 2008 held at Allahabad	76
2	7th International CALIBER 2019, February 25-27, 2009 held at Puducherry	73
3	8th International CALIBER 2011, March 2-4, 2011 held at Goa	62
4	9th International CALIBER 2013, March 21-23, 2013 held at Gandhinagar, Gujarat	51
5	10th International CALIBER 2015, March 12-14, 2015 held at Shimla	57
	Total	**319**

1.5 Review of Literature

The researcher reviewed some of the relevant literature conducted on bibliometric studies are mentioned below:

Alam and Shukla (2016) studied the growth of Solar Physics research in India and it is identified that a total of 2066 literatures have been published in the area; and quantum of citations received by these literatures all together is 22254. **Chowdhury & Chowdhury (2016)** studied the research output of Netaji Subhas Institute of Technology, Delhi and found that institute has a great potential to maximise the levels of its publication output. It is identified that publications have increased over a given time but INDEST-AICTE consortium does not play a hand on the growth of publication at institute.

Gogoi (2016) studied the bibliometric study of articles and references provided at the end of each article contributed in *Indian Journal of Chemistry Section B*, Vol. 52B, 2013. It reveals that journal articles are dominantly cited which confirms that scientific journals played an important role in scientific communication. The year-wise distribution of

journals indicated that journals published from 2000-09 are highly preferred. In the field of Chemistry as a whole, it was also established that researchers mostly cites earlier works of 10-20 years. **Madhirasalam (2016)** conducted a study on the research output of PSG College of Technology, Coimbatore and found that 2357 papers were produced by the institute over a span of 44 years. Majority of the authors preferred Journals as a platform to publish their works.

Biradar and Tadasad (2015) measures the authorship pattern of literatures in the field of Economics, it is found that majority of the papers were single authored. **Dash (2015)** analysed the papers published in the Library Assessment Conference proceedings (2006-2014). It showed that the numbers of contributors are increasing over time and the contributors are handsomely restricted to the theme of LAC and University of Washington contributed most papers in the LAC during 2006 to 2014. **Nagarkar et al. (2015)** study intended to find out the productivity level of the faculties of Life Science department at the Savitribai Phule Pune University and understand the authorship pattern and identify the most preferred journals by the faculty members.

Doraswamy (2013) analysed 300 conference papers that were published in National Convention on Knowledge Library and Information Networking (NACLIN) from 2001 to 2008. It reveals that contribution is highest in NACLIN 2007 (54 papers) and lowest in NACLIN 2008 (23 papers) and the average number of articles per conference volume is 37.5. This study also reveals that out of 300 contributions the highest number i.e. 57 papers are submitted from New Delhi, followed by 42 from Maharashtra, 32 from Tamil Nadu and 26 each from Andhra Pradesh and Karnataka and 17 from Kerala. **Panda et al. (2013)** analysed publications and citation patterns in the *Journal of Information Literacy* from 2007-2012. It is found that the number of papers is not consistent and varies from volume to volume. Single author papers are largely dominant (68.70%) followed by two author papers (17.55%) and three author papers constitute 9.16 %. The papers have an average length of 9 pages which more or less confirm to the international practice. Majority of the papers are submitted from the United Kingdom which can hamper the image of this journal as an international journal. Most of the papers emanated from

academic institution. **Deshmukh (2011)** studied the nature of information source cited by contributors of Annals of Library and Information Studies, and also tend to establish a rank list of core journals in the fields of Library and Information Science. It is found that journals are dominantly cited followed by books. The contributors of Annals and Library and Information Studies cited the same chiefly.

Shriram (2011) analysed the growth of literature and their geographical distributions. It also studies the type of publications and their language-wise distributions. It is found that most of the literature on Artemisia appeared in form of journal articles in English. Out of 52 countries who participated in publishing such literature China ranked number one and India find its spot on the 8th position with 52 publications over the span of 15 years. **Sarkhel & RayChoudhury (2010)** studied the work published by BCKV with an aim to identify the department-wise quantum of publications, identify the authorship pattern and locate the area wise distributions of research publications. The Department of Agronomy has the highest publications (436 papers). Majority of the papers are published on the fields of plant production. **Ahmed & Rahman (2009)** analyzed the authorship distribution in the fields of nutrition research in Bangladesh so as to examine the validity of Lotka's Law using "full productivity" of authorship and come up with a conclusion that "full productivity" of authorship is not applicable to nutrition research in Bangladesh.

Krishna Moorthy et al. (2009) analysed the growth of literature in the fields of Diabetes in the MEDLINE database and identify the core journal in the fields of diabetes. It is found that a total of 97,454 literatures have been published in the fields of diabetes from 1995-2004. Publication was highest in 2003 (13,244 literatures) and lowest in 1995 (7,075 literatures). This paper ranked the journal *Diabetes Care* (USA) at number one place. **Sharma (2009)** studied the growth of Potato research during 1991-2007 by CPRI scientists and examine the authorship pattern as well as the proportion of single authored papers as against multi-authored papers. It is found that a total of 2603 research papers were produced during 1991-2007 and papers with two authors are greatest in number i.e. 834 followed by three author papers i.e. 728. **Kumar & Kumar (2008)** analysed 8093

citations given in the *Journal of Oilseeds Research* published during 1993-2004 and it show that journals are dominantly cited. Self-citations and collaborate authors is very common among the contributors of *Journals of Oilseeds Research.*

Dixit (2007) analysed the patterns of article published in the Journal of Indian Society for Cotton Improvement in terms of authorship, bibliographic forms, citations, contributing institutions and subjects. The study showed that the number of citation is increasing per year. **Gupta (2007)** investigated the growth of literature in LIS marketing, its publishing pattern and the types of information sources is LIS marketing. It is found that literature on LIS marketing is growing and the most of the literatures are in the form of journal articles. **Rajendiran & Parihar (2007)** identified various bibliometric indicators of articles published by the Indian Researchers in the field of LASER Science. This study revealed the slow growth of literature in LASER Science during 1995-2005. The Indian contribution to the world in the same literature has also witnessed a slow increase from 0.71 to 1.67%. **Sudhier Pillai (2007)** studied the authorship pattern in Physics by taking a sample of 11,412 journals and 1,328 book citation in the Physics doctoral dissertations awarded by the Indian Institute of Science. It found out that single author contributions are 56.4% and multi-author contributors constitute 43.6%.

Suryanarayana (2000) analysed the type of contributions and there geographic distribution over the years 1987-97 in Tobacco Research, a journal published by Indian Society of Tobacco Science. It studied the contributing institutions and authorship pattern, prepared a core list of journals useful for Tobacco research. It found out that the journal receives most of its articles from CTRI and its research stations. All the issues under study consisted of 69% main articles and 31% short communications. The rate of main articles showed signs of decreased during the period of this study. The main articles have an average of 9.2 citations. In all the papers 74.4% of the citations are from periodicals. **Verma et al. (2007)** analysed 131 contributions from the journal '*Annals of Library and Information Studies*' from several attributes of bibliography such as year-wise, state-wise and institution-wise distributions, authorship pattern, and citation analysis, etc. It was found that majority of the contributions are two-authored and

majority of the contributions came from New Delhi. With regard to citations 85 contributions have upto 10 citations.

Research Gap

On the analysis of above literature review, it has been observed that there are sufficient numbers of researches conducted on the bibliometric studies of journal articles. It is observed that, still there is lack of bibliometric researches on conference proceedings of LIS field. This research gap motivated to undertake the bibliometric study of conference proceedings of Library and Information Science held in India.

1.6 Research Design

1.6.1 Statement of the Problem

Scholarly communication mostly takes place in the form of journal articles as well as conference proceedings. These research articles bear original contribution to the field by the researchers. Most of the time, researchers have joint contribution from various geographic locations in the same field. Numbers of conferences have been organised by various institutions/ universities/ organisations etc. every year on the individual subject field. In the field of Library & Information Science (LIS), there are tremendous researches contributed and published in the form of conference proceedings. These researches conducted specially on particular themes and sub-themes of the field. Various studies have been conducted to know the trends of the subject field from the published literature in the form of journal but there is still lack of such kind of researches conducted on conference proceedings to know the trends and growth of the field.

The study was required to know the contributions made by researchers/ library professionals in conference proceedings towards global perspectives and what are the trends in scholarly communication of LIS researchers. The degree of collaboration among researchers and their geographical locations is required to know the correlation among them. From Indian LIS perspective, it was interesting to investigate bibliometric analysis of conference proceedings.

1.6.2 Objectives of the Study

The objectives of the study were to:

a) Identify the themes and sub-themes which gain the attention of the contributors.
b) Find the authorship pattern of contributors.
c) Assess the degree of collaboration among authors.
d) Find out geographical distribution of authors.
e) Assess the number of references and average number of reference per article.
f) Identify the bibliographic forms of document used as reference in articles.
g) Prepare the list of top 10 journals referred by paper contributors.

1.6.3 Research Methodology

The study has been designed to investigate the research contributions in conference proceedings of CALIBER Conventions through bibliometric analysis. The last five (5) CALIBER Conventions have been used for study. The survey and observation methods of research were found appropriate to undertake the study. The survey was conducted for retrieving 319 full text articles which is the *n* value for the study from CALIBER Convention's available under INFLIBNET Centre's website. The unavailable published articles were downloaded from the Institutional Repository of INFLIBNET Centre, especially made for holding INFLIBNET's publications. The obtained data was tabulated, organized, and analysed by the use of MS-Excel as statistical tools and technique.

1.7 Chapterization

The study has been divided into the following chapters:

Chapter 1: Introduction
Chapter 2: Bibliometrics: Concepts
Chapter 3: CALIBER Conventions: An Overview
Chapter 4: Analysis of CALIBER Conventions
Chapter 5: Conclusion & Suggestions
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LIST OF TABLES

4.1 Introduction

Analysis of data involves several mathematical and statistical techniques. Data analysis is an important part of the research work; and for this purpose vital data are acquired with suitable data collection technique. The acquired data are analyzed to bring forward the fruitful findings and conclusions.

4.2 Themes and Sub-themes of CALIBER conventions from 2008 – 2015

Since 1994, CALIBER convention was held annually until 2009 but from 2009 onwards the convention was organized once after every two years. The convention calls for paper with specified themes which are further divided into several sub-themes.

4.2.1 Main Themes of CALIBER convention 2008-2015

Like other conferences, CALIBER convention also had main themes and sub-themes for authors. Themes and sub-themes of the conference draw an outline about the conference. The following table displays the themes of CALIBER conventions and total number of published contributions towards them.

Table 4.1: Distribution of articles for main themes of CALIBER conventions

Year of CALIBER	Main Themes of CALIBER	No. of Papers	%
2008	From Automation to Transformation	76	24%
2009	E- Content Management: Challenge and Strategies	73	23%
2011	Towards Building a Knowledge Society: Library as Catalyst for Knowledge Discovery and Management	62	19%
2013	Library Vision 2020: Moving Towards the Future	51	16%
2015	Innovation Librarianship: Adapting to Digital Realities	57	18%
Total		319	

(Source: CALIBER Convention Websites)

Table 4.1 displays the number of articles in each CALIBER conventions held during 2008-2015. The CALIBER 2008 has the main theme "*From Automation to Transformation"* and received the highest number of articles i.e. 76 articles (24%) followed by CALIBER 2009 (73 articles) with the main theme "*E-Content Management: Challenge and Strategies"*, CALIBER 2011 (62 articles) with the main

theme "*Towards Building a Knowledge Society: Library as Catalyst for Knowledge Discovery and Management"*. CALIBER 2015 has 57 articles whereas CALIBER 2013 has the least number of articles (51 articles) amongst all five conventions.

4.2.2 Sub-themes of CALIBER 2008

Table 4.2: Distribution of articles among the sub-themes of CALIBER 2008

SN	Title of sub-themes	No. of Papers	%
1	Impact of ICT in LIS: Major Shifts and Practices	23	30%
2	Use of E-resource and UGC-Infonet Digital Library Consortium	21	28%
3	Evolving Technologies: RSS Feeds, Blogs, Web 2.0, Lib 2.0	10	13%
4	Content Aggregation and Content Presentations	8	10.5%
5	Digital Libraries: Federated Search and Metadata Harvesting	8	10.5%
6	Standards and Protocols in LIS	6	8%
Total		76	

(Source: CALIBER Convention Websites)

Table 4.2 shows the distribution of articles among the various sub-themes of CALIBER 2008. Analysis reveals that the sub-theme, "*Impact of ICT in LIS: Major Shifts and Practices"* attracted the highest number of papers (23 papers, 30%) out of total 76 papers published in its proceedings. The sub-theme, "U*se of E-resource and UGC-Infonet Digital Library Consortium"* has attracted 28% papers (21 papers) whereas the sub-theme "*Evolving Technologies: RSS Feeds, Blogs, Web 2.0, Lib 2.0"* has attracted only 13% (10) papers. Other sub-themes have less number of papers comparatively.

4.2.3 Sub-themes of CALIBER 2009

Table 4.3: Distribution of articles among the sub-themes of CALIBER 2009

SN	Title of the sub-themes	No. of Papers	%
1	E-Publishing	26	36%
2	Digital Preservation and Digital Persistence	16	22%
3	Web 2.0/Library 2.0	16	22%
4	Web-Content Management	15	20%
Total		73	

(Source: CALIBER Convention Websites)

Table 4.3 highlighted the distribution of papers among the different sub-themes of CALIBER 2009. Among the four sub-themes, "*E-Publishing"* received the highest number of papers (26) i.e. 36% followed by "*Digital Preservation and Digital Persistence"* (22%), "*Web 2.0/Library 2.0"* (22%), and "*Web-Content Management"* (20%). Except "*E-Publishing*", other sub-themes have almost equal number of articles.

4.2.4 Sub-themes of CALIBER 2011

Table 4.4 Distribution of articles among the sub-themes of CALIBER 2011

SN	Title of sub-themes	No. of Papers	%
1	Knowledge Discovery and Techniques	12	19%
2	Web Resource Management and Semantic Web	22	35%
3	Information Literacy	13	21%
4	Measuring Research Productivity and ROI	15	24%
Total		62	

(Source: CALIBER Convention Websites)

Table 4.4 shows that sub-theme, "*Web Resource Management and Semantic Web"* has the highest number of papers (22 papers) i.e. 35% of total papers contributed for the convention. The sub-theme, "*Measuring Research Productivity and ROI"* has 24% papers (15) while sub-theme, "*Information Literacy*" and "*Knowledge Discovery and Techniques*" have 21% and 19% papers respectively.

4.2.5 Sub-themes of CALIBER 2013

Table 4.5: Distribution of papers among the sub-themes of CALIBER 2013

SN	Title of sub-themes	No. of Papers	%
1	Migration towards Future	18	35%
2	Collaborative Library Services	17	33%
3	Open Access and Open Content	16	31%
Total		51	

(Source: CALIBER Convention Websites)

Table 4.5 shows the number of papers under each sub-themes of CALIBER 2013. The number of papers under the three sub-themes came in a sequence. The sub-theme, "*Migration towards Future"* has the highest number of papers (35%) followed by "*Collaborative Library Services"* (33%) and "*Open Access and Open Content" have*

31% papers. There is almost equal balance of research papers have been observed for the sub-themes of CALIBER 2013.

4.2.6 Sub-themes of CALIBER 2015

Table 4.6: Distribution of papers among the sub-themes of CALIBER 2015

SN	Title of sub-themes	No. of Papers	%
1	Scientometric, Bibliometrics, Webometrics, and Altmetrics	23	40%
2	Library 3.0	21	37%
3	e- Learning and Online Open Courses	13	23%
Total		57	

(Source: CALIBER Convention Websites)

Table 4.6 reveals the number of papers under the three sub-themes of CALIBER 2015. The sub-theme, "*Scientometric, Bibliometrics, Webometrics and Altmetrics*" has the highest number of papers (40%) followed by *"Library 3.0" (37%)* and "*e-Learning and Online Open Courses"* have 23% papers.

4.3 Analysis of Authorship Pattern of CALIBER Conventions 2008-2015

Table 4.7: Authorship Pattern in the CALIBER convention 2008-2015

Year of CALIBER	No. of Authors						Total No. of Authors	Total No. of Papers
	One	Two	Three	Four	Five	Six		
2008	24 (31.57%)	37 (48.68%)	13 (17.1%)	2 (2.63%)			145	76
2009	31 (42.46%)	21 (28.76)	16 (21.9%)	3 (4.1%)	1 (1.36%)	1 (1.36%)	144	73
2011	14 (22%)	32 (52%)	16 (26%)				126	62
2013	14 (27.45%)	24 (47%)	9 (17.64%)	3 (5.88%)	1 (1.96%)		106	51
2015	18 (32%)	20 (35%)	19 (33%)				115	57
Total	**101**	**134**	**73**	**8**	**2**	**1**	**636**	**319**

(Source: Primary Data)

Table 4.7 shows the authorship pattern of articles accepted for full text publication in CALIBER conventions during 2008-2015. From the analysis, CALIBER 2008 is dominated by the Two Authorship Pattern which constitutes 48.68% followed by Single Authorship Pattern (31.57%), and Three Authorship Pattern (17.1%). In

CALIBER 2009, Single Authorship Pattern is found to be most prevalent with 42.46% which is succeeded by Two Authorship Pattern (28.76%), Three Authorship Pattern (21.9%) and so on. In CALIBER 2011, majority of the articles are co-authored and Two Authorship pattern has a share of 52% followed by Three Authorship Pattern (26%), and Single Authorship Pattern (22%). CALIBER 2013 is dominated by Two Authorship Pattern (47%) followed by Single Authorship Pattern (27.45%), and Three Authorship Pattern (17.64%). The Two Authorship Pattern (35%) is found to be dominant in CALIBER 2015 followed by Three Authorship Pattern (33%), and Single Authorship Pattern (32%).

4.4 Degree of Collaboration among Authors

Table 4.8 Degree of Collaboration in CALIBER conventions from 2008- 2015

Year of CALIBER	Single Author (Ns)	Multiple Authors (Nm)	Total (Ns+Nm)	Degree of Collaboration
2008	24	52	76	0.68
2009	31	42	73	0.57
2011	14	48	62	0.77
2013	14	37	51	0.72
2015	18	39	57	0.68
Total	**101**	**218**	**319**	**0.68**

(Source: Primary Data)

The Degree of Collaboration (C) of the contributors has been calculated using the Subramanyam formula.

Degree of Collaboration (C) = $\frac{Nm}{Nm+Ns}$

Where,

C = Degree of Collaboration

Nm = Number of Multiple authors

Ns = Number of Single authors

Table 4.8 shows the degree of collaboration among authors. The degree of collaboration for CALIBER 2008 is 0.68. For the CALIBER 2009, degree of collaboration is 0.57 which is the lowest amongst all CALIBER conventions during

the study. CALIBER 2011 has degree of collaboration 0.77 which is the highest value amongst all CALIBER conventions during the study. CALIBER 2013 has 0.72 degree of collaboration whereas CALIBER 2015 has 0.68 degree of collaboration. The higher degree of collaboration tends to higher level of collaborative works and vice versa.

4.5 Analysis of Geographic Distribution of Authors

4.5.1 State-wise Distribution of the Indian Authors in CALIBER 2008

Table 4.9 State-wise distribution of the Indian authors in CALIBER 2008

SN	Name of State	No. of Authors	Percentage
1	Uttar Pradesh	29	20%
2	Karnataka	21	15%
3	West Bengal	13	9%
4	Maharashtra	12	8%
5	Delhi	12	8%
6	Assam	9	6%
7	Manipur	8	6%
8	Madhya Pradesh	7	5%
9	Rajasthan	5	4%
10	Gujarat	5	4%
11	Odisha	4	3%
12	Kerala	3	2%
13	Jammu and Kashmir	3	2%
14	Uttarakhand	3	2%
15	Punjab	3	2%
16	Tamil Nadu	3	2%
17	Chhattisgarh	1	1%
18	Mizoram	1	1%
	Total	142	100

(Source: Primary Data)

Table 4.9 shows the state-wise distribution of authors in CALIBER 2008. Uttar Pradesh has the highest number of contributors (20%), followed by Karnataka (15%), West Bengal (9%), Maharashtra (8%), and Delhi (8%) etc. In CALIBER 2008, total contributions came from 18 different States and Union Territories of India.

4.5.2 Country-wise Distribution of Authors in CALIBER 2008

Table 4.10: Country-wise distribution of authors in CALIBER 2008

SN	Country	No. of Authors	Percentage
1	India	142	98%
2	Bangladesh	3	2%
	Total	145	100

(Source: Primary Data)

Table 4.10 shows the country-wise distribution of authors in CALIBER 2008. Except India, only Bangladesh has contributed research papers to CALIBER 2008. The total contribution of authors of Bangladesh is 2% only.

4.5.3 State-wise Distribution of Indian Authors in CALIBER 2009

Table 4.11: State-wise distribution of Indian authors in CALIBER 2009

SN	Name of State	No. of Authors	Percentage
1	Karnataka	39	28%
2	Maharashtra	20	14.4%
3	West Bengal	19	13.7%
4	Delhi	12	9%
5	Tamil Nadu	10	7%
6	Kerala	7	5%
7	Andhra Pradesh	7	5%
8	Gujarat	5	4%
9	Himachal Pradesh	3	2%
10	Assam	2	1%
11	Madhya Pradesh	2	1%
12	Odisha	2	1%
13	Rajasthan	2	1%
14	Jharkhand	2	1%
15	Sikkim	2	1%
16	Manipur	1	1%
17	Uttarakhand	1	1%
18	Arunachal Pradesh	1	1%
19	Haryana	1	1%
	Total	138	

(Source: Primary Data)

Table 4.11 shows the state-wise distribution of authors in CALIBER 2009. Karnataka has the highest number of contributors (28%) followed by Maharashtra (14.4%), West Bengal (13.7%), Delhi (9%), and Tamil Nadu (7%) etc. In CALIBER 2009, 138 authors from 19 different States of India contributed research articles.

4.5.4 Country-wise Distribution of Authors in CALIBER 2009

Table 4.12: Country-wise distribution of authors in CALIBER 2009

SN	Name of Country	No. of Authors	Percentage
1	India	138	96%
2	UK	2	1.3 %
3	Iraq	1	0.69%
4	Taiwan	1	0.69%
5	Wales	1	0.69%
6	USA	1	0.69%
	Total	144	

(Source: Primary Data)

Table 4.12 shows country-wise distribution of authors in CALIBER 2009. The total contributions came from 6 countries around the globe. India has the highest number of contributors (96%) followed by United Kingdom (1.3%), Iraq, Taiwan, Wales, and USA with 0.69% each.

4.5.5 State-wise Distribution of Authors in CALIBER 2011

Table 4.13: State-wise distribution of authors in CALIBER 2011

SN	Name of State	No. of Authors	Percentage
1	Karnataka	21	18%
2	Maharashtra	19	16%
3	Gujarat	14	12%
4	Andhra Pradesh	12	10%
5	Kerala	11	9%
6	Delhi	8	7%
7	Assam	5	4%
8	Tamil Nadu	5	4%
9	West Bengal	5	4%
10	Madhya Pradesh	4	3%
11	Uttar Pradesh	4	3%
12	Goa	3	2.5%
13	Punjab	3	2.5%
14	Mizoram	2	2%
15	Telangana	2	2%
16	Chhattisgarh	1	1%
17	Rajasthan	1	1%
	Total	120	

(Source: Primary Data)

Table 4.13 display the state-wise distribution of contributors in CALIBER 2011. Analysis reveals that 120 author belong to 17 States of India contributed research papers for CALIBER 2011. Karnataka has the highest number of contributors (18%) followed by Maharashtra (16%), Gujarat (12%), Andhra Pradesh (10%), and Kerala (9%) etc.

4.5.6 Country-wise Distribution of Authors in CALIBER 2011

Table 4.14: Country-wise distribution of authors in CALIBER 2011

SN	Name of Country	No. of Authors	Percentage
1	India	120	95%
2	Kenya	1	0.79%
3	South Korea	1	0.79%
4	Sri Lanka	1	0.79%
5	Saudi Arabia	1	0.79%
6	UK	1	0.79%
7	Scotland	1	0.79%
	Total	126	

(Source: Primary Data)

Table 4.14 shows the country-wise distribution of article contributors in CALIBER 2011. India being the host country has the highest number of contributors (95%) followed by Kenya, South Korea, Sri Lanka, Saudi Arabia, UK, and Scotland (with 0.79% contributors each).

4.5.7 State-wise Distribution of Indian Authors in CALIBER 2013

Table 4.15: State-wise distribution of Indian authors in CALIBER 2013

SN	Name of State	No. of Authors	Percentage
1	Gujarat	18	18%
2	Kerala	18	18%
3	Maharashtra	18	18%
4	Delhi	9	9%
5	Karnataka	6	6%
6	Rajasthan	5	5%
7	Chhattisgarh	4	4%
8	Madhya Pradesh	4	4%
9	Andhra Pradesh	3	3%
10	Assam	3	3%
11	Jammu and Kashmir	3	3%
12	Tamil Nadu	3	3%

13	West Bengal	3	3%
14	Uttarakhand	2	2%
15	Odisha	1	1%
16	Uttar Pradesh	1	1%
	Total	101	

(Source: Primary Data)

Table 4.15 highlights the state-wise distribution of authors in CALIBER 2013. Article contributions came from 16 different States of India among which Gujarat, Maharashtra and Kerala shares the first place with 18% authors followed by Delhi, Karnataka and Rajasthan with 9%, 6% and 5% of the authors respectively.

4.5.8 Country-wise Distribution of Authors in CALIBER 2013

Table 4.16: Country-wise distribution of authors in CALIBER 2013

SN	Name of Country	No. of Authors	Percentage
1	India	101	95%
2	Tanzania	2	1.88%
3	Sri Lanka	2	1.88%
4	USA	1	0.94%
	Total	106	

(Source: Primary Data)

Table 4.16 shows the country-wise distribution of authors in CALIBER 2013. Out of total number of authors, 95% authors are from India and the rests are from foreign countries like Tanzania, Sri Lanka, and USA. Among the foreign countries, Tanzania and Sri Lanka have equally 1.88% contributors followed by USA with 0.94% contributors.

4.5.9 State-wise Distribution of Authors in CALIBER 2015

Table 4.17: State-wise distribution of authors in CALIBER 2015

SN	Name of State	No. of Authors	Percentage
1	Gujarat	13	12.74%
2	Delhi	11	10.78%
3	Uttar Pradesh	9	8.82%
4	Karnataka	8	7.84%
5	Maharashtra	8	7.84%
6	Kerala	6	5.88%
7	Odisha	5	5%

8	Punjab	5	5%
9	West Bengal	5	5%
10	Jammu and Kashmir	4	3.92%
11	Madhya Pradesh	4	3.92%
12	Rajasthan	4	3.92%
13	Tamil Nadu	4	3.92%
14	Uttarakhand	4	3.92%
15	Andhra Pradesh	3	3%
16	Himachal Pradesh	3	3%
17	Sikkim	3	3%
18	Puducherry	2	2%
19	Bihar	1	1%
		102	

(Source: Primary Data)

Table 4.17 display the state-wise contribution of authors in CALIBER 2015. A total of 102 authors belong to 19 States of India contributed research articles in CALIBER 2015. Gujarat has the highest number of contributors (12.74%) followed by Delhi (10.78%), Uttar Pradesh (8.82%), Karnataka and Maharashtra (7.84% each) etc.

4.5.10 Country-wise Distribution of Authors in CALIBER 2015

Table 4.18: Country-wise distribution of authors in CALIBER 2015

SN	Name of Country	No. of Authors	Percentage
1	India	102	88.69%
2	Sri Lanka	3	2.60%
3	UK	3	2.60%
4	Singapore	2	1.73%
5	Fiji	2	1.73%
6	Canada	1	0.86%
7	Scotland	1	0.86%
8	Spain	1	0.86%
	Total	115	

(Source: Primary Data)

Table 4.18 shows the country-wise distribution of authors in CALIBER 2015. The authors came from 8 different countries from around the globe. There is no doubt that India has the highest number of contributors (88.69%). Among the foreign countries, Sri Lanka and UK has the highest contributors (2.60% each) followed by Singapore and Fiji (1.73% each), Canada, Scotland, and Spain (0.86% each).

4.5.11 Summary of Distribution of Authors State-wise during 2008-2015

Table 4.19: Summary of State-wise distribution of authors during 2008-2015

Name of State	No. of Authors	Percentage
Karnataka	95	15.75
Maharashtra	77	12.76
Gujarat	55	9.12
Delhi	52	8.62
Kerala	45	7.46
West Bengal	45	7.46
Uttar Pradesh	43	7.13
Andhra Pradesh	25	4.14
Tamil Nadu	25	4.14
Madhya Pradesh	21	3.48
Assam	19	3.15
Rajasthan	17	2.81
Odisha	12	1.99
Punjab	11	1.82
Jammu and Kashmir	10	1.65
Uttarakhand	10	1.65
Manipur	9	1.49
Chhattisgarh	6	0.99
Himachal Pradesh	6	0.99
Sikkim	5	0.82
Goa	3	0.49
Mizoram	3	0.49
Jharkhand	2	0.33
Puducherry	2	0.33
Telangana	2	0.33
Arunachal Pradesh	1	0.16
Bihar	1	0.16
Haryana	1	0.16
Total	603	

(Source: Primary Data)

Table 4.19 shows the summary of state-wise distribution of authors during 2008-2015. From the analysis of table, it has been found that Karnataka state has contributed the highest number of authors (95) followed by Maharashtra (77), Gujarat (55), Delhi (52), Kerala and West Bengal (45 each) and Uttar Pradesh (43) etc.

4.5.12 Summary of Distribution of Authors Country-wise during 2008-2015

Table 4.20: Summary of Country-wise distribution of authors during 2008-2015

Name of Country	No. of Authors	Percentage
India	603	94.81
Sri Lanka	6	0.94
UK	6	0.94
Bangladesh	3	0.47
Fiji	2	0.31
Scotland	2	0.31
Singapore	2	0.31
Tanzania	2	0.31
USA	2	0.31
Canada	1	0.15
Iraq	1	0.15
Kenya	1	0.15
Saudi Arabia	1	0.15
South Korea	1	0.15
Spain	1	0.15
Taiwan	1	0.15
Wales	1	0.15
Total	636	

(Source: Primary Data)

Table 4.20 shows the summary of country-wise distribution of authors during 2008-2015. From the analysis of table, it has been found that India is the top contributor for CALIBER conventions and covered 94.81% authors whereas rests of authors (33) belongs to 16 different foreign countries. Amongst the foreign contributors, Sri Lanka and United Kingdom both have contributed highest (6 authors each) followed by Bangladesh (3) etc.

4.6 Reference Study of CALIBER Conventions during 2008-2015

4.6.1 Analysis of References per Article in CALIBER conventions from 2008–2015

Table 4.21: References per article in CALIBER conventions from 2008-2015

Year of CALIBER	Total No. of References	No. of Papers	References per Article
2008	773	76	10.17
2009	780	73	10.68
2011	756	62	12.19
2013	666	51	13.05
2015	620	57	10.87
Total	**3595**	**319**	**11.26**

(Source: Primary Data)

Table 4.21 shows the number of reference per article in CALIBER conventions from 2008-2015. The number of reference per article is the highest for CALIBER 2013 (13.05) followed by CALIBER 2011 (12.19), CALIBER 2015 (10.87), CALIBER 2009 (10.68), and CALIBER 2008 (10.17). There are total 3595 references found for 319 published papers. On the observation of table 4.21, it has been found that CALIBER 2009 has the highest number of references (780) followed by CALIBER 2008 (773), CALIBER 2011 (756), CALIBER 2013 (666), and CALIBER 2015 (620). From all the CALIBER conventions, on an average 11.26 references per article has been found.

4.6.2 Forms of Document used as Reference in CALIBER 2008

Table 4.22: Forms of document used as reference in CALIBER 2008

Forms of Document	No. of References	%
Web Resources	185	24%
Journal articles	221	29%
Books	135	17%
Conference Papers	78	10%
Miscellaneous	70	9%
News Items	60	8%
Theses and Dissertations	13	2%
Reports	11	1%
Total	773	

(Source: Primary Data)

Table 4.22 reveals the number of references for a given form of documents in CALIBER 2008. In CALIBER 2008, there are total of 773 references. Journal articles have been cited most frequently (29%) followed by Web Resources (24%), Books (17%), Conference Papers (10%), Miscellaneous (9%), News Items (8%), Theses and Dissertations (2%) and Reports (1%).

4.6.3 Forms of Document used as Reference in CALIBER 2009

Table 4.23: Forms of document used as reference in CALIBER 2009

Forms of Document	No. of References	%
Web Resources	213	27%
Journal articles	235	30%
Books	73	9%
Conference Papers	91	12%
Miscellaneous	71	9%
Reports	55	7%
News Items	13	2%
Theses and Dissertations	29	4%
Total	780	

(Source: Primary Data)

Table 4.23 shows the analysis of forms of document used as references in CALIBER 2009. Among the various forms of document, Journal Articles (30%) are most preferred source for references followed by Web based Resources (27%), Conference Papers (12%), Books (9%), Miscellaneous (9%), Reports (7%), Theses/Dissertations (4%) and News Items (2%).

4.6.4 Forms of Document used as Reference in CALIBER 2011

Table 4.24: Forms of document used as reference in CALIBER 2011

Forms of Document	No. of References	%
Journal articles	297	39.28%
Web Resources	227	30.2%
Books	88	11.64%
Conference Papers	80	10.58%
Miscellaneous	26	3.43%
Reports	19	2.51%
Theses and Dissertations	14	1.85%
News Items	5	0.66%
Total	756	

(Source: Primary Data)

Table 4.24 display the number of references for a given forms of document. Analysis shows that Journal Articles are highly cited (39.28%) by the authors followed by Web based Resources (30.2%), Books (11.64%), Conference Papers (10.58%), Miscellaneous (3.43%), Reports (2.51%), Theses/Dissertations (1.85%) and News Items (0.66%).

4.6.5 Forms of Document used as Reference in CALIBER 2013

Table 4.25: Forms of document used as reference in CALIBER 2013

Forms of Document	No. of References	%
Journal articles	234	34%
Web Resources	205	31%
Conference Papers	81	12%
Books	70	11%
Miscellaneous	47	7%
Reports	16	2%
Theses and Dissertations	8	1%
News Items	5	1%
Total	666	

(Source: Primary Data)

Table 4.25 shows the frequency of references for a given forms of document in CALIBER 2013. The highest number of references have been recorded for Journal Articles (34%) followed by Web based Resources (31%), Conference Papers (12%), Books (11%), Miscellaneous (7%), Reports (2%), Theses/Dissertations (1%) and News Items (1%).

4.6.6 Forms of Document used as Reference in CALIBER 2015

Table 4.26: Forms of document used as reference in CALIBER 2015

Forms of Document	No. of References	%
Journal articles	318	51.29%
Web Resources	185	29.83%
Books	62	10%
Conference Papers	22	3.5%
Miscellaneous	11	1.77%
Reports	10	1.61%
News Items	8	1.29%
Theses and Dissertations	4	0.64%
Total	620	

(Source: Primary Data)

Table 4.26 shows frequency of references for a given forms of document in CALIBER 2015. Journal articles has been extensively used as references (51.29%) followed by Web based Resources (29.83%), Books (10%), Conference Papers (3.5%), Miscellaneous (1.77%), Reports (1.61%), News Items (1.29%), and Theses/Dissertations (0.64%).

4.6.7 Summary of Forms of Documents in CALIBER conventions

Table 4.27: Forms of document cited in CALIBER conventions during 2008-2015

Forms of Document	Total No. of References	Percentage
Journal Articles	1305	36%
Web Resources	1015	28%
Books	428	12%
Conference Papers	352	10%
Miscellaneous	225	6%
Reports	111	3%
News Items	91	2.5%
Theses / Dissertations	68	2%
Total	3595	100

(Source: Primary Data)

A study has been conducted to identify the prevailing forms of document cited in the proceedings of CALIBER conventions 2008 – 2015. Table 4.27 shows that a total of 3595 references from the 319 papers accepted for full-text publishing. Analysis of the table shows that Journal Articles are most frequently cited (36%) by the authors for writing papers followed by Web Resources (28%), Books (12%), Conference Proceedings/ Seminar Papers (10%), Miscellaneous (6%), Reports (3%), Theses/Dissertations (2%), and New Items (2.5%).

4.7 List of Top 10 Journals cited in CALIBER conventions from 2008-2015

4.7.1 List of Top 10 Journals cited in CALIBER 2008

Table 4.28: List of Top 10 Journals cited in CALIBER 2008

SN	Name of Journal	Frequency of Citations
1	Library Hi Tech News	14
2	Library Trends	10
3	IASLIC Bulletin	8
4	University News	8
5	Library Herald	7
6	SRELS Journal of Information Management	7
7	DESIDOC Bulletin of Information Technology	6
8	D-Lib Magazine	6
9	ILA Bulletin	6
10	The Electronic Library	6

(Source: Primary Data)

Table 4.28 shows the list of top 10 journals cited by the authors in their articles appeared in CALIBER 2008. A total of 92 journals have been cited among which 'Library Hi Tech News' is most frequently cited journal (14 citations) followed by 'Library Trends' (10 citations) etc. The full list of journals is available at Annexure – I.

4.7.2 List of Top 10 Journals cited in CALIBER 2009

Table 4.29: List of Top 10 Journals cited in CALIBER 2009

SN	Name of Journal	Frequency of Citations
1	Journal of the American Society for Information Science and Technology	10
2	D-Lib Magazine	8
3	College and Research Libraries	6
4	Journal of Medical Internet Research	6
5	Program	6
6	ASLIB Journal of Information Management	4
7	DESIDOC Bulletin of Information Technology	4
8	Library Hi Tech News	4
9	Library Journal	4
10	Nature	4

(Source: Primary Data)

Table 4.29 shows the list of top 10 journals cited by the authors in their articles appeared in CALIBER 2009. A total of 138 journals have been cited among which 'Journal of the American Society for Information Science and Technology' is most frequently cited journal (10 citations) followed by 'D-Lib Magazine' (8 citations) etc. The full list of journals is available at Annexure – II.

4.7.3 List of Top 10 Journals cited in CALIBER 2011

Table 4.30: List of Top 10 Journals cited in CALIBER 2011

SN	Name of the Journal	Frequency of Citations
1	Annals of Library and Information Studies	17
2	Library Hi Tech	13
3	Annals of Library Science and Documentation	12
4	SRELS Journal of Information Management	12
5	DESIDOC Bulletin of Information Technology	9
6	IASLIC Bulletin	9

7	Electronic Library	7
8	Journal of Library and Information Science	7
9	Library Review	7
10	Current Science	6

(Source: Primary Data)

Table 4.30 shows the list of top 10 journals cited by the authors in their articles appeared in CALIBER 2011. A total of 129 journals have been cited among which 'Annals of Library and Information Studies' is most frequently cited journal (17 citations) followed by 'Library Hi Tech' (13 citations) etc. The full list of journals is available at Annexure – III.

4.7.4 List of Top 10 Journals cited in CALIBER 2013

Table 4.31: List of Top 10 Journals cited in CALIBER 2013

SN	Name of the Journal	Frequency of Citations
1	DESIDOC Journal of Library and Information Technology	12
2	The Electronic Library	10
3	Inter-lending and Document Supply	9
4	Library Hi Tech News	8
5	Library Philosophy and Practice	8
6	OCLC Systems and Services	7
7	The Journal of Academic Librarianship	7
8	Annals of Library and Information Studies	5
9	First Monday	5
10	Journal of Documentation	5

(Source: Primary Data)

Table 4.31 shows the list of top 10 journals cited by the authors in their articles appeared in CALIBER 2013. A total of 127 journals have been cited among which 'DESIDOC Journal of Library and Information Technology' is most frequently cited journal (12 citations) followed by 'The Electronic Library' (10 citations) etc. The full list of journals is available at Annexure – IV.

4.7.5 List of Top 10 Journals cited in CALIBER 2015

Table 4.32: List of Top 10 Journals cited in CALIBER 2015

SN	Name of the Journal	Frequency of Citations
1	World Libraries	14
2	WSEAS Transaction on Advances in Engineering Education	14
3	Wilson Library Bulletin	13
4	Vine	9
5	University News	8
6	The Library	6
7	The Library Quarterly	6
8	The Reading Matrix	6
9	The Sociological Quarterly	6
10	The Electronic Library	5

(Source: Primary Data)

Table 4.32 shows the list of top 10 journals cited by the authors in their articles appeared in CALIBER 2015. A total of 173 journals have been cited among which 'World Libraries' and 'WSEAS Transaction on Advances in Engineering Education' is most frequently cited journal (14 citations each) followed by 'Wilson Library Bulletin' (13 citations) etc. The full list of journals is available at Annexure – V.

4.7.6 Summary of Top LIS Journals cited in CALIBER during 2008-2015

Table 4.33: List of Top LIS Journals cited in CALIBER during 2008-2015

SN	Name of the Journal	Frequency of Citations
1	Electronic Library	28
2	Library Hi Tech News	26
3	Annals of Library and Information Studies	22
4	SRELS Journal of Information Management	19
5	DESIDOC Bulletin of Information Technology	19
6	IASLIC Bulletin	17
7	University News	16
8	WSEAS Transaction on Advances in Engineering Education	14
9	World Libraries	14
10	D-Lib Magazine	14
11	Wilson Library Bulletin	13
12	Library Hi Tech	13

13	DESIDOC Journal of Library and Information Technology	12
14	Annals of Library Science and Documentation	12
15	Library Trends	10
16	Journal of the American Society for Information Science and Technology	10

(Source: Primary Data)

Table 4.33 shows the list of top LIS journals cited by the authors in their articles appeared in CALIBER conventions during 2008-2015. A total of 16 LIS journals have been mentioned here which were cited more than 10 times. The journal 'Electronic Library' has been cited highest in CALIBER conventions held during 2008-2015 followed by 'Library Hi Tech News', 'Annals of Library and Information Studies', 'SRELS Journal of Information Management', 'DESIDOC Bulletin of Information Technology', and 'IASLIC Bulletin' etc.

4.8 Research Findings

The analysis of data collected through survey and observation have been critically analyzed that revealed several findings which are as follows:

1) CALIBER 2008 has the highest number of papers (76) followed by CALIBER 2009 (73), and CALIBER 2011 (62).
2) CALIBER 2008 theme has been divided into 6 sub-themes in which ICT and E-resources related concepts have majority of contributions. The theme of CALIBER 2009 has been divided into 4 sub-themes in which electronic publishing related concepts has highest number of contributions. CALIBER 2011 theme has been divided into 4 sub-themes and web resources related concept has received the highest number of papers. CALIBER 2013 theme has been divided into 3 sub-themes in which almost equal number of papers contribution has been made. The theme of CALIBER 2015 has been divided into 3 sub-themes and in which scientometric related concepts have received the highest number of papers.
3) CALIBER conventions during 2008-2015 have published 319 papers contributed by 636 authors. There are 101 papers have been contributed by 101 authors whereas 218 papers have been contributed by 535 authors. It shows that multiple authorships are prevalent in CALIBER conventions also.

The two authorship pattern (134) has been found most prevalent followed by single authorship pattern (101), and three authorship pattern (73) etc.

4) The Degree of Collaboration has been calculated for the published proceedings of CALIBER conventions held during 2008-2015. The range of Degree of Collaboration is 0.57 to 0.77 for CALIBER conventions. The average Degree of Collaboration is 0.68 for overall convention publications which reveals the existence of high degree of collaborative research among authors.
5) The geographic distribution of authors (State-wise) have been analysed and found that 28 States and Union Territories of India have contributed papers for CALIBER conventions during 2008-2015. Further, majority of the authors belong to Karnataka (15.75%) followed by Maharashtra (12.76%), Gujarat (9.12%), Delhi (8.62%), Kerala (7.46%), West Bengal (7.46%), and Uttar Pradesh (7.13%) etc. The least number of contributors belong to Arunachal Pradesh, Bihar, and Haryana (0.16% each).
6) The geographic distribution of authors (Country-wise) have been analysed and found that 17 countries around the globe including India have contributed papers for CALIBER conventions during 2008-2015. Further, majority of the authors belong to India (94.81%). Amongst the foreign countries, 6 authors of Sri Lanka and UK contributed the paper followed by Bangladesh (3), Fiji, Scotland, Singapore, Tanzania, and USA (2 each), and rests of 8 countries have only one author each. Out of 636 authors, only 33 authors belong to foreign countries which are very less in number comparatively.
7) The number of references per articles is counted for each CALIBER convention separately and combined also. The highest number of references encountered for CALIBER 2009 (780) whereas least references for CALIBER 2015 (620). There are total 3595 references for 319 articles which gives an average 11.26 references per article.
8) The forms of documents have been analysed from all the references used in CALIBER conventions during 2008-2015. From the study, it has been found that Journal articles are preferred source of reference for writing a research paper followed by Web based resources, books, and conference papers. Theses/ Dissertations are least used source of information.

9) The study has been conducted to found the list of core journals which were used in the references of CALIBER conventions papers. On analysis, it has been found that '*Electronic Library*', '*Library Hi Tech News', 'Annals of Library and Information Studies', 'SRELS Journal of Information Management', 'DESIDOC Bulletin of Information Technology', 'IASLIC Bulletin'* etc. are core journals of the field as cited many times in the references of CALIBER convention papers.

LIST OF ABBREVIATIONS

CALIBER	Convention on Automation of Libraries in Education and Research Libraries
CDS/ISIS	Computerized Documentation System/ Integrated Sets of Information System
CEC	Consortium of Education Communication
CLOCKSS	Controlled Lot of Copies Keep Safe Stuff
CTRI	Central Tobacco Research Institute
DESIDOC	Defense Scientific Information and Documentation Centre
DRTC	Documentation Research and Training Centre
ERNET	Education and Research Network
GIST	Global Information Systems Technology
ICT	Information and Communication Technology
INFLIBNET	Information and Library Network
INSDOC	Indian National Scientific Documentation Centre
IPR	Intellectual Property Rights
ISBN	International Standard Book Number
LAC	Library Assessment Conference
LASER	Light Amplification by Stimulated Emission of Radiation
LIS	Library and Information Science
LOCKS	Lot of Copies Keep Safe Stuff
MEDLINE	MEDLARS Online System
MOOC	Massive Open Online Course
MOU	Memorandum of Understanding
NAAC	National Assessment and Accreditation Council
NACLIN	National Convention on Library and Information Networking

NASSDOC	National Science Documentation Centre
NISSAT	National Information System for Science and Technology
OPAC	Open Public Access Catalogue
OSS	Open Source Software
PASCAL	Preservation and Storage Centre for Academic Libraries
Ph. D.	Doctor of Philosophy
R&D	Research and Development
SOUL	Software for University Libraries
UGC	University Grants Commission
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USA	United States of America
VSAT	Very Small Aperture Terminal

3.1 Introduction

Several libraries around the globe are fighting for their share of survival in this ICT era. The introduction of typewriters in 1800s and innovations ranging from printing press to microcomputers have affected a wide spectrum of library operations (Reynolds, 1985). Need for change in the library and its services is noticed by various governments and there are several initiatives taken by different countries at different levels. Convention on Automation of Libraries in Education and Research Institutions (CALIBER) is such an initiative organized by Information and Library Network (INFLIBNET) Center after every two years. CALIBER conventions had been successfully held in different part of the country with the partnership of different universities. The detailed information regarding to each CALIBER conventions have been mentioned below:

3.2 CALIBER Conventions

Till now nineteen (19) CALIBER conventions have been organized in different parts of the country. The summary of CALIBER conventions are given below:

Table 3.1: CALIBER conventions summary

SN	Name & Year	Place	Date
1	CALIBER 1994	Ahmedabad	19-20th January, 1994
2	CALIBER 1995	Hyderabad	10-12th February, 1995
3	CALIBER 1996	Vadodara	15-17th February, 1996
4	CALIBER 1997	Patiala	6-8th March, 1997
5	CALIBER 1998	Bhubaneswar	4-5th March, 1998
6	CALIBER 1999	Nagpur	18-20th February, 1999
7	CALIBER 2000	Madras	16-18th February, 2000
8	CALIBER 2001	Pune	15-16th March, 2001
9	CALIBER 2002	Jaipur	14-16th February, 2002
10	CALIBER 2003	Ahmedabad	13-15th February, 2003
11	CALIBER 2004	New Delhi	12th-14th February, 2004
12	CALIBER 2005	Kochi	2nd- 4th February, 2005

13	CALIBER 2006	Gulbarga	2-4th February, 2006
14	CALIBER 2007	Chandigarh	8-10th February, 2007
15	CALIBER 2008	Allahabad	28th Feb. – 1st March, 2008
16	CALIBER 2009	Pondicherry	25-27th February, 2009
17	CALIBER 2011	Goa	2-4th March, 2011
18	CALIBER 2013	Gandhinagar	21-23rd March, 2013
19	CALIBER 2015	Shimla	12th -14th March, 2015
20	CALIBER 2017*	Chennai	2-4th August, 2017

*going to be held on 2-4th August, 2017 at Anna University Chennai.

CALIBER 1994

CALIBER 1994 was the first CALIBER, occurred during 19-20th January, 1994. It was held at Ahmedabad and attended by 170 delegates from all over the country. The theme of the convention was "Library Automation".

CALIBER 1995

CALIBER 1995 was held at the University of Hyderabad. It took place during 10th to 12th February, 1995. Issues related to the topic, "Information Access through Networks" were discussed and attended by 200 library and information professionals. CALIBER 1995 was improved in certain ways based on the experience from CALIBER 1994. The convention made some recommendations from which most of them were implemented.

The Convention recommended that:

a) INFLIBNET, which was rightly envisaged as a significant investment of the country towards enabling wider and easier access to information for and in the centers of higher learning and research all over the country should be fully supported.
b) Funding of the INFLIBNET by the UGC and Ministry of Human Resource Development should be enhanced in keeping with the legitimate demands of the modernization of libraries and the development of library networks in the country.

c) In view of increasing awareness of the need for the library networks and eagerness to participate in the development of such networks by users, institutions of higher learning, and the government at the centre, state and local levels should encourage investments in the development and promotion of networks and information access through networks.

d) The management of institutions of higher learning should recognize the importance of modernizing their libraries and appropriately investing to enable the objectives of INFLIBNET for the computerization and networking to be fulfilled.

e) Recognizing the importance of sensitizing and training of managerial, supervisory and operational staff at all levels to the technology of networking and managerial dimensions of the application of new technologies, INFLIBNET in association with other bodies should organize suitable awareness generation and training programmes at various levels.

f) INFLIBNET with other bodies should devise appropriate programmes and project to enable centers of higher learning to improve their capabilities to access and handle new information source and system.

g) Keeping in view that networking requires conformity to mutually agreed standards, INFLIBNET standards which have evolved through wide consultations on a national scale should be adopted by libraries in centers of higher learning. However standards are dynamic and INFLIBNET should monitor their developments and also ensure that problems faced by libraries in centers of higher learning in implementing these standards are addressed through appropriate method.

h) INFLIBNET and institutions of higher learning should take note of the trends in the world towards a distributed networking. Investments in technology and adoption of standards should be done with a perspective for distributed networking. Investment in technology and adoption of standards should be done with a perspective for distributed networking and distributed access to information products and services. This will enable even those in remote areas of the country to have efficient access to information needed by them.

i) INFLIBNET, which is truly a national endeavour, should involve all sectors of the government and not just the UGC. Investments in fulfilling the goals of INFLIBNET should come from local, state, central governments and other bodies.

CALIBER 1996

CALIBER 1996 was held at Smt. Hansa Mehta Library, Maharaja Sayaji Rao University of Baroda, Vadodara during 15th – 17th February, 1996. The topic of the convention was "Library Database Management". Over 220 library professional gathered for this convention. Total 54 papers were submitted in this convention among which 20 papers were from woman professionals which is very much noteworthy. This convention framed 16 recommendations which are as follows:

a) INFLIBNET should, as far as possible, provide support for purchase of Pentium and other State-of-the-Art technology in computer and communication fields. It should provide facilities for accessing GIST cards for Indian database.
b) INFLIBNET should train at least two professionals from the library and one from the computer center.
c) All libraries should adopt standards laid down by INFLIBNET programme for data capturing. Individual libraries should take prior permission of INFLIBNET to use software of their own choice, to encourage uniformity in the country.
d) INFLIBNET should create data conversion programme for integration of databases of various libraries.
e) INFLIBNET should promote projects to identify new libraries to concentrate on database creation in Indian languages such as BHU for Sanskrit, AMU or Osmania University for Urdu. Tamil University for Tamil languages, etc. and come up with a software package for creating databases for Indian languages.
f) For the purpose of developing a common union catalogue of books, it would be helpful if INFLIBNET can pool all the documents having ISBN since 1969 and develop a database using the ISBN system. All the Universities should provide details of document having ISBN to INFLIBNET programme for developing union catalogue of books using ISBN system.

g) The UGC/INFLIBNET may be requested to issue directions to the state universities to take immediate step to fulfill the sanctioned post of computer/information scientist under the INFLIBNET Programme with a view expedite automation and library database creation activities. The facility should be continued till the end of 8th Plan and later also in the 9thPlan of the UGC.

h) INFLIBNET should develop a multimedia teaching kit to database creation for libraries and provide access to it for all participating libraries in the INFLIBNET programme.

i) INFLIBNET should promote action towards facilitating INTERNET connectivity to all libraries and also help access INTERNET.

j) INFLIBNET having a National Mission for promoting academic library system, should coordinate with NISSAT and other national system such as National informatics Centre, NEW Delhi, INSDOC, DESIDOC, etc. to develop a national union catalogue for in-line access and other common areas of interest to university and academic world.

k) INFLIBNET should provide continuous training programme for university library staff on modern information handling tools such as Optical Character Recognition (OCR) and other imaging systems, Expert systems for cataloguing and On-line Public Access Catalogues (OPAC), etc.

l) INFLIBNET in collaboration with appropriate organization/institution in India such as DRTC, INSDOC, etc. should organize short training programmes and workshops on information analysis, knowledge organization, and vocabulary control with practical exercise. This can enhance the use and usefulness of databases and quality of retrieval of information and records from library databases.

m) Courses/Programmes designed to promote the application of information technology in information centres and libraries should include an emphasis on quality and quality assurance concept, methods and techniques in handling information products, services and management of information centres and libraries.

n) INFLIBNET and NISSAT are promoting the use of Micro CDS/ISIS. There are several PASCAL utilities and interfaces available in India that enhances the capabilities and user friendliness of Micro CDS/ISIS distributed by UNESCO. INFLIBNET and NISSAT can jointly promote the use of and make accessible to users in India, these PASCAL programmes along with related manuals and write ups.

o) In order to encourage sustained software development for library databases, every library should be encouraged to create a special software development fund at least 20% of the hardware cost. This fund should be utilized for interactive development of software packages by library and computer scientist.

p) In order to facilitate sustained software development for library databases, in all regions of India, the UGC and MHRD should immediately plan to develop five regional centres of INFLIBNET through India. Such regional centres should provide adoption of National Standards for library databases and networking facilities. They should also encourage training in the computer and networking. Services of several existing National Centres in different regions such as DRTC, INSDOC, NCST, NIC, etc. can be utilized.

CALIBER 1997

CALIBER 1997 was organized by INFLIBNET Center in association with Thapar Institute of Engineering and Technology in Patiala. It was held during 6^{th} – 8^{th} March, 1997. The main theme of the convention was "IT Application in Academic Libraries in India: With Emphasis on Network Service and Information Sharing." More than 225 participants graced this convention and a total of 68 technical papers were presented in three technical sessions. CALIBER 1997 made the following recommendations:

a) INFLIBNET should established regional centres as stated in its original scheme and also stressed by the INFLIBNET Review Committee. The Regional Centres should act as a Resource Centres and provide Guidance, Training and other technical support to the participating libraries of the respective regions. They will also maintain database of holdings of the region and other important databases of holdings of the region and other important databases of common interest.

b) INFLIBNET may plan to provide 64kbps VSATs to each university library for the networking, resource sharing and for accessing INTERNET.

c) Libraries must lay greater emphasis on development of need based indigenous databases including their holdings.

d) At present there is no organized system to know about the ongoing research projects handled by researchers in the university system. University libraries should initiate and organize these resources and make them available through the network.

e) Training is needed to access INTERNET and retrieve desired information in minimum possible time. INFLIBNET may coordinate and arrange on-site training for library professionals in this regard by identifying University? Research Libraries where INTERNET facilities are available.

f) University libraries should try to procure image processing systems like scanners for effective storage and use of important collections including manuscripts.

g) INFLIBNET may take up the task of mirroring useful INTERNET sources like "Course Wave" enabling easy access with-in the country.

h) INFLIBNET can start subject-wise forum for interaction among academicians/ Researchers through e-mail. It may identify institutions to act as coordinators for different fields of specialization.

i) It is necessary to formalize modus operandy for free flow and exchange of information among libraries. Priority should be given to resource sharing and creation of regional periodical holdings to minimize duplication in subscription to costly periodicals.

j) UGC may provide recurring grants as part of 9^{th} Plan development allocation for the Universities. This may be provided separately to the libraries that may have been given grants under INFLIBNET programme.

k) Some Universities could not utilize the funds for various reasons under non-recurring grants. They may be allowed to spend unutilized grants in the next two years as a special case.

CALIBER 1998

CALIBER 1998 was the fifth in the series. It was organized by the INFLIBNET centre in collaboration with Department of Library and Information Science, Utkal University, Bhubaneshwar. The main theme of the conference of was, "Information Management in Academic and Research Libraries". A total of 71 papers were submitted to this convention.

CALIBER 1999

CALIBER 1999 was at Nagpur in collaboration with University Library, Nagpur University. It was the sixth convention in the series, it was held during February 18-20, 1999 which coincides with the Platinum Jubilee celebration of the host university. The main theme was "Academic Libraries in the INTERNET Era". CALIBER 1999 points out five recommendations as follows:

a) Access to INTERENT be taken up by the INFLIBNET /UGC as the area of top priority and that to being with, each University Library in the Country be provided with independent VSAT along with its accessories.
b) Taking cognizance of the fact that content relating to India is lacking on the INTERNET, the convention calls upon the INFLIBNET "to identify Libraries and Information Centers with sources of information relating to India, and to encourage and enable them to input the same on INTRANETS and INTERNET, after creating Web-sites and appropriate search engines".
c) Recognizing the key-role of education and training in imparting necessary skills in handling information in its new formats, the Convention recommends to the INFLIBNET "to identify select Library and Information Science Departments in different parts of the country for the purpose of providing them the necessary infrastructure to educate and train the novice and the existing staff in the technique of handling information technology".
d) Emphasizing the fact that Libraries and Information Centers exist to serve the community, this Convention calls upon them "to initiate programmes for educating their users in making effective and purposeful use of electronic media,

including the INTERNET, for accessing information of their interest and choice".

e) Expressing concern over the non-provision of recurring grants to such university libraries which were initially provided with grants to modernize themselves, this convention calls upon the INFLIBNET/UGC "to make provision for annual grants to maintain their existing infrastructure and to add on to the same to remain up-to- date".

CALIBER 2000

CALIBER 2000 was held during 16th – 18th February, 2000. The convention was hosted by University of Madras. CALIBER 2000 was the seventh convention in the series. The main theme of the convention was "Information Services in a Networked Environment in India". The convention was attended by more than 325 delegates representing various institutions from different part of the country. A total of 122 papers were contributed by various author for presentation in the technical sessions. The number of paper submitted in CALIBER 2000 is almost double the number of papers in the previous conventions. Following are the recommendations of CALIBER 2000:

a) Recognizing the need for developing adequate infrastructure for networking, the Convention recommends that UGC through INFLIBNET should initiate immediate action for networking of universities through a VSAT Network with Internet connectivity. It further recommends that as a complementary effort, universities should establish campus-wide INTRANETs to extend networking facilities to all concerned.

b) Realizing the importance of e-content creation for the efficient and effective utilization of the network and in view of the availability of the required infrastructure already provided by the INFLIBNET, the Convention strongly urges university libraries to develop databases of their own resources in the prescribed formats and of acceptable quality.

c) Recognizing the absolute need for and importance of sharing resources with other libraries/institutions. CALIBER-2000 strongly recommends that it should be a

mandatory obligation on the part of all participating libraries to make available their resources and services to all network users.

d) Realizing the importance of resource sharing through networks, the Convention recommends that INFLIBNET should take immediate action to form a consortium of academic libraries to avoid costly duplication of resources in the country. It is further recommended that UGC/INFLIBNET should constitute a mechanism for:
    i. identification and acquisition of resources to be made available over the network
    ii. examining the financial, legal and technological implications and identify appropriate solutions for sharing of resources over a network.

e) Recognizing the need for providing effective software at an affordable price, this Convention urges the INFLIBNET to explore the possibility of introducing/implementing a one-time licensing policy with reference to SOUL with a provision for use in universities and government aided institutions/library networks and systems. The Convention further recommends that INFLIBNET/UGC should provide financial support to university libraries funded under the INFLIBNET programme till 1996-97 to upgrade/acquire hardware and software to enable them to use SOUL.

f) Realizing the dire need for developing Quality Information Manpower with knowledge and skills to effectively function in a Networked Environment, the Convention recommends that INFLIBNET/UGC should identify certain university departments of library and information science in each region and develop them as Centres for Excellence with a mandatory provision that they should design and conduct training programmes for trainees.

CALIBER 2001

CALIBER 2001 was held at Pune in collaboration with University of Pune during March 15-16, 2001. The main theme of this convention was *"*Creation and Management of Digital Resources". This convention was attended by more than 250 delegates from various parts of the country. Total 84 papers were contributed for the convention which was presented by their respective authors. Two pre-convention tutorials on the topic

"Development of Databases in Indian Languages" and "Metadata" were conducted during the convention. This convention put up several resolutions which were accepted by INFLIBNET for implementation.

CALIBER 2002

CALIBER 2002 was organized in collaboration with University of Rajasthan during 14th – 16th February, 2002. This convention was attended by two hundred and sixty two library and information professionals from all over the country. The main theme of CALIBER 2002 was, "Internet Engineering for Library and Information Centres". Around 50 papers were presented by the authors on four technical sessions. CALIBER 2002 made a recommendation which were categorized separately for Librarians, INFLIBNET and UGC.

Recommendation for Librarians:

a) With a view to bring all the universities into the mainstream of automation, this Convention calls upon the librarians to:
    a. Frame time bound programme for database creation, latest by 2005.
    b. Acquire and access material in electronic form, particularly the reference sources available in public domain.
    c. To acquire necessary skills to exploit increasingly the potential offered by Internet access.
b) Considering the rapid development in the field of information technology, which has influenced libraries and library services, this Convention implores the Departments of Library and Information Science in the country to upgrade the curriculum on the lines suggested by the UGC.
c) The Convention calls upon the librarians engaged in content creation to evolve effective security systems for data protection, especially of indigenous origin.
d) With a view to conserve the already scarce resources, the Convention advises librarians to resort to consortia approach wherever feasible.

Recommendations for INFLIBNET:

a) Considering that the SOUL as developed by INFLIBNET meets more or less all the requirements of the library management, the Convention recommends that INFLIBNET should ensure:
    a. marketing of the SOUL in an aggressive manner all over the country;
    b. provide a mechanism for support service;
    c. institute diversified training facilities through Regional Centers, to be set up for the purpose;
    d. develop SOUL by incorporating the suggestions received from its users and provide more features in it;
    e. incorporate the provision for creating databases of material in regional languages.
b) Considering the need to bring college libraries located in rural areas at par with their counterparts in urban areas, this Convention recommends that special attention needs to be paid by providing them necessary infrastructure, and training facilities.
c) Taking note of the fact that, only about 50% of the university libraries in the country have been covered under the INFLIBNET Programme. This Convention emphasizes the need to take rest of them under its ambit.
d) Since many agencies, such as NISSAT, NAAC, NASSDOC, DELNET are involved in creating Databases of Experts, this Convention recommends to INFLIBNET to coordinate these efforts to avoid duplication.
e) Since the document delivery service expected from the Document Delivery Centres, is not widely known in the academic circles due to lack of publicity and support, the Convention calls upon the INFLIBNET to give wide publicity to this service and provide backup grants for the purpose, and increase the number of Document Delivery Centres.
f) The Convention recommends the establishment of INFLIBNET Regional Centers in different parts of the country for the purpose of helping the libraries in the region in computerization and creation of specialized databases, and for manpower development.

g) Considering that printed sources of information, periodicals in particular, are the main stay for study and research, the Convention recommends that the INFLIBNET identify Resource Centres for supplementing their collection.
h) This Convention recommends to INFLIBNET to sponsor series of lectures on specialized topics of the day, viz. Intellectual Property Rights, Knowledge Management, and on other developments related to library and information services.
i) Promote training Programmes specially targeted at the use of Internet.

Recommendations for the UGC:

a) Considering the fact that majority of university libraries have vacant positions of university librarians, which is hampering their growth as well as the pace of modernization of libraries, this Convention calls upon the UGC to ensure that the top posts in the university libraries are filled up by March, 2003 positively, which is the time limit set by the NAAC for accreditation.
b) Taking into account the ageing of infrastructure provided to some of the university libraries more than half-a-decade back, this Convention calls upon UGC to provide such libraries necessary funds to replace obsolete equipments.
c) The Convention implores the UGC to be prompt and regular in the release of non-recurring and recurring grants.
d) Taking note of the fact that adequate bandwidth for surfing Internet is a problem in many parts of the country, the Convention recommends that the emerging UGC Net is provided with sufficient bandwidth for accessing enormous data which is available and will be generated as more and more libraries come under the purview of the Network.

CALIBER 2003

CALIBER 2003 held at Nirma Education and Research Foundation during 13th – 15th February, 2003. This convention was the tenth convention in the series and it was attended by a total of 316 participants. CALIBER 2003 was the first international CALIBER as well. In this convention besides the Indian participants numerous delegates

from foreign countries such as USA, Philippines, UK, Sri Lanka and Bangladesh also attended the convention. The main theme of CALIBER 2003 was, "Mapping Technology on Libraries and People". Total 67 full-text papers and 37 abstract were accepted for publishing.

CALIBER 2004

In 2004, CALIBER was held at Jamia Millia Islamia. The convention was attended by more than 240 national and international delegates. The main theme of the convention was "Road Map to New Generation of Libraries using Emerging Technologies". Total 78 technical papers were accepted for publication in the proceedings.

CALIBER 2005

The convention was hosted by Cochin University of Science and Technology. It was the 12th CALIBER and third international CALIBER. It was attended by more than 280 delegates from India and abroad. The main theme of the convention was "Multilingual Computing and Information Management in Networked Digital Environment". The convention consists of five technical sessions under four topics respectively. Eighty Six papers and a number of abstract were published in the proceedings. Recommendations and Resolutions of CALIBER 2005 are as follows:

For UGC

a) There was a unanimous view that the UGC-Infonet and E-Journal Consortium activity is being well piloted and executed by INFLIBNET (UGC). The role of INFLIBNET was greatly appreciated and admired. Further it was suggested to extend the facilities to Colleges across the country, including multi-campus Universities, by releasing adequate funds.
b) There is also an urgent need to create awareness of IT based training and automation among the school libraries which may be entrusted to INFLIBNET.
c) Institutions and Industrial R&D Units etc. may also be included as Members through a MOU by INFLIBNET for extending these facilities.

d) INFLIBNET may be entrusted with higher responsibilities relating to content creation and management by way of coordinating with CEC, ERNET and other agencies in the E-learning programmes.
e) A Multilingual Database must be created.

For INFLIBNET

a) Large number of training programmes for creating awareness among the information seekers in academic R&D and Industrial sectors be conducted by involving institutions.
b) Issues relating to Digital Libraries/current topics of interest be organized as tutorials in the CALIBER to facilitate the participants with more understanding.
c) Keeping in view the growing demand, the SOUL Library Software developed by INFLIBNET (UGC), be extended beyond the geographic territory of India.
d) Critical studies relating to utilization of the Bandwidth and E-Journals provided to the Universities may be taken up on regular basis and thereby help the system for effective performance.

For Universities and Colleges

a) Expedite bibliographic data in the machine-readable form for adding it to the national union database maintained at INFLIBNET on regular basis.
b) Data relating to Ph.D. theses be supplied on continuing basis without any interruption to the National Union Database created at INFLIBNET.
c) SOUL Library related issues be addressed to list groups created by INFLIBNET for quick services.

CALIBER 2006

CALIBER 2006 held at Gulbarga University, Gulbarga during 2nd – 4th February. It was attended by more than 500 delegates from within and outside the country. The main theme of the conference was, "Dynamic Interoperable Web based Information Systems". About 150 research papers were presented and deliberated during the convention.

Resolutions and Recommendations:

a) Information portals are gateway to the wealth of modern information. It is important for librarians in the modern era to be comfortable in using and managing a library portal. It is also proposed that Library School, Professional Organisations like INFLIBNET should act upon the implementation of the proposal.
b) It was proposed that Information Literacy should be an integral part of educational curriculum at all level of institutions as well as the LIS curriculum.
c) Awareness on the use of UGC-Infonet Consortium with respect to accessing e-journals is increasing among the academic community, but its optimum usage has not been achieved due to lack of teaching and research faculty. It was further resolved that UGC-Infonet Consortium should be made available to all universities and colleges of the country and especially to those located in rural and remote areas.
d) It was recommended that digitization of doctoral theses at the university level should be encouraged with the financial assistance from the UGC.

CALIBER 2007

For the fourteenth times in the series and fifth times as an international convention CALIBER 2007 was held at Chandigarh in collaboration with Punjab University during 8th – 10th February, 2007. A total of 400 delegates from within and outside India participate in the convention. The theme of CALIBER 2007 was, "Information and Knowledge Management in Networked World". A total of 160 papers were received for the convention out of which 76 full-text papers and 40 abstracts have been selected for presentation.

CALIBER 2008

INFLIBNET organized the CALIBER 2008 at the Allahabad city in association with University of Allahabad during 28th February to 1st March, 2008. CALIBER 2008 was the 6th International CALIBER. It was attended by more than 400 delegates including 14

delegates from overseas. The main theme of the convention was, "From Automation to Transformation".

CALIBER 2009

CALIBER 2009 was held during 25th - 27th February, 2009 at Pondicherry University. The convention received 240 papers out of which 70 papers and 110 abstracts were selected for publication in the proceedings. A total of 275 delegates registered for this convention. Major recommendations resolved during the Convention that need to be address are:

a) The generation of e-content and its availability is an important activity for all academic institutions. All institutions should pay attentions to the aspect of e-content creation and creation of inter-operable digital repositories.
b) Many academic institutions are generating textual as well as multimedia content in analogue format. They should make efforts to convert such content into e-content.
c) The increased bandwidth is a necessity for the universities / institutes and their libraries for optimal use of free or fee-based digital resources. Institutions should work towards getting additional bandwidth and necessary infrastructure.
d) Considering the high rates of techno-obsolescence, migration of digital objects from one media of storage to another, from one computer hardware to another, and from one format to another is a necessity to ensure that the digital objects are used. The digital library projects should provide for such migrations of digital content created under the project.
e) India should have National Digital Preservation Policy. The Committees set-up by the Ministry of Information and Communication Technology should prepare a white paper on the subject and draw implementation strategies for various stakeholders.
f) Ministry of Culture should review the existing Delivery of Books Act so as to incorporate delivery of digital publications.
g) The library and information professionals should be well aware of IPR laws and policies, and continue to update themselves regularly. They should ensure that

they are not violating any IPR laws and policies knowingly or unknowingly. The parent institutions should organize training programmes on IPR issues for LIS professionals and other users. The IPR Laws and Policies as applicable in libraries should also be covered in LIS curriculum;

h) Copyright laws of India should be appropriately amended to incorporate provision of digitizing rare & important publications by a library so as to make it accessible to its users.

i) The new technology has given opportunities to Librarians to create contents. The Libraries should concentrate on developing skills required for content creation. Universities and institutions have several documents that are "borne digital", for example Ph.D. thesis and M.Tech. Dissertations; Progress and technical Reports, etc. The Universities should make it mandatory for the Ph.D. / M.Tech. students to make their submission in digital format to strengthen their digital collections.

j) Development of a digital library is a collaborative effort. It requires a nodal agency to lay guidelines on standards and formats to be used to ensure compatibility and interoperability of digital objects for better resource sharing in digital environment and to avoid duplication in developing digital collection. The UGC/INFLIBNET, through appropriate committees, may provide guidelines, standards and formats to universities.

CALIBER 2011

CALIBER 2011 was organized by the INFLIBNET in collaboration with Goa University during 2nd - 4th March, 2011. The main theme of the convention was, "Towards Building a Knowledge Society: Library as Catalyst for Knowledge Discovery and Management". The number of registered delegates rises to more than 400. From over 220 submissions 62 papers were accepted for presentation and 120 for poster presentation. After enthusiastic deliberation of the various presentations, CALIBER 2011 made the following recommendations:

a) Develop knowledge portals to handle complex information requirements;

b) Subject-wise analysis of e-resources offered by the consortium may be provided to assess availability of e-resources in different subject domain;

c) Subject gateways are useful resources of information it provides a great insight into a subject. The INFLIBNET Centre may build such subject gateways targeting Indian content;
d) Development of subject portals may be assigned as topic of dissertation for the library and information science students;
e) The encoding of the open source software developed by the INFLIBNET should be made available on open platforms;
f) INFLIBNET's online copy cataloguing system is a very useful tool and needs more visibility by way of training programmes and other promotional media;
g) There is a need to extend online and copy cataloguing facility beyond SOUL, Koha and NewGenLib software; and
h) INFLIBNET and IGNOU may partner to develop content for "digital information literacy programme".

CALIBER 2013

CALIBER 2013 was organized at the new building of INFLIBNET at Gujarat from 21st – 23rd March, 2013. CALIBER 2013 was organized under the theme, "Library Vision 2020: Moving towards Future". A total of 200 submissions were accepted in CALIBER 2013 out of which 51 papers were selected for presentation and 23 papers were selected for poster presentation. CALIBER 2013 was graced by more than 300 delegates. Following are the recommendations of CALIBER 2013:

a) Librarians are the best knowledge managers as they assess technical know-how about organizing "Tacit and Explicit knowledge", as well as techniques of creating road map among various disciplines. Librarians are involved in the process of exploration the divergence in growth of knowledge and Segregation of specialization among different disciplines and developing the inter-connectivity among the various zones of knowledge. However, librarians must train themselves in the use if new tools and techniques of ICT.
b) It is inferred from the presentations of papers that the future libraries would require revised benchmarks for taking stock of the infrastructural facilities and services. In the context of growing assessment and evaluation process, especially

in the academic environment, formulation of the renewed parameters on benchmarking and the best practices in the context of emerging future libraries is envisaged. The convention hence resolved and recommended undertaking suitable steps in this context, and the institutions and the professionals should initiate proper actions in the matter. INFLIBNET should play a pivotal role in providing and delivering ICT based best practices.

c) The growth of information industry is quite visible now and the output of varieties of information and knowledge resources is on the rise. In this context it is recommended that suitable training programmes on "Information Literacy Programmes" be undertaken.

d) The last two decades have witnessed a tremendous growth of e-resources, in the form of e-journals, e-books, online databases, digital library consortia and so on. There is a need for concentrating on the "management of e-resources" and the programmes and course on the management of new kinds of information and knowledge resources should be focused more intensively than before. The convention recommended that INFLIBNET Centre should design specialized training programmes in this context to prepare the LIS professionals for the future.

e) There is a growing impetus on the availability of OSS and open access resource mobilization like IRs and self-archiving. The deliberations in the convention revealed that the pace of building IRs is moderate and sporadic. As such, there is an urgent need to initiate suitable actions to intensify building Open Access Resources at all levels and in all sectors viz., education, industry and government. This will provide proper visibility to such efforts and would encourage collaboration among different sectors for mutual sharing of the resources.

CALIBER 2015

CALIBER 2015 was organized in collaboration with Himachal University and Indian Institute of Advance Studies, Shimla. The main theme of the convention was, "Innovative Librarianship: Adapting to Digital Realities". A total of 194 papers were submitted for this convention out which 57 were selected for presentation and 50 papers were selected

for poster presentation. More than 250 delegates registered for this convention. Following are the recommendations of CALIBER 2015:

a) The quality of higher education in India can be improved using e-learning platforms. The INFLIBNET Centre should convert its e-PG Pathshala content into MOOCs environment in association with universities and research institutions. Moreover, content should also be created on traditional and ancient knowledge of India on various subjects.

b) The INFLIBNET Centre should conduct studies on Return on Investment (ROI) in Indian environment. Moreover, the Centre should also set-up policies and parameters for benchmarking of libraries and information centres in universities, research institutions and institutions of national importance.

c) India should have a well-defined anti-plagiarism policy to improve quality of higher education and research in India. The Centre should launch plagiarism literacy campaign in universities and research institutions and mandate submission of electronic version of theses and dissertations into Shodhganga and other ETD repositories only after content of doctoral dissertations are subjected to plagiarism detection software.

d) Library & Information Centres should increasingly use social networking sites to connect to their clientele and involve them in designing library services and activities.

e) Funds for research should be allocated to universities based on their research performance. As such, benchmarking among research intensive universities should be done regularly and funds should be allocated only to research intensive universities for furthering their research and development activities.

f) MHRD must set-up a National Research Evaluation Programme at national and institutional level. The universities and other educational institutions should be encouraged to carry out in-house research evaluation to measure impact of their research programmes and adopt these measures for resource allocation within universities.

g) Tools and techniques of altmetrics should be deployed by LIS personnel to measure impact at articles level within an organization. These tools and

techniques should be embedded into institutional repositories and content management systems facilitating authors to view impact of their research work.

h) India as a nation should endorse open access (OA) policy and mandate submission of research articles into institutional repositories in every universities and research institute.

i) Tenets on digital preservation and archiving should be adopted at national level. Various methods of digital preservation such as local archiving, LOCKS, CLOCKSS and Portico may be deployed as archival solution.

j) The INFLIBNET Centre should come up with a model national license agreement for e-resources to strike a balance between the interests of publishers and libraries. Libraries should get their license agreement vetted by Legal Cell of their parent organisation before signing the license document.

k) The LIS professionals should redefine their role in the changing scenario and contribute proactively towards building world-class universities, influencing policy decisions, providing proactive help to researchers for research funding and reaching out to the unreached mobile applications.

CALIBER 2017

CALIBER 2017 is going to be held at Anna University, Chennai on 2nd – 4th August, 2017. The main theme of the convention is, "Re-Envisioning Role of Libraries: Transforming Scholarly Communication". A total of 52 papers were accepted for presentation.

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2.1 Introduction

Science cannot be based on mere assumptions it requires critical evaluation with scientific research method. Many attempt of scientific breakthrough have failed because of lack of scientific proves and least complex research techniques. Several notions the society entertain for the time being though may not be scientifically correct it is very difficult to change that thought, from the time of Galileo's theory on the solar where all the other planets orbit the sun, it was very difficult to change the concept which the society believes for the time being. In other words we can assume that mankind curiosity is demanding the right proof in order to change his believe. Science is not changing believes the whole time but scientific method of study is finding the right alternative for incorrect believes of man regarding his environment. Many subjects under the universe of knowledge have a scientific way of proving things included under its study. The study of Librarianship which in the beginning was regard as a simply form of study may not be far wrong for the time being but the study is gradually developed with several research and inter-disciplinary research performed by various intellectuals in the field. The subject have been improved in several ways and bringing out a scientific and more complex way of performing research is one of the outcome of such improvement. Bibliometric is a research method in Library and Information Science which involved mathematical and statistical methods. It is a culmination of several attempts to quantitatively and qualitatively analyze research literature. It is increasingly attracting the attention of researchers and others LIS professionals. Its implication of complex calculations and mathematical method has made it more and more accepted world-wide. Bibliometric test the impact of a research publication in various ways. Research implies heavy expenditure and public money have been utilized to support these researches. So, it is very important to know the impact of a research work. Bibliometric can be used to identify the impact factor of a journal. The central theme of Bibliometric is literature study it involves several methods which could be applied to the test a given literature in several ways.

Patra, Bhattacharya and Verma (2005) conducted a study on the growth of literature in the field of Bibliometrics and observed that even though the growth of literature in this field does not show a regular pattern but it did grow. The study identified an exponential

grow during the 90swhich can be credited to the emergence of Bibliometrics as a new subject, it is a common phenomena for a new subject to attract more authors in its arrival.

2.2 Genesis of Bibliometrics

Bibliometric is not a concept which erupted out of nowhere, it is a culmination of several attempts to quantitatively analyse research literatures. In 1917 Cole and Eale count the research contributions of various countries in the field of Anatomy, in their study entitled '*The History of Comparative Anatomy, Part 1: A Statistical Analysis.*' In this study the expression *'Statistical Analysis'* was used and this work can be regarded as the first trace of *Bibliometrics.*

In 1923, Hulme came up with the phrase '*Statistical Bibliography*' while preparing a rank list of countries in term of scientific productivity during 1900-1913. The same terminology was repeated by Heckle in 1938 in his paper entitled *'The Periodical Literature of Bio-Chemistry'* and it was repeatedly used until the late 1960s. However the term *'Statistical Bibliography'* did not caters the intension of this specific research method.

In 1948, Dr. S. R. Ranganathan came into the limelight by coining a new term *'Librametry'* with a view to introduce statistical measures in examining the library services as well as the resource. Librametry can be regarded the first least vivid picture of bibliometric, it encompasses some certain concept of bibliometrics which is still valid in the fields of research.

In 1969, Alan Pritchard came up with the term *'Bibliometric'* and he went on to define it as "The application of mathematical and statistical methods to book and other media of communication." The term *'Bibliometrics'* began to be accepted worldwide.

2.3 Definition of Bibliometrics

Several attempt have been made to define the term *'Bibliometrics'* and several definition did exist, some of the definition framed by various individuals are

a) Alan Pritchard defined Bibliometrics as, “The application of mathematical and statistical methods to book and other media of communication.”
b) Fairthorne defined Bibliometrics as, “The field of Bibliometrics is the quantitative treatment of the properties recorded discourse and behavior pertaining to it.”
c) Ravichandra Rao defined Bibliometrics as, “Bibliometric is understood to cover the study of statistical distribution of the process relating to the activities of library staff and readers.”
d) J.M. Britain defined Bibliometrics as, “The study of nature, use and non-use of documents only. It deals only with the document that is the unit of analysis is the document and its characteristics. It does not deal with users and his needs.”
e) Bonitz defined Bibliometrics as, “Bibliometric is a methodological sub-discipline of Library Science, including the complex of mathematical and statistical methods, used for analysis of scientific and non-scientific documents, library networks, indexing languages information systems, communication systems, etc.”
f) In an attempt to explain the term Bibliometrics, the British Standard Glossary of Documentation framed the following, “Bibliometrics is the used of documents and patterns of publication in which mathematical and statistical methods have been applied”.
g) Potter defined bibliometrics as “the study and measurement of the publication patterns of all forms of written communication and their authorship.”
h) Schrader defined bibliometrics in a most simplest form by framing, “Bibliometric is the scientific study of recorded discourse”.
i) Sengupta defined Bibliometrics as, “Organisation, classification and qualitative evaluation of publications along with their authorship by mathematics and statistical calculus.”

The above given definition clearly advocate that Bibliometrics is an area of Library and Information studies which uses the multifaceted mathematical and statistical methods in order to weigh up the bibliographical attributes of a document. Scientometrics and Bibliometrics are used synonymously but there are minute differences between the two. Bibliometrics is primarily extended to the evaluative

studies of a published literature with a view to indentify the characteristics of the document while Scientometrics normally studies the subject of the publication. In a growing ITC environment World Wide Web have become an integral part of our day to day lives. Scholars around the world are tune in to the internet domain to quench their thirst for information and in this case Webometrics have been developed webometrics, it have a common concept with Bibliometrics or Informetrics but its scope may be restricted only to the World Wide Web.

2.4 Types of Bibliometrics

Bibliometrics can be divided into two areas as:

Productivity Count (descriptive):

This can be regarded as the simplest method in Bibliometrics. Research Literature produced by a scientist or a group of scientist, countries and institution is counted. The purpose of this method is to study the degree of productivity in the scientific community. Productivity count is an important method to identify the growth of subject as a whole or a particular area within a subject. Productivity count is an important part of bibliometric study, the first trace of bibliometric study was confined to productivity count of literature in the field of anatomy which was performed by Cole and Eales. Productivity count can also result to decline in the production of a particular subject as well as geographic locations which will ultimately indicates the degree of relevance of a particular subject among the research community or the society as a whole. Research production is counted of the basis of three heads:

a) Geographic (Countries): Research productivity of a particular geographic area is counted. It is an important task to know the level of activeness of countries or states within a country in research productivity. This category can also be extended to institutions of several kinds. Identifying the rate of productivity at institutional level is an important measure to highlight the research environment prevailing in the particular institution.

b) Time period (Era): Research literature produced within a given time is counted. Under this category research publications are counted corresponding to their time period. Very often it can be noted that rate of research publication tends to increase whenever a new area is introduced. Certain subject or area within a subject attracted more researchers at time of their introduction. Counting publication could be further used to determine obsolesce of a particular literature.
c) Disciplines (Subjects): Research publication produced for a given subject is counted under this head. The sole purpose of this count is to identify the growth and decline of a particular subject. Every subject has the possibilities of both growing and declining and every subject does not does not have the same share on research output. There are some subjects or areas within a subject which have fair amount of research literature in its name and there are some areas or subject which does not entertain researchers at all. Productivity count based on the subject creates a clear delineation between those subjects which are followed by the researchers and those which are not.

Literature Usage Count (Evaluative)

Literature used for references are counted under this head. Evaluative of references is an integral part of Bibliometric studies. References can be counted in multiple ways and means. References can be counted to identify the average number of references given per article. References are also counted with a view to evaluate the most prevailing form of document used for references. In the information era information exist in different format such as printed journals, e-journals, books, e-books, reports, websites, etc. Evaluative count of the form of document used for references is an important method to identify the prevailing form of document which is in used for references. Evaluative count of references is also intended to identify the frequently used journals which will structure a list of core journals used for references and the same method can be applied for other information source, the result of which can be an ideal base for libraries to enhance their collection.

2.5 Laws of Bibliometrics

One of the most important parts of Bibliometric studies is the laws which have been devised to evaluate a given problem in a more complex scientific ways. Bibliometric laws are very important to promote an ideal research finding. These laws till today draw to themselves multiple researchers. Research publications pertaining to bibliometric laws are increasing at a fair rate. Bibliometrics have several laws but the most prominent among them are Lotka's Law of Scientific Productivity, Bradford's Law of Scattering and Zipf's Law of Word Occurrence.

2.5.1 Lotka's Law of Scientific Productivity

This law was devised by Alfred James Lotka (1880- 1949) to find out the frequency of publication by authors in a given subject. This law describes the counting names and the number of publications. A general formula for the relation between the frequency 'y' of persons making 'x' contribution as "$x^n y$=constant" finding the value of the constant when n=2. He observed that the number of one person's making 2 contributions is about one-fourth of those making one; 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 percent and 15 percent will contribute two publications, 7 percent of the authors will contributes three publications and so on. Lotka suggested that once the number of authors contributing a single publication is known then the number of authors contributing two or more publications can be predicted.

2.5.2 Bradford's Law of Scattering

This law was formulated by Samuel Bradford in 1934. The law states that if scientific journals are arranged in order of decreasing productivity of articles on a given subject, they may be divided into a 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 $1:n:n^2$.... (Hertzel, 2003). Samuel Bradford suggested that list of journals arranged in decreasing order of productivity highlight the level of productivity of the journal as the journals with high productivity will come to the top and those with low productivity will goes to the bottom. Samuel Bradford, in his paper entitled *'Source of information on specific subjects'*

examined two bibliographies of journal articles in Applied Geophysics and Lubrication. He structured a list of 326 journals which contain articles pertaining to Applied Geophysics and the journals were arranged in order of decreasing productivity. The list was divided into 3 zones which approximately contain equal number of titles the zones are highlighted by blank line which leads to a result where journals contributing titles to each zone increased 5 times. The first zone increased by 9 journals contributed 429 articles, the second zone contained 56 journals contributed 499 articles and the third zone contained 258 journals contributed 404 articles (Tiwari, 2006, pp. 33).

2.5.3 Zipf's Law of Word Occurrence

This law was formulated by George Kinsley Zipf in 1935. The law states that in a long textual matter, if words are arrange in their decreasing order of frequency, then the rank of any given word of the text will be inversely proportional to the frequency of occurrence of the word. In other words, if 'r' is the rank of aword and 'f' is its frequency, then mathematically Zipf's law can be stated as r.1/f, or r.f=c where 'c' is a constant (Jena, 2012, p.51). This law has great significance in developing indexes.

2.6 Scope of Bibliometrics

Bibliometric studies are vested with the capability to analyse and identify important features embedded in research literature in multiple ways. It can be used to identify the descriptive characteristic of the literature pertaining to the responsible authority for the production of a literature as well as its geographic distribution and nature of the thought content. The study of authorship pattern of a literature is an integral part of bibliometrics. Authorship pattern can be studied with a view to highlight the productivity level of an individual as well as group of individuals. A Bibliometric study includes all those studies which identify the form of documents such as Books, Journals, Websites, etc. It involves study of a given literature in term of its year of publication and deciding its relevance and the frequency of its usage as a reference for bringing out another work. Bibliometric studies can be extended to the study of a literature to identify its link with the previously published literature of its kind. Matching the bibliographic details highlight the relationship between the current literature and the previous literature.

2.7 Techniques of Bibliometrics:

Bibliometric involves several techniques which can be studied as under:

2.7.1 Citation Analysis: Citation analysis means the study of cited documents of a given literature, in this regard the term citation and reference are concluded to be synonymous term. Citation analysis prevail the relationship between the citing document and the cited document and citation analysis is a study design to bring this relationship into the spot-light. K. P. Vijayakumar in 1997 framed the use of citation analysis as follows:

a) To lead the readers into further studies
b) For the preparation of Bibliographies
c) To study the use pattern of different types of documents.
d) To find out the relatives use of different languages.
e) To study the use of literature from different countries
f) To study the scattering of subjects
g) To decide the obsolescence rate of documents in different subjects
h) To determine the interdependence and lineage of subjects.
i) To prepare rank list of periodicals
j) To study the rate of collaborative research
k) For the analysis of scientific journals. (Vijayakumar, 1997)

2.7.2 Direct Citation Counting: Counting the number of times a given document is cited is called *Citation Count*. The primary objectives of citation count is to identify the use and validity of a given document, therefore it subsequently highlight the impact factor of a given document, a document which is cited frequently are considered productive whereas documents which are seldom cited are least productive. The term Impact Factor was coined by Garfield and defined the same as, "the ratio of the number of times a journal is cited in a given time period to the total number of times a journal is cited in a given time period to the total number of source items published in the journal during specified time period." The result of citation count reflects the impact factor of a journal after taking into consideration the age of publication as well as its size and frequency.

2.7.3 Bibliographic Coupling: Fano came up with the concept of Bibliographic coupling but it was Kessler who coined the term. When two documents cited a number of common references they are said to be bibliographically coupled. The bibliographically coupled documents are presumed to have a relationship in one way or the other. In this regard citations can serve as a node thus creating a network of inter-related knowledge.

2.7.4: Co-citation: When a pair of document is cited together in a given literature it is called co-citation. A Pair of documents which are frequently cited together can be assumed to be closely related to each other. A study on co-cited documents can bring to light the subject specialties and sub- specialties, further studies over a period of time.

2.8 Use of Bibliometrics in Libraries

Application of Bibliometrics in Library practice is noteworthy. Bibliometric study identifies the degree of usage of journals, the result of which can be used by the libraries to identify the most ideal journals to subscribe. Since bibliometric is not limited to published journals alone, it can utilized in several other form of literature thus making bibliometrics more accountable in library practice. Collection development based on bibliometric data which comprised of publication count, citation count, etc. can help to pile up the most valid documents of the time. Depending on the intention of the researcher bibliometric studies can provide the sustainability and effectiveness rate of a given literature using definite parameters. So, findings of bibliometric analysis can be utilized as a predefined parameters for libraries to enhance their collection development strategies In the modern era multiple information can be retrieved from the world wide web and still bibliometrics have provision for measuring these information that exist in the internet domain using its webometric techniques.

2.9 Conclusion

Bibliometrics is a long yearn area in the fields of library and information science. It has developed itself through the passage of time and today it has become one of the most important fields of study in Library and Information Science. Literature on Bibliometric is increasing at a fair rate and it is fair to assume that its inclusion of mathematical and

statistical standards as well as its complexity in the method of evaluation is favored by researcher around the world. The realistic of applying results of bibliometrics analysis as a parameters for collection development in academic and research libraries have been widely acknowledged.

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